



27 SECEC-ESSSE CONGRESS

**EUROPEAN SOCIETY FOR SURGERY
OF THE SHOULDER AND THE ELBOW**

BERLIN 2017 • GERMANY

SEPTEMBER 13-16



SECEC-ESSSE

ABSTRACT & POSTER BOOK



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**Thursday 14 September**

MISCELLANEOUS - I

11:00 - 12:15

PAVILLON

11:00 - 11:08

9 How Do We Deliver Our Findings? Analysis Of Podium Presentations In Shoulder MeetingsJoan Miquel¹, Fernando Santana², Carlos Torrens²

1. Consorci Sanitari de l'Anoia, Igualada, Spain
2. Parc de Salut Mar, Barcelona, Spain

Aim

The aim of the present study is to evaluate the time structure of the oral presentations delivered in the most relevant shoulder congresses.

Background

Hundreds of oral presentations are held annually in orthopaedic forums, but few guidelines exist regarding the necessary elements needed to deliver an effective scientific presentation according to time distribution.

Methods

A total of 160 oral presentations held in the 2016 American Academy of Orthopedic Surgeons (AAOS) Annual Meeting, 17th European Foundation of National Associations of Orthopaedics and Traumatology (EFORT, 2016) Congress and in 13th International Congress of Shoulder and Elbow Surgery (ICES, 2016) were included. Podium presentations were categorized by topic, congress, inclusion of video support and nationality of the speaker. Total time and time dedicated to every section of the presentation was collected (introduction, methods, results, discussion and conclusions) for all podium presentations.

Results

33,8% of speakers exceed time constraints. Presenters consigned similar time for introduction, methods, results and conclusions ($p > 0,05$). However, when extended introductions are delivered, results and conclusions are shortened ($r = -0,2$; $r = -0,21$). Presenters who decided the inclusion of video support in their presentation tend to overtake time limits ($p < 0,01$).

Conclusions

One third of shoulder surgeons exceed time constraints in their conferences and make no distinct when allocating time in different sections of the presentation. Longer introductions may lead to time restriction in results and conclusions sections.



11:56 - 12:04

194 Brain Recovery Is Only Partial After Anterior Shoulder Stabilization

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Aim

The aim of the present study was to assess evolution of brain alterations in patients with glenohumeral instability before and one year after surgical stabilization.

Background

It is now that glenohumeral instability lead to brain remodeling. It is still unclear if shoulder stabilization allowed the brain to heal

Methods

13 patients with shoulder apprehension (30.03 ± 7.64 years) underwent clinical and fMRI examination before and one year after surgery for shoulder dislocation contrasting apprehension cue videos and control videos. Data analyses included task-related general linear model (GLM), voxel-based morphometry (VBM) of grey matter and tract-based spatial statistics (TBSS) of white matter.

Results

GLM results show decreased activation of the left pre-motor cortex for post-surgery vs. pre-surgery. Decreased in orbito-frontal activity predicts good recovery of shoulder function measured by STT.

Conclusions

Changes at the brain level also occur one year after surgery with however incomplete recovery.



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11:40 - 11:48

430 Sham Surgery For SLAP Lesions Of The ShoulderCecilie Piene Schrøder¹, Øystein Skare¹, Olav Reikerås², Petter Mowinckel², Jens Ivar Brox²

1. Lovisenberg Deaconal Hospital, Oslo, Norway
2. Oslo University Hospital, Oslo, Norway

Aim

To evaluate the effect of labral repair, biceps tenodesis and sham surgery for patients with SLAP-lesions of the shoulder.

Background

Labral repair and biceps tenodesis are routinely performed worldwide for superior labrum anterior posterior (SLAP) lesions of the shoulder, but evidence of their efficacy is lacking.

Methods

A double-blind, sham-controlled trial was conducted with 118 surgical candidates (mean age 40 years), with patient history, clinical symptoms and MRI arthrography indicating an isolated type II SLAP lesion. Patients were randomly assigned to labral repair, biceps tenodesis, or sham surgery if arthroscopy revealed an isolated SLAP II lesion. Primary outcomes at 6 and 24 months were clinical Rowe score ranging from 0 to 100 (best possible) and Western Ontario Shoulder Instability Index (WOSI) ranging from 0 (best possible) to 2100. Secondary outcomes were Oxford Instability Shoulder Score, change in main symptoms, EuroQol (EQ-5D and EQ-VAS), patient satisfaction, and complications.

Results

There were no significant between-group differences at any follow-up in any outcome. Between-group differences in Rowe scores at two years were: biceps tenodesis vs labral repair: 1.0 (95%CI -5.4 to 7.4), $p=0.76$; biceps tenodesis vs sham surgery: 1.6 (95% CI -5.0 to 8.1), $p=0.64$; and labral repair vs sham surgery: 0.6 (95% CI -5.9 to 7.0), $p=0.86$. Similar results were found for WOSI scores. Postoperative stiffness occurred in five patients after labral repair and four after tenodesis.

Conclusions

Labral repair and biceps tenodesis did not have significant clinical benefit over sham surgery for patients with SLAP II lesions in the population studied.



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11:48 - 11:56

64 Tenodesis Renders Superior Long-Term Outcomes For Isolated Supraspinatus Tears With Biceps Pathology In Younger Patients**Arnaud Godenèche**¹, Philippe Collin², Gilles Walch¹, Philippe Valenti³, Pierre Mansat⁴, Jean-François Kempf⁵

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2. Clinique Saint Grégoire, Saint Grégoire, France
3. Institut parisien de l'épaule, Paris, France
4. CHU de Toulouse, Toulouse, France
5. CHRU de Strasbourg, Strasbourg, France

Aim

To report clinical and radiographic outcomes 10 years following repairs of isolated supraspinatus tears, and determine whether outcomes were influenced by pre-operative biceps pathology or by adjuvant biceps procedures.

Background

Rotator cuff tears are frequently associated with biceps pathology, often addressed by adjuvant tenodesis or tenotomy, though there is no consensus whether selective or systematic biceps procedures improve outcomes of rotator cuff repairs.

Methods

The authors retrieved the records of all 511 patients that underwent repair of isolated supraspinatus tears by 15 surgeons. The patients were evaluated at a minimum follow-up of 10 years. We could not reach 188 patients, 39 were excluded because no information was documented on biceps status or adjuvant procedures and 35 were excluded because they were reoperated. A total of 249 patients (51% men) aged 56.7±6.3 years (range, from 46 to 72) were evaluated clinically, of which 182 were also evaluated using MRI.

Results

The biceps was pathologic in 129 (52%), of which 50 (39%) had a tenotomy and 70 (54%) had a tenodesis; it was found normal in 120 (48%), of which 106 (88%) were left intact. The post-operative Constant score was equivalent for patients with pathologic (77.7±12.0) or normal (77.5±11.7) biceps. When the biceps was pathologic, tenodesis was associated with better scores (79.8±11.5) than tenotomy (75.3±10.7) ($p=0.056$), particularly for patients under 60 ($p = 0.03$). The supraspinatus retear in 35 (19%) of the 182 shoulders evaluated using MRI, with no significant differences in retear incidence among patient that had tenotomy (16%), tenodesis (18%), or no adjuvant procedures (22%).

Conclusions

If found normal, the biceps could be left intact; while if found pathologic, an adjuvant procedure is recommended. Tenodesis yields superior functional outcomes for patients under 60, while for patients over 60 tenodesis and tenotomy yield similar functional outcomes.



12:04 - 12:12

164 Is Economic Evaluation In Orthopedic Surgery An Obstacle To Innovation? The Latarjet Procedure Example.

Christel Conso, Emmanuel De Thomasson, Olivier Guingand, Richard Terracher, Christian Mazel

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Aim

Technological progresses lead automatically to a reflexion about additional costs related to it. Arthroscopy has permitted complete changes of surgical indications and possibilities.

Background

We compared the cost of devices used during 5 classic Latarjet procedures an 5 arthroscopic Latarjet.

Methods

Both procedures were performed by the same surgeon. Structural costs related to the institution, weren't taken int account as weren't also medical and paramedical costs. The hospital belongs to private insurances and is financed by a case based payment related to Health related groups HRG.

We used the pharmacy inventory management software to account for average consumption. It is implemented by tracing the live consumption during the intervention by the nurse.

Results

The average cost of an open Latarjet procedure was estimated at 111 euros. The first expense is represented by the sterile surgical draping and the second by the angulated saw blade used to cut the coracoid process.

The average cost of an arthroscopic Latarjet represented 1351 euros. The first expense was the disposable ancillary for positioning the coracoid process, the two canulated screws, the coagulation device, the shaving device and the burr.

The surgical treatment of instability is linked to the same health related group wether it's an arthroscopic or an open procedure meaning a payment of 2581,55 euros per case for the institution.

Conclusions

The mere economic vision of an innovation can lead to limitations to its diffusion.

The patient's benefit needs to be studied and put forward. Reflection remains essential on the design of ancillaries, shaver handpieces, re-usable electrocoagulation probes, economic reflection must also be a source of innovation. The obvious profitability of out patient open Latarjet intervention must be able to serve its arthroscopic version. The surgery of the rotator cuff has become a very arthroscopic procedure despite increased costs compared to the open one, why not arthroscopic Latarjet ?



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11:16 - 11:24

218 Analysis Of Complications After Arthroscopic Stabilization Of Chronic AC-Joint Instabilities With A Gracilis Tendon Graft And Tight-Rope Augmentation

Carmen Hann, Nina Maziak, Marvin Minkus, Natascha Kraus, Markus Scheibel

CMSC-Charité Universitaetsmedizin Berlin Campus Virchow, Berlin, Germany

Aim

The aim of this study was to evaluate the rate of complications after stabilization of chronic AC-Joint instabilities with gracilis tendon graft and Tight-Rope augmentation.

Background

After stabilization of chronic AC-Joint instabilities complication of more than 50% have been reported.

Methods

Patients with a chronic bidirectional AC-Joint instability were prospectively included and treated using the above-mentioned technique. After a mean follow-up of 25.2 months 27 patients (9f/18m, \bar{x} 43.0 age) were available for follow-up examination. 14 patients had prior conservative (group 1) and 13 prior surgical treatment (group 2). All patients underwent a full clinical examination including AC-joint specific (TF, ACJI) as well as overall shoulder scores (CS, SSV). Bilateral anteroposterior stress radiographs and bilateral Alexander views were obtained.

Results

The complication rate was 26 % (N=3 group 1, N=4 group 2), three patients required revision (11%, N=1 group 1, N=2 group 2). Two patients had a recurrent instability and received a stabilization with a semitendinosus graft (each N=1). One patient had a removal of the implant material due to implant irritation (N=1 group 2). All remaining complications were treated conservatively. No significant difference between the two groups could be revealed regarding complications ($p > 0,05$). Patients with complications achieved on average 67.8% in the SSV, 70 points in the CS, 7.8 points in the TF und 58.8 points in the ACJI. Comparison of score results revealed no significant differences between the groups ($p > 0,05$). Only in the SSV a significant difference between revision relevant and non-revision relevant complications could be revealed ($p < 0,05$). Patients without complications achieved significantly better results in all scores than patients with complications ($p < 0,05$).

Conclusions

The rate of revision relevant complications after stabilization with gracilis tendon graft and Tight-Rope augmentation is relatively low with 11%. Revision relevant complications were good to handle. However, complications had a negative influence on the clinical outcome.



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11:32 - 11:40

236 Treatment Of Focal Glenohumeral Cartilage Defects With Autologous Chondrocyte Transplantation – Preliminary Results

Elisabeth Böhm, Marvin Minkus, Anna Krukenberg, Markus Scheibel

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Aim

The aim of this study was to evaluate the clinical, radiological and arthroscopic results of autologous chondrocyte transplantation (ACT) for the treatment of focal cartilage defects of the shoulder.

Background

Successful results are achieved by ACT for the treatment of focal cartilage defects of the knee. Up to date, no outcomes are described for the application of ACT for glenohumeral cartilage defects.

Methods

Seven patients [7m/0f, mean age 39.5 years (18-56)] with humeral posterocentral grade IV cartilage defects underwent ACT. During a staging arthroscopy, the defect size was determined and a chondrocyte sample harvested. The ACT was conducted arthroscopically in four and by an open approach in three cases. The patients were assessed clinically [range of motion, Visual Analogue Scale (VAS), Subjective Shoulder Value (SSV), Constant Score (CS), American Shoulder and Elbow Surgeons (ASES) Standardized Shoulder Assessment Form] and radiologically (true anteroposterior, axillary, y-views). The cartilage defect was re-evaluated arthroscopically in five patients.

Results

After a mean follow-up of 27.8 months (1.13-58.4) the SSV averaged 88.3% (60-100) compared to 51.7% (30-70) preoperatively, VAS 0 at rest and 1 (0-4) during exercise, CS 94.4 points (80-100) and ASES 92.8 points (76.7-100). All patients had a free range of motion and stated that they would repeat and recommend the surgery. The mean cartilage defect size was 3.3cm² (2.3-4.5). During the arthroscopic re-evaluation of five patients 7.2 months (4.2-12) postoperatively, complete coverage of the cartilage defect was observed in four cases. One patient had a circumferential residual defect of 0.3cm². One case of persistent postoperative shoulder stiffness was successfully treated by an arthrolysis and capsular release. Radiologically, a grade I arthrosis was observed in one shoulder.

Conclusions

ACT for focal glenohumeral cartilage defects yields good to excellent clinical results during a short to mid-term follow-up period and leads to successful coverage of grade IV cartilage defects.



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11:24 - 11:32

762 Mid- To Longterm Outcome Of Glenohumeral Microfracturing

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Aim

The aim of the study was to evaluate the mid- to longterm outcome of microfracturing for contained glenohumeral chondral defects.

Background

Localized cartilage lesions present a therapeutical problem in young and/or active patients. Microfracturing has widely been shown to be a viable treatment for small to medium osteochondral defects of the tibia and femur, and to a lesser degree also of the patellofemoral joint. However, the literature regarding the outcome of microfracturing for glenohumeral chondral defects is still limited.

Methods

All patients who underwent arthroscopic microfracturing between 2002 and 2012 at our department were considered for inclusion in the present study. Clinical and radiological examination was performed preoperatively and at the latest follow-up. Clinical outcome was assessed according to the Constant Score, Oxford Shoulder Score, and Subjective Shoulder Value. Radiological evaluation included four different grading systems (according to Guyette et al., Weinstein et al., Kellgren & Lawrence, and Samilson & Pietro) to assess progression of joint space narrowing, sclerosis, marginal osteophytes and presence of cysts over time.

Results

A total of 22 patients (age: 48.3±12.5) was available for follow-up at a mean 94.7±35.7 months. Constant Score (64.0±12.7 to 80.4±11.2; p<0.001), Oxford Score (28.3±5.8 to 32.3±13.0; p<0.001), and Subjective Shoulder Value (24.7±10.6 to 79.3±18.6; p<0.001) changed significantly from pre- to postoperatively. 20 out of 22 patients were able to return to their previous level of activity postoperatively. During the follow-up period, eight patients developed radiological signs of progressive glenohumeral degeneration. However, only one patient showed a progression of arthritic changes of more than one grade according to all four used classifications. At the latest follow-up, two patients had undergone revision surgery with implantation of a total shoulder arthroplasty.

Conclusions

The current study confirms the feasibility of microfracturing as a treatment option for contained glenohumeral cartilage lesions with reproducible, good mid- to longterm outcome.



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11:08 - 11:16

721 Concomitant Glenohumeral Pathologies Associated With Acute And Chronic Grade III And Grade V Acromioclavicular Joint Injuries

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4. Department of Trauma, Hand and Reconstructive Surgery University Hospital Münster, Münster, Germany

Aim

The purpose of this study was to identify the risk of concomitant glenohumeral pathologies with acromioclavicular joint injuries grade III and V.

Background

The debate, if the arthroscopic procedure is beneficial compared to open techniques is still ongoing.

Methods

Patients who underwent arthroscopically-assisted stabilization of acromioclavicular joint injuries grade III or V between 01/2007 and 12/2015 were identified in patient databases of two surgical centers. Gender, age at index surgery, grade of acromioclavicular joint injury (Rockwood III or V), and duration between injury and index surgery (classified as acute or chronic) were of interest. Concomitant glenohumeral pathologies were noted and their treatment was classified as debridement or reconstructive procedure.

Results

A total of 376 patients (336 male, 40 female) were included. Mean age at time of arthroscopic acromioclavicular joint reconstruction surgery was 42.1±14.0 years. Overall, 201 patients (53%) had one or more concomitant glenohumeral pathologies. Lesions of the biceps tendon complex and rotator cuff were the most common. Forty-five patients (12.0%) had concomitant glenohumeral pathologies that required an additional repair. The remaining 156 patients (41.5%) received a debridement of their concomitant pathologies. Rockwood grade V compared to Rockwood grade III ($p=0.013$; odds ratio 1.7), and chronic compared to acute injury were significantly associated with having a concomitant glenohumeral pathology ($p=0.019$; odds ratio 1.7). The probability of having a concomitant glenohumeral pathology was also significantly associated with increasing age ($p<0.0001$).

Conclusions

Concomitant glenohumeral pathologies were observed in 53% of surgically treated patients with an acute or chronic acromioclavicular joint injury of either grade III or V. Twenty-two percent of these patients with concomitant glenohumeral pathologies received an additional dedicated repair procedure. Although a significant difference in occurrence of concomitant glenohumeral pathologies was seen between Rockwood grades III and V, and between acute and chronic lesions, increasing age was identified as the most dominant predictor.



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Thursday 14 SeptemberROTATOR CUFF - I
11:00 - 12:15
POTSDAM

11:40 - 11:48

801 The Effect Of Intravenous Tranexamic Acid On The Visual Clarity During Arthroscopic Rotator Cuff Repair : A Randomised Controlled, Double Blind Study**Ali Ersen**, Mehmet Ersin, Mehmet Buget, Ata Can Atalar

Istanbul University Istanbul Medical Faculty, Istanbul, Turkey

Aim

The aim of this randomised prospective study is to investigate the influence of the the utilisation of intravenous tranexamic acid to visual clarity during arthroscopic rotator cuff repair.

Background

Arthroscopic repair of a torn rotator cuff became the gold standart treatment in the last decade. Bleeding during the procedure is the main influencing factor of visual clarity, which is essential for a safe and succesfull procedure. The use of intravenous tranexamic is a well accepted method to decrease the bleeding during arthroplasty procedures.

Methods

60 eligible and consecutive patients with rotator cuff tears were randomised into 2 groups. In tranexamic acid group, 10 mg/kg intavenous tranexamic acid was utilised in 100 cc isotonic solution before 30 minutes of the operation in 10 minutes. 100 cc isotonic solution without tranexamic acid was used in control group.

At the end of each procedure the surgeon rated the visual clarity on a scale from 1 to 10. Mean arterial pressure , total operation time and total use of irrigation fluid were also recorded.

Results

No adverse effects were seen during the study period. Visual clarity in tranexamic acid group was significantly better than the control group (8.1/10 vs 7.0/10 p: 0.018) . Although a significant difference in total operation time could not be found between the groups (99 min in control group vs 1 06 min in Tranexamic acid group p>0.05) , there was significant difference in total use of irrigation fluid (p:0.007 10 lt vs 16 lt, respectively)

Conclusions

10 mg/kg intravenous tranexamic acid before the start of the arthroscopic rotator cuff repair may improve the visual clarity during the procedure by reducing bleeding from small vessels. So that the total amount of irrigation fluid may also be decreased.



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11:16 - 11:24

526 Ten-Year Multi-Center Clinical And MRI Evaluation Of Cuff Repairs According To Type Of Tear.Luc Favard¹, Charles Agout¹, **Julien Berhouet**¹, Philippe Collin², Jean François Kempf³

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2. St Gregoire, Rennes, France
3. University of Strasbourg, Strasbourg, France

Aim

The authors aimed to report clinical and radiographic outcomes 10 years following repair of cuff tears and to investigate healing according to type of extension of the rupture anteriorly or posteriorly.

Background

It has been proposed that most rotator cuff tears initiate within the supraspinatus tendon and propagate to different extents and directions.

Methods

The authors retrieved the records of all 965 patients that underwent repair of cuff tears in 2004. The patients were recalled in 2015 for evaluation at a minimum follow-up of 10 years. 392 patients did not respond and 62 were re-operated (26 retears, 12 arthroplasty conversions, 24 other causes). A total of 511 patients were evaluated clinically, of which 397 were also evaluated using MRI. There were 289 isolated supraspinatus ruptures (SS), 94 with a posterior extension of the tear (P), 92 with an anterior extension (A) and 36 with a anteroposterior (AP) extension. All repairs were watertight at the end.

Results

Complications were noted in 51 shoulders (10%) shoulders (35 stiffness, 2 infection, and 14 others). The Constant score had improved from 53.8 ± 14.7 pre-operatively to 77.7 ± 12.1 at 10 years, without any difference between 4 groups. The rate of re-tear (Sugaya 4 & 5) was 23,4% with significantly less re-tear (19%) in SS group and significantly more (31,6 %) in P group. Only 9% had perfect integrity (Sugaya I). Tendon healing was correlated with total Constant score ($p > 0.01$), particularly with strength ($p > 0.001$), and inversely associated with pre-operative fatty infiltration of muscles ($p < 0.001$).

Conclusions

Ten years following repair of cuff tears, 76.6% of tendons had healed. The risk of re-tear is more important in case of posterior extension of the tear. However, surgical repair appeared to give good functional outcome whatever the type of tear, despite an overall revision rate of 6.4% and a complication rate of 10% .



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11:56 - 12:04

870 A Pilot Study Examining The Feasibility And Safety Of Using Bone Marrow Aspirate Concentrate In Improving Rotator Cuff Tendon Healing Following Arthroscopic Rotator Cuff Repair

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Aim

The purpose was to evaluate the use of BMA concentrate in arthroscopic RC tendon repair, with evaluation of clinical and radiographical outcomes at one-year patients follow-up.

Background

Few studies have used bone marrow aspirate (BMA) for augmentation of rotator cuff (RC) tendon healing, and none have characterized the numbers of true mesenchymal stem cells (MSC) applied at the repair site or correlated clinical outcomes with biologic activity of the implanted cells.

Methods

19 patients (15 BMAC and 4 control) with a full thickness RC tear, undergoing arthroscopic RC repair had 60ml of bone marrow aspirated from the iliac crest (IC), then concentrated and 5mL of the BMAC directly injected arthroscopically into the reapproximated ends of the tendon and the footprint. The numbers of mononucleated cells (MNC), MSCs returned to the patient was measured by flow cytometry analysis. All patients underwent radiographical (MRI and ultrasound) and clinical assessment (strength, ROM, pain, and outcome scores) at 12 months follow-up.

Results

The average number of MSCs returned to the patient was 5515+/-9655cells/mL. There were no significant differences between groups in the rate of tendon healing based on MRI. For all physical exams, there were no significant differences between groups. There was improvement in the ASES score from baseline to 6 months in the BMAC group, but this change and the overall 6 month score trended higher in the control group (98.3 and 70.8, p=0.078). There was statistically significant improvements over time in the ASES functional subscale in both groups.

Conclusions

This preliminary data demonstrates no significant improvement in healing or clinical outcome at 12 months after surgery. This may be due to inadequate numbers of MSC's delivered to the repair site. Significant limitations to the use of bone marrow aspirates are the variability between patients and the overall low number of MSC's present in bone marrow.



11:24 - 11:32

70 Twenty-Year Results Of Isolated Supraspinatus RepairMikael Betz¹, **Philippe Collin**², Gilles Walch³, Christian Gerber⁴, Jean François Kempf⁵

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3. Centre Orthopédique Santy, Lyon, France
4. Balgrist, Zurich, France
5. CHU, Strasbourg, France

Aim

To evaluate the clinical and morphological outcome 20 years following repair of isolated supraspinatus tears. We hypothesized that deterioration in and around the rotator cuff would have progressed leading to a substantial rate of secondary interventions.

Background

there are no studies documenting the clinical and morphological outcome after rotator cuff repair at 20 years follow-up .

Methods

The authors identified 137 patients, operated for isolated full thickness supraspinatus tears in 1994. All patients were recalled for a standardized clinical and radiographic assessment. 13 (9.5%) patients had been re-operated, and 6 patients (4.3%) had died from unrelated causes. 52 (38.0%) were lost to FU. This left 66 patients, for clinical evaluation. In 45 of these patients, X-ray and Magnetic Resonance Imaging (MRI) could additionally be performed and allowed assessment of osteoarthritis, Hamada and Fukuda classification, anatomic assessment of tendon healing, fatty infiltration (FI) and muscle atrophy.

Results

In 66 clinically assessed patients, the Constant score (CS) improved from 51.5 ± 14.1 points to 71. points ($p < 0.05$), with a mean SSV of 77.2 ± 22 . There were 7 (11%) post-operative complications treated conservatively. In 45 patients assessed with MRI, re-torn tendons (Sugaya IV-V) were found in 19 cases (42 %), advanced fatty infiltration (Goutallier III-IV) was found in 12 cases (27%) for the supraspinatus (SSP) and in 16 cases for the infraspinatus (ISP) muscle (35%). Muscle atrophy (Warner tangents) was found in 12 cases (28%), advanced arthritis (Samilson 3-4) was found in 6 cases and cuff tear arthropathy (Hamada-Fukuda stage 4) in 12 cases (30%). The Constant score and SSV were significantly inferior for shoulders with fatty infiltration of stages III-IV ($p < 0.05$). The CS was lower in cuff tear arthropathies and correlated to ISP FI

Conclusions

: Twenty years after surgical repair of isolated supraspinatus tears, the clinical outcome remains superior to the preoperative status.



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11:00 - 11:08

74 Evaluation Of Symptomatic Rotator Cuff Tears With Dynamic Magnetic Resonance ImagingHideyuki Sasanuma¹, Yuki Iijima², Yuji Kanaya³, Katsushi Takeshita²

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3. Jichi Medical University, Tochigi, Japan

Aim

The purpose of this study was to evaluate the effectiveness of current techniques for dynamic 3-dimensional magnetic resonance imaging (MRI) in the diagnosis of in symptomatic rotator cuff tear (RCT).

Background

We have reported that dynamic MRI of idiopathic frozen shoulder (FS) demonstrates an abnormal cluster of blood flow around the glenohumeral joint (burning sign, BS). There have been no reports on dynamic MRI of RCT using current techniques and devices.

Methods

The study included 5 healthy volunteers, 31 symptomatic RCTs and 30 FSs. We compared the characteristics of dynamic MRI in the three groups, and the relationship between clinical symptoms and the BS in RCT was evaluated.

Results

In the healthy volunteer group, no evidence of abnormal blood flow or uptake of contrast medium around the glenohumeral joint was observed in any of the 5 shoulders from either the early or the delayed phase. The BS in RCT and FS was observed in the rotator interval (RI) of 23 and 28 shoulders, in the axillary pouch (AP) of 3 and all shoulders ($P < 0.01$), and in the groove of 12 and 12 shoulders, respectively.

In the RCT group, patients with strong deposition of contrast medium in the RI in the early phase ($n = 12$) had a statistically significant score for night pain and rest pain, which was higher than that in patients with weak deposition of contrast medium ($n = 19$, respectively, $P = .014$, $P = .006$).

Conclusions

BS appears on dynamic MRI of symptomatic RCT. The BS of the RI may be associated with pain and inflammation in RCT as well as in FS.



12:04 - 12:12

227 Management And Outcome Of Acute Postoperative Infections After Arthroscopic Rotator Cuff Repair In The Shoulder. A Prospective Cohort Study.

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2. Oslo University Hospital, Oslo, Norway

Aim

The aim of this prospective study was to describe incidence, treatment and outcome after acute postoperative infections following arthroscopic rotator cuff repair.

Background

Acute postoperative infection is reported to occur in 0.3-2% after arthroscopic rotator cuff repair.

Methods

Patients undergoing arthroscopic rotator cuff repair in our department have been prospectively registered since 2009. 11 out of 1072 repairs developed an acute postoperative infection. The patients were examined with an MRI scan and functional score Constant Murley (CM) and Western Ontario Rotator Cuff Index (WORC) at final follow-up.

Results

All 11 patients that developed acute postoperative infections were male. Mean age was 54 (41-68) years. All patients underwent arthroscopic debridement and biopsies were collected 26 (14-50) days after primary surgery. In 10 patients *Propionibacterium acnes* was cultured, 6 of these patients also had positive cultures for coagulase negative staphylococci. In the remaining patient only coagulase negative staphylococcus was cultured. 5 patients were treated with one arthroscopic debridement, 5 had two arthroscopic debridements and whereas 1 required arthroscopic debridement four times before the infection was eradicated. Only 2 patients had to have their implants removed during the reoperation due to loosening of the suture anchors. All 11 patients were treated with parenteral antibiotics for 1-4 weeks, followed by oral treatment for 1-5 weeks. Median CM score was 84 and median WORC index was 81% at last follow-up after median 22 (11-28) months. 10 patients had a postoperative MRI scan after median 23 (3-49) months, 8 of them showing a healed cuff repair.

Conclusions

Acute postoperative infections after arthroscopic rotator cuff repair can be eradicated with arthroscopic debridement(s) and removal of implants may not be necessary if patency is adequate. Despite the postoperative acute infection our patients presented good functional results at final follow-up.



11:08 - 11:16

280 Increased Mortality And High Rates Of Contralateral Cuff Tears At 22-year Follow-Up After Arthroscopically Verified Rotator Cuff Tear.Mats C. Ranebo¹, Hanna Björnsson Hallgren², Lars E. Adolfsson²

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2. Orthopedic Clinic, Linköping University Hospital, Linköping, Sweden

Aim

To investigate rates of contralateral rotator cuff tears and mortality in patients with long-standing cuff tear in one shoulder.

Background

Rotator cuff tears have risk factors that may affect both shoulders and some risk factors are common to those for cardiovascular disease and cancer. Mortality and rates of contralateral tears are unknown in patients with long-standing cuff tear in one shoulder.

Methods

Patients with an arthroscopically verified rotator cuff tear 1989-1993 were retrospectively reviewed with bilateral x-ray, ultrasonography and Constant score.

Results

After a mean of 22 years (range 21-25) operative protocols and medical records were reviewed in a consecutive series of 111 patients with a mean age of 50 years (SD 11) at index operation. Twenty-one out of 111 patients (18.9%) were deceased at follow-up, an 11.6 times increased mortality compared to the 1.6% expected from national statistics in this age group. Sixty-five patients were examined. The rate of full-thickness tears in the contralateral shoulder was 50.8%. Rates of contralateral full-thickness tears ranged from 13.6% (partial tear in operated shoulder) to 90% (full-thickness tear and arthropathy in operated shoulder). Tendon status, Hamada score and relative Constant score were combined to a single score on a 1-10 point scale (Rotator Cuff Severity Score) for each shoulder and Spearman's correlation coefficient between shoulders was 0.73. The number of tendons with a full-thickness tear was a risk factor for a contralateral full-thickness tear in logistic regression analysis (OR 3.28, CI 1.67-6.44), $P < 0.001$). Thirty-nine percent of patients with partial or full-thickness tear in contralateral shoulder had pain.

Conclusions

Patients with long-standing cuff tear have a markedly increased mortality and high rates of contralateral cuff tears. The severity of the condition in one shoulder is strongly correlated to the condition in the contralateral shoulder and tear size is a risk factor for having a contralateral full-thickness tear.



11:32 - 11:40

588 Cost-Effectiveness Of Single Row Versus Double Row Constructs In Arthroscopic Rotator Cuff Repair

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3. Clinical Epidemiology Program, Ottawa Hospital Research Institute, The Ottawa Hospital, Ottawa, Canada
4. Section of Orthopaedic Surgery & The Pan Am Clinic, University of Manitoba, Winnipeg, Canada

Aim

To determine whether double row fixation is a cost-effective option compared with single row fixation in arthroscopic repair of the rotator cuff.

Background

The optimal technique for arthroscopic rotator cuff repair is controversial and both single and double row techniques are commonly used. In the current era of increasing costs, health care delivery models are focusing on value of care. This study evaluates the cost-effectiveness of single row compared to double row constructs in patients undergoing arthroscopic rotator cuff repair.

Methods

A cost-utility analysis was performed from the perspective of the health care system. Health care costs, probabilities, and utility values were derived from the published literature. Efficacy data was obtained from a published randomized controlled trial comparing the effect of single row (n=48) or double row (n=42) constructs in 90 surgical patients. Unit cost data were obtained from a hospital database and the Ontario Schedule of Benefits and Fees. Results were presented as an incremental cost per quality adjusted life year (QALY) gained. All costs are presented in 2015 Canadian dollars. A series of one-way and probabilistic sensitivity analyses were performed.

Results

Double row fixation was more costly (\$2,255.13 versus \$1,561.91) but was more effective than the single row method (4.073 versus 4.055 QALYs). An incremental cost-effectiveness ratio (ICER) was estimated to be \$38,540.37 per QALY gained for double row fixation relative to single row. Subgroup analysis demonstrated that patients with larger rotator cuff tears (≥ 3 cm) had a lower ICER, suggesting that double-row fixation may be more cost-effective in larger tears.

Conclusions

Based on the willingness to pay threshold of \$50,000/QALY, double row was found to be more cost effective than single row. Furthermore, a double row construct is found to be more economically attractive with larger rotator cuff tears (≥ 3 cm).



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11:48 - 11:56

406 Effect Of Recombinant Human Growth Hormone On Rotator Cuff Healing After Arthroscopic Repair**Joo Han Oh**¹, Seok Won Chung², Kyung-Soo Oh², Jae Chul Yoo³, Yang Soo Kim⁴, Jin-Young Park⁵

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2. Konkuk University Medical Center, Seoul, South Korea
3. Samsung Seoul Medical Center, Seoul, South Korea
4. Seoul Saint Mary's Hospital, Seoul, South Korea
5. Neon Orthopaedic Clinic, Seoul, South Korea

Aim

To evaluate the effect of the systemic injection of recombinant human growth hormone (rhGH) on clinical outcomes after arthroscopic rotator cuff repair

Background

Insulin-like growth factor-1 (IGF-1), which is the main factor of rhGH, is known to be able to regenerate skeletal muscle mass and associated with fat decrease.

Methods

In this multicenter prospective randomized comparative trial, patients who underwent arthroscopic rotator cuff repair in large sized tears and fell under inclusion and exclusion criteria were randomly divided into three groups: rhGH 8 mg (A) group, rhGH 4 mg (B) group, and control (C) group (n=24, 26, and 26, respectively). The sustained release rhGH was injected subcutaneously once a week for 3 months after surgery. The retear rate, and fatty infiltration and atrophy of the supraspinatus muscle were evaluated by MRI at 6 months postoperatively. Range of motion (ROM), pain VAS, and serum IGF-1 level were measured at each follow-up, and functional scores (Constant and ASES scores) were checked at final follow-up.

Results

There were no rhGH injection-related major safety issues. Group A showed more increased peak IGF-1 level (279.43 ng/ml) compared to other groups (196.82 ng/ml (Group B), 186.31 ng/ml (Group C); p=0.08). The retear rate was lower in the Group A (16.7%) without statistical significance (p=0.203) than Group B (30.8%) and Group C (34.6%). The proportion of severe fatty infiltration (Goutallier grade \geq 3) was 20.8% in Group A, 23.1% in Group B, and 34.6% in Group C (p>0.05). There were no differences in pain VAS, ROM, and functional scores between groups (all p>0.05).

Conclusions

This was the first prospective randomized trial investing the favorable effect of systemic growth hormone treatment on surgical outcomes of large sized rotator cuff tears. This study would serve as a preliminary exploratory study for the later study with sufficient power and various rhGH doses.



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Thursday 14 September

BASIC SCIENCE

14:30 - 16:00

PAVILLON

15:34 - 15:42

789 Scapular Morphology In Patients With Hill-Sachs Lesions Using Statistical Shape Modeling

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Aim

To quantify and compare scapular morphology between subjects with Hill-Sachs lesions and controls using statistical shape modeling (SSM).

Background

Patients with Hill-Sachs lesions are a difficult subgroup of anterior shoulder instability patients to treat. Previous research associated morphology differences of the glenoid with anterior shoulder instability. SSM is a powerful tool to compare complex morphology without idealizing underlying geometry, and identify unknown morphologic differences of the scapula.

Methods

CT-scans of 41 control scapulae and 54 scapulae of patients with Hill-Sachs lesions were 3D reconstructed. SSM identified the modes of variation in scapulae of both groups. Measurements quantified the morphometric differences identified by the modes in relation to the glenoid center (offset measures) or glenoid center-plane (angles) in control subjects and subjects with Hill-Sachs lesions.

Results

Mean glenoid bone loss was 13.5% for the pathologic shoulders. Compared with the control subjects, the glenoid of the pathologic group had an increased estimated height-width ratio (1.39 vs. 1.43; $p = 0.024$), an increased retroversion (-1° vs. -3° ; $p = 0.008$), and was flatter in the anterior-posterior direction (radius of curvature: 125 mm vs. 541 mm; $p = 0.004$). In the pathologic group, a more superior and medial offset of the coracoid tip (mean difference: 8 mm and 4mm, respectively; $p < 0.001$) with a posterior-inferiorly rotated acromion and scapular spine (mean difference: 5° ; $p = 0.001$) was present. This resulted in a larger acromioclavicular distance (40 mm vs. 42 mm; $p = 0.003$) and a posterior-inferiorly rotated fulcrum axis (mean difference: 7° ; $p < 0.001$) for the unstable shoulders.

Conclusions

Differences in glenoid morphology, as well as previously unknown shape variations of the coracoid and acromion were identified in scapulae with anterior shoulder instability. These findings suggest that the morphology of the scapula, and specifically the acromion and coracoid, may be a predictor of shoulder instability.



14:38 - 14:46

537 PARP-1 Inhibition Improves Healing In A Rat Model Of Acute Rotator Cuff Repair

Mike B Künzler¹, Matthias A Zumstein¹, Michelle H Mcgarry², Masaki Akeda², Hansel E Ihn², Agnieszka Karol³, Brigitte Von Rechenberg³, Thay Q Lee²

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2. VA Long Beach Healthcare System, Long Beach, United States
3. Vetsuisse Faculty University of Zurich, Zurich, Switzerland

Aim

Investigate the influence of PARP-1 inhibition on biomechanical and histological properties of the repair in a rat model of acute rotator cuff repair.

Background

Repair of rotator cuff tears (RCT) have a high retear rate due to the formation of mechanical inferior scar tissue during the healing period.

Methods

24 Sprague Dawley rats were randomly allocated into an Inhibitor and Control group (n=12 each). In all rats the tendon of the supraspinatus muscle was sharply detached and immediately repaired with a single transosseous suture. The rats in the Inhibitor group received 12.5mg/kg/d Veliparib in their drinking water (ABT-888, APExBio, TX, USA) during the recovery period. The animals were sacrificed 8 weeks after surgery and analyzed utilizing macroscopic, biomechanical and histological methods.

Results

Macroscopically and histologically the SSP muscles of the Inhibitor group had a significantly higher cross sectional area at their midsubstance (p=0.034 and p=0.0004 respectively). The Inhibitor group had a significantly better histological grading than the Control group (p=0.022) with less scar tissue formation and a tendency to better formation of the neo-entheses, less vascularity of the tendon and better tendon organization. During biomechanical testing most of the specimens in the Inhibitor group failed in the tendon midsubstance (n=4/6), whereas most of the Controls failed at the entheses (n=4/6). The differences in yield load, stiffness, energy absorbed to failure and ultimate load did not reach statistical significance.

Conclusions

Inhibition of PARP-1 activity leads to better histological healing of the RCT repair; in addition, it leads to both higher histological muscle fiber cross-section and higher macroscopical muscle diameter. Although biomechanical properties were not significantly different between the groups due to being underpowered, the PARP-1 inhibitor group showed a general trend of improvement. Taken together, we conclude that PARP-1 inhibition is beneficial for the healing after acute rotator cuff repair.



15:02 - 15:10

57 What Is The Best Surgical Knot For High-Strength Suture Material? A Biomechanical Study

Thorsten Jentzsch¹, Elias Bachmann², Alexandre Lädermann³, Georg Lajtai⁴, Dominik C. Meyer¹

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2. The Balgrist, Zürich, Switzerland
3. La Tour Hospital, Meyrin, Switzerland
4. Private Hospital Maria Hilf, Klagenfurt, Austria

Aim

To compare novel looped to conventional knot configurations.

Background

Almost every surgery requires the use of surgical knots. Double-stranded looped configuration may be advantageous due to fewer free suture ends and mechanical properties.

Methods

An in vitro biomechanical study repeatedly (five times each) tested 12 different knots (conventional half hitch, square knot and eight-sling-eight with secured ends, Nicky's knot, Nice knot, racking hitch, cow hitch [Larks head], clove hitch, altered cow hitch and clove hitch with four and five knots using braided polyblend non-bioresorbable suture material) with a distraction material testing machine with constant displacement speed. Afterward, the cow hitch, its altered version, and conventional half hitches were investigated on bovine tendon. Knot security (stiffness) at assumed clinical failure (≥ 3 mm displacement) was the primary outcome. Size and loop security (maximal tension) was the secondary outcome. Oneway ANOVA and post hoc tests with Bonferroni correction were used to compare groups.

Results

Compared to one and a half- and single-stranded knots, double-stranded looped knots were up to three times stronger. The stiffest knot was the cow hitch (mean 184.7 [95% confidence interval 172.0-197.4] Newton [N]/ mm) ($p < 0.001$), trailed by the Nice knot (168.6 [154.0-183.2] N/mm). Conventional half hitches were less stiff (65.4 [52.9-77.9] N/mm). These findings remained in tendons (81.8 [77.1-86.4] and 40.4 [32.0-48.8] N/mm, $p < 0.001$). Half hitches (9.5mm³) were larger than cow hitches (7.6mm³) and Nice knots (6.1mm³). Cow hitches had higher loop security than half hitches (157.6 [119.6-195.6]N and 85.0 [56.9-113.2]N, $p < 0.001$).

Conclusions

Double double-stranded surgical knots with a loop on one side are mechanically stiffer (stronger), smaller, and keep applied tension better than conventional knots. The simple-to-tie cow hitch and Nice knot seem to be the knots with the best performance.

[Note: This abstract has also been submitted to the EFORT and swiss orthopaedics congresses 2017.]



14:46 - 14:54

351 Regeneration Capacity Of The Irreversibly Fattened Rotator Cuff After Transplantation Allogenic Mesenchymal Stem Cells And Myocytes In A Rat Model.

Mehmet Fatih Gülecüyüz¹, Konstanz Eichmüller², Matthias Frank Pietschmann¹, Birte Sievers³, Andreas Ficklscherer⁴, Björn Peter Roßbach⁵, Thomas Richard Niethammer⁶, Peter Ernst Müller⁶

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6. Department of Orthopaedics, Physical Medicine and Rehabilitation – Medical Center of the University of Munich (Ludwig-Maximilian-University), Marchioninistrasse 15, 81377 Munich, Germany, Munich, Germany, Munich, Germany

Aim

The aim of this study was to analyze the regeneration capacity of fattened RC muscles in a rat model after local transplantation of allogenic MSC and myocytes.

Background

Rotator cuff ruptures lead to functional impairment and irreversible muscle fattening. The regeneration capacity of irreversibly fattened skeletal muscle with MSC hasn't been analyzed yet.

Methods

The supraspinatus tendon of 105 rats were detached to provoke muscle fattening over 4 weeks. The animals of the output group served as reference. All other animals received transosseous tendon repair and were either left untreated, treated with saline, transplantation of 5×10^6 MCS or transplantation of 5×10^6 myocytes. After a healing phase of 4 weeks, the animals were euthanized and the supraspinatus mass was compared quantitatively and histologically.

Results

The groups treated with myocytes and MCS showed a significantly higher muscle mass in comparison to the output group but there was no significance in comparison to the other repaired groups or spontaneous healing group. The muscle mass of the repaired group, with or without additional treatment, was insignificantly inferior to the contralateral untreated supraspinatus muscle.

Conclusions

This defect model shows that the transplantation of allogenic myocytes and MCS is better than no treatment but cannot retrieve the muscle mass as the untreated healthy contralateral side. In all treated groups, a distinctive spontaneous healing potential of the rat SSP tendon could be observed where scar tissue (neo-tendon) between the SSP and the humeral head substituted the function of the original tendon and prevented total degeneration.



15:26 - 15:34

364 Neuroanatomical Distribution Of Sensory Receptors In The Human Elbow Joint CapsuleErica Kholinne¹, Hyun Joo Lee², Maria Florencia Deslivia³, Ga Yeong Kim⁴, In-Ho Jeon⁴

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2. Department of Orthopedic Surgery, Kyungpook National University Hospital, Daegu, South Korea
3. Korea Institute of Science and Technology, Seoul, South Korea
4. Department of Orthopedic Surgery, Asan Medical Center, University of Ulsan, Seoul, South Korea

Aim

To describe the spatial arrangement of noci- and mechanoreceptors in human cadaveric elbow capsule.

Background

The site and topographic arrangement of neural ultrastructure are pertinent for its great role of neural signal delivery. This stimuli signal is concisely delivered from the joint to the afferent pathway to allow recognition of pain and proprioception. Sensory receptors of the elbow joint were served by free nerve endings as nociceptive and mechanoreceptors for which the distribution of each structures have not been determined despite the importance of these tissues. We believed that such structures will have essential contribution to elbow pathology such as lateral epicondylitis and elbow instability.

Methods

Eight elbow joint capsule from fresh cadavers were harvested. The specimens were carefully separated from its adjacent osteoligamentous attachment. The capsular complex was sectioned into 12 regions of interest. Modified gold chloride method was used for staining. We observed the status of Golgi, Ruffini and Pacinian corpuscle and free nerve endings with light inverted microscope. The number and density of each structure were recorded. Density were presented as unit/volume.

Results

Ruffini corpuscle was the most dominant mechanoreceptor found for 83.87%. No Golgi corpuscle was observed. Free nerve endings were found more than mechanoreceptor of all population. All structures were found more in the mid-substance compare to bony attachment site. The density of mechanoreceptor and free nerve endings was found higher in anterior capsule complex for 0.23/mm³ (74.19%) and 0.21/mm³ (60%) respectively.

Conclusions

A distribution pattern for articular sensory receptors was consistently observed which allows further understanding for elbow elbow pathology. Awareness of neuroanatomical distribution of sensory receptors in the elbow joint capsule may allow preservation during surgical procedure for elbow joint pathology.



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15:10 - 15:18

743 Feasibility Of Lower Trapezius And Rhomboid Minor Transfer For Irreparable Subscapularis Tears: Anatomic Cadaveric StudyMarco Cartaya¹, Pablo Canales², Gwenole Kermarrec¹, Philippe Valenti¹

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2. Clinica Indisa, Santiago, Chile

Aim

To determine the feasibility of lower trapezius and rhomboid minor transfer to reconstruct irreparable subscapularis tendon tears.

Background

Previously reported tendon transfers to reconstruct the subscapularis don't reproduce the vector of action, the excursion and the strength of the subscapularis. We studied the anatomic feasibility of the lower trapezius and the rhomboid minor transfer to reconstruct irreparable tendon tears of the subscapularis which present more theoretical advantages.

Methods

We measured the tendons dimensions, muscles excursions, distances to pedicles and dissection needed to complete a successful lower trapezius and/or rhomboid minor transfer to the subscapularis footprint in 10 cadaveric shoulders. The transferred muscles were detached distally, augmented with a semitendinosus and gracilis autograft and passed anteriorly between the scapula and the subscapularis remnant through a small serratus and rhomboid major window to reach the lesser tuberosity. The risk of pedicle compression was subjectively assessed in all cases.

Results

The trapezius and rhomboid tendons had an average length of 37.6 mm and 21.7 mm and width of 63 mm and 33.4 mm respectively. The mean distances from each distal insertion to the lesser tuberosity were 109 mm for the trapezius and 144 mm for the rhomboid minor. Mean distances from tendon to pedicle was 57.9 mm and 33.1 mm respectively. The mean size of the serratus and rhomboid major window was 49.4 mm and 17.4 mm respectively, measured at maximal excursion achieved at ER2 90°. Superior luxation of the transfer was observed during passive external rotation if the insertion point was too high.

Conclusions

Transfer of the lower trapezius and rhomboid minor to the middle of the lesser tuberosity to reconstruct an irreparable subscapularis tear is feasible without extensive dissection and a low risk of nerve compression.



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15:50 - 15:58

**905 Glenoid Defect Reconstruction With RSA-
A Biomechanical Analysis Comparing Partial Anterior Bone Graft
Augmentation Versus Bone Joint Line Reconstruction**

Dominik Florian Seybold¹, Matthias Königshausen¹, Nina Sverdlova², Christoph Ehlert²,
Corinna Mersmann¹, Birger Jettkant¹, Rolf Dermietzel³, Thomas Armin Schildhauer¹

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3. Institute of Anatomy, Neuroanatomy and Molecular Brain Research Ruhr-University, Bochum, Germany

Aim

The aim of this biomechanical study was to compare two surgical techniques for the reconstruction of large, combined, uncontained glenoid defects with reversed shoulder arthroplasty (RSA).

Background

Large, uncontained glenoid defects are frequently observed in posttraumatic or degenerative pathologies of the shoulder that must be reconstructed for implant fixation in RSA.

Methods

Three groups of scapulae with RSA were tested by the application of a physiological combination of compressive/shear loads in sawbones and cadavers. Two of the groups consisted of anterior combined defects, of which the first group was reconstructed with anterior bone grafts (GD) to contain the defect and cancellous bone to fill the central defect before RSA. In the second group, the technique of bony- joint line reconstruction (BJR-RSA) was performed. The third group served as a control group of intact glenoid with RSA in sawbones.

Results

At 150 μm of displacement, the loadings in the inferior-superior (IS) direction were significantly more stable than those in the anterior-posterior- (AP) direction within both reconstructed defect groups ($p \leq 0.002$). In contrast, no significant differences were found between the GD and BJR-RSA group in either direction (sawbones: AP: $p=0.29$; IS: $p=0.44$; cadavers: AP: $p=0.67$; IS: $p=0.99$). The control group revealed significantly higher values in all of the different loadings in the IS direction and significantly higher loadings at 40 μm and 150 μm in the AP direction.

Conclusions

Both techniques could be applied for such complex defects provided that there is sufficient medial bone stock for a BJR-RSA. Significantly greater stability was found in the IS direction than in the AP direction within each group, which could be explained by the longer screw anchoring within the superior and inferior columns. Both defect groups were less stable than the group of intact glenoids, which should be considered in rehabilitation programs.



14:30 - 14:38

520 Hypoxia, Apoptosis And Oxidative Stress In Rotator Cuff Fibroblasts

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Department of Orthopaedic Surgery, Gyeongsang National University Changwon Hospital, Changwon, South Korea

Aim

The purpose of this study was to determine whether hypoxia induces apoptosis of rotator cuff fibroblasts and to evaluate its mechanism.

Background

The etiology of rotator cuff disease is multifactorial. Excessive apoptosis has been associated with tendinopathy and is present in degenerative tendons. It is known that most cells are highly sensitive to oxygen levels and undergo apoptosis following periods of hypoxia. However, it has not yet been studied whether hypoxia induces apoptosis in the rotator cuff tendon fibroblasts.

Methods

Third-passage fibroblasts, which had been isolated from the supraspinatus tendons of male Sprague-Dawley rats, were used throughout the current experiments. The fibroblasts were divided into control and hypoxia groups. Hypoxia was induced, using CoCl₂ in five different concentrations (25, 50, 100, 500 and 1000 μ M). These study groups were evaluated for cell viability, apoptosis rates, levels of intracellular ROS production, expression levels of HO-1, HIF1- α , and VEGF, and expression levels of MMP-2 and MMP-9 mRNA. All statistical analyses were performed via one-way ANOVA, followed by Tukey's post hoc test.

Results

CoCl₂ decreased cell viability in a concentration-dependent manner ($p < 0.001$). In several kinds of morphological analyses, we confirmed decrement of cell population in hypoxia group. The level of intracellular ROS production in the hypoxia group was higher than in the normoxia. The apoptosis rate was increased in hypoxia group compared with the normoxia. The expression levels of HO-1, HIF1- α , VEGF, and MMP-2 in the hypoxia group were higher than in the normoxia. The mRNA expression levels of MMP-2 and MMP-9 in the hypoxia group were higher than in the normoxia.

Conclusions

Hypoxia increases intracellular ROS formation, which induces apoptosis of rotator cuff fibroblasts. Hypoxia also induces MMP-2 and MMP-9 through VEGF pathway. Therefore, hypoxia is a potential cause of rotator cuff tendon degeneration associated with apoptosis and matrix degradation.



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14:54 - 15:02

327 Perspectives In Rotator Cuff Repair With Tenocytes And Scaffold

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3. RoMed Klinikum Rosenheim, Klinik für Urologie und Kinderurologie, Rosenheim; Klinikum der Universität München, LMU, Campus Großhadern, Klinik und Poliklinik für Orthopädie, Physikalische Medizin und Rehabilitation, München, Germany

Aim

Improved ability for histological and biomechanical regeneration in full-thickness rotator cuff tear.

Background

Tendon regeneration is largely determined by the tissue biology after reconstruction. In this connection, among others, tissue inflammation, insufficient vascularization and formation of ossifications result in reruptures and poor clinical outcomes. Regarding shoulder surgery irreparable massive rotator cuff tears and high rerupture rate still represent an unsolved problem. Therefore, autografts, allografts, absorbable xenografts and synthetic biomaterials are experimental used. A new method for tendon regeneration is the scaffold based autologous tenocyte transplantation.

Methods

A full-thickness rotator cuff defect in the tendon-bone junction of infraspinatus tendon of 24 sheep (3 groups with each 8 animals) was created. Group I served as defect group. Animals in group II received implantation of a biodegradable collagen-based scaffold. In group III a scaffold seeded with autologous tenocytes was implanted. Contralateral healthy tendons served as controls. Neo-tendons were investigated 12 weeks postoperatively with histological and biomechanical examinations.

Results

In histological assessment in group III an improved histological fiber pattern, a lower inflammatory response and an increased proteoglycan and collagen synthesis could be detected compared to groups II and I. In mean stiffness a significant difference between group III and II (*p = 0.0313) was registered. With an average tensile strength of 2516 N for group III (healthy control tendons 2995 N) a biomechanical improvement was seen in comparison to groups II and I with 2088 N respectively 2004 N.

Conclusions

Implantation of biodegradable collagen-based scaffold seeded with autologous tenocytes in large animal model results in improved histological and biomechanical outcome compared to unsupplied defect and to defect coverage with non-colonized scaffold. This could be a promising approach for rotator cuff tears that cannot be closed.



15:42 - 15:50

557 Biomechanical Comparison Of Three Different Plate Configuration For Clavicle Midshaft Fracture FixationGokcer Uzer¹, Fatih Yildiz¹, Suat Batar¹, Kerem Bilsel¹, Ergun Bozdog², Hacer Kuduz²

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2. Biomechanics Laboratory, Faculty of Mechanics, Istanbul Technical University, Istanbul, Turkey

Aim

To compare fixation stabilities of anterior, spiral antero-superior and superior plates in the treatment of midshaft clavicle fractures.

Background

In the surgical treatment of midshaft clavicle fractures, antero-superior(spiral) plating is thought to have better fixation stability, especially against torsional loading, than anterior or superior plating.

Methods

Forty-two fourth generation, large size, left-sided, polyurethane, identical clavicle models were divided into three groups, 14 models in each, for the torsional and bending loads. Six-holes, custom-made, titanium plates were produced according to the anatomical features of the artificial clavicles for anterior(group I), antero-superior(group II) and superior(group III) fixations. After fixation of the plates, 5 mm segments were resected from the middle one-third of the clavicles in a standard manner to create comminuted fracture models. Half of the models from each group were tested under rotational and the other half under three-point bending forces using a servo-hydraulic universal test machine. Failure modes, stiffness values and failure loads were recorded.

Results

All models were fractured at the level of most distal screw during the failure torque however several failure modes were observed in three-point bending tests. The mean stiffness values of the group I, II and III were 635.5 ± 77.5 , 766.8 ± 71.9 and 744.9 ± 214.0 ($p=0.171$) for torsional tests (Nmm/deg) and 38.3 ± 4.6 , 19.5 ± 3.4 , 12.9 ± 1.8 for bending (N/mm) tests ($p<0.001$ for group I vs group II and III, and $p=0.015$ for group II vs group III), respectively. The mean failure torques (Nmm) of the group I, II and III were 8248.2 ± 2325.7 , 12637.9 ± 1749 and 10643.0 ± 1837.6 ($p=0.02$ for group I vs II) and the mean failure loads (N) were 408.5 ± 81 , 359.6 ± 122 , and 270.6 ± 86.7 ($p=0.108$), respectively.

Conclusions

In the surgical treatment of comminuted midshaft clavicle fractures, fixation strength of antero-superior plating was found to be higher than anterior plating under rotational forces and similar to the superior plating.



15:18 - 15:26

693 Metabolomic Profiling Of Serum And Capsular Tissue From Patients With Adhesive Capsulitis : A Preliminary StudyHyo-Jin Lee, Yang-Soo Kim, Jong-Ho Kim, **Gwang Young Sung**, Dong-Jin Kim

Seoul St. Mary hospital, Catholic University of Koera, Seoul, South Korea

Aim

To evaluate the relationship between adhesive capsulitis and metabolic profiles.

Background

Adhesive capsulitis of the shoulder is a common disease that debilitates normal life, but its etiology is unclear. Using mass spectrometry, we evaluated the metabolic profiles.

Methods

28 patients consisting of 10 patients with rotator cuff tear(RCT) with adhesive capsulitis(Group I), nine patients with primary adhesive capsulitis(Group II), and nine controls were enrolled. Blood (serum) and tissue from the rotator interval and anterior capsule were collected from all patients. In all, 82 samples were analyzed for metabolite profiling. Amino acids and biogenic amines were analyzed quantitatively by stable isotope dilution in LC-MS/MS using mass spectrometer. For acylcarnitines, hexoses, phosphor-and sphingolipids, mass spectrometry analysis was done by the FIA-MS/MS method.

Results

Comparison of the 186 metabolites evaluated among groups revealed that groups I and II had a significantly higher concentration of sphingolipids than the control group. The concentration of glycerophospholipid was significantly higher in the anterior capsule tissue of groups I and II than that of the control group. Total cholesterol level was positively correlated with sphingolipid concentration in serum and rotator interval tissue. There were no significant differences in the 186 metabolites evaluated between groups I and II.

Conclusions

Metabolic profiling showed that levels of lipid-related metabolites (sphingomyelin and glycerophospholipid) were increased in the anterior capsule tissue and rotator interval tissue of patients with adhesive capsulitis. Furthermore, these metabolites had positive correlation with serum level of total cholesterol. Regarding the results indicating that serum level of total cholesterol has a significant association with the pathogenesis of adhesive capsulitis, control of serum level of total cholesterol may have positive effect on the treatment of adhesive capsulitis.



BERLIN 2017 • GERMANY • SEPTEMBER 13-16

Thursday 14 September

BASIC SCIENCE

14:30 - 16:00

POTSDAM

14:30 - 14:38

954 Patterns Of Osteoporotic Proximal Humerus Fractures**Stefano Carbone**¹, Matteo Papalia², Valerio Arceri³, Riccardo Mezzoprete³, Andrea Carbone¹

1. Sapienza University of Rome, Dept. Of Molecular Medicine, Rome, Italy
2. Clinica Nuova Itor, Dept. Of Orthopaedics and Traumatology, Rome, Italy
3. Ospedale San Camillo de Lellis, Dept. Of Orthopaedics and Traumatology, Rieti, Italy

Aim

The objectives of the study are to identify osteoporotic proximal humerus fractures in a large consecutive series of patients; to analyze radiographic fracture patterns among osteoporotic and non-osteoporotic proximal humerus fractures; and to calculate intra- and inter-observer reliability of assessment of osteoporosis and of osteoporotic fracture patterns.

Background

Assessment of osteoporosis of proximal humerus fractures is often empiric, with a general consensus that osteoporotic fractures are more displaced and comminuted and belong to the elderly.

Methods

This is a prospective observational study of patients admitted in emergency department affected by a proximal humerus fracture between June 2014 and June 2016. Demographic data, comorbidities, x-rays and CT-scans were studied by three surgeons, two times per each. Evaluation of osteoporosis with a three-level evaluation method was assessed; radiographic patterns were studied. Intra- and inter-tester reliability were calculated, as well as correlations between osteoporosis and radiographic patterns.

Results

225 proximal humerus fractures were available, 163/225(72.4%) were identified as osteoporotic. The intra- and inter-observer agreement of the proposed method was 0.83 and 0.84. Significant correlations with diagnosis of osteoporosis were found with Codman-Lego type 12($p=0.041$), metaphyseal comminution($p<0.001$), impaction of fragments($p=0.023$), comminution of tuberosities($p=0.037$), inferior subluxation($p=0.029$). Intra- and inter-tester reliability of evaluation of these osteoporotic patterns were high.

Conclusions

Osteoporosis of the proximal humerus was identified in $\frac{3}{4}$ of a two-year survey population group; most of these patients were elderly female sustaining low energy trauma. These fractures have specific radiographic patterns, as comminution of metaphysis and tuberosities, impaction of fragments, and inferior subluxation of the humeral head. These patterns can be assessed with the simple observation of a 2-plain radiograph, without the use of specific software.



14:54 - 15:02

493 Five Year Follow-Up Results Of The PROFHER Randomised Clinical Trial

Amar Rangan¹, Helen Handoll², Stephen Brealey³, Ada Keding³, Belen Corbacho-Martin³, Catherine Hewitt³

1. The James Cook University Hospital, Middlesbrough, United Kingdom
2. Teesside University, Middlesbrough, United Kingdom
3. University of York, York, United Kingdom

Aim

To determine the long-term treatment effects beyond the two-year follow-up reported in the PROximal Fracture of Humerus: Evaluation by Randomisation (PROFHER) randomised clinical trial that compared surgery versus non-surgical treatment of adults with displaced proximal humeral fractures involving the surgical neck.

Background

PROFHER was a pragmatic, multi-centre randomised controlled trial (RCT) that compared surgical with non-surgical treatment of adults with displaced fractures of the proximal humerus involving the surgical neck. It recruited 250 adults between September 2008 and April 2011, with data available for the Oxford Shoulder Score (OSS), the primary outcome at two-year follow-up. The pragmatic choice of a two-year follow-up balanced feasibility and the expectation that any differences in OSS between treatment groups by two years would represent a true and enduring effect. However, there is insufficient evidence from other randomised trials to confirm this assumption. We therefore extended the follow-up of trial participants for five years from randomisation to test this assumption.

Methods

Trial participants consenting to the extended follow-up were sent postal questionnaires at three, four and five years after trial recruitment. The Oxford Shoulder Score (OSS; the primary outcome), EQ-5D-3L, and recent shoulder operations and fractures data were collected. Statistical and economic analyses, consistent with those of the main trial were applied.

Results

OSS data were available for 164, 155 and 149 participants at three, four and five years. There were no statistically or clinically significant differences between surgical and non-surgical treatment at each follow-up in the OSS. No participant had secondary shoulder surgery for a new complication. Analyses of EQ-5D data showed no significant between-group differences in quality of life over time.

Conclusions

These results confirm that the main findings of the PROFHER trial over two years following fracture occurrence are enduring and persist in the long term.



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15:26 - 15:34

283 Inferior Outcome After Shoulder Arthroplasty For Failed Osteosynthesis In Proximal Humeral Fractures Compared With Primary Shoulder Arthroplasty Of Proximal Humeral Fractures: A Registry-Based Study Of 285 Cases.

Marc Randall Kristensen¹, Jeppe Vejlgard Rasmussen¹, Brian Elmengaard², Steen Lund Jensen³, Bo Sanderhoff Olsen¹, Stig Brorson¹

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2. Aarhus University Hospital, Aarhus, Denmark
3. Aalborg University Hospital, Aalborg, Denmark

Aim

To study if previous osteosynthesis is a risk factor for inferior outcome following shoulder arthroplasty for a proximal humeral fracture.

Background

Failed osteosynthesis of a proximal humeral fracture is often revised to a shoulder arthroplasty, but it has not been reported if previous osteosynthesis is a risk factor for inferior outcome following shoulder arthroplasty for a proximal humeral fracture.

Methods

The study design is a matched case-control study based on data from the Danish Shoulder Arthroplasty Registry (DSR). All patients treated with a shoulder arthroplasty after failed osteosynthesis of a proximal humeral fracture reported to DSR from 2006-2013 were included. Each case was matched with two controls treated with a primary shoulder arthroplasty for an acute proximal humeral fracture. The two groups were compared using the Western Ontario Osteoarthritis of the Shoulder index (WOOS) and the relative risk of revision as outcome measures.

Results

285 cases and 570 controls were included. The mean WOOS was 46 (SD = 25.2) and 52 (SD = 26.6) respectively. The difference was statistically significant (95% CI 2.0 to 10.7; $p = 0.005$). The relative risk of revision for a shoulder arthroplasty after failed osteosynthesis was 1.8 (95% CI 1.1 to 3.0; $p = 0.01$) with a primary arthroplasty as reference.

Conclusions

A revision with a shoulder arthroplasty after failed osteosynthesis cannot be counted on as a fall back. The results support that we should be more inclined to choose a shoulder arthroplasty rather than an osteosynthesis if there is any doubt.



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15:18 - 15:26

737 Results And Therapeutic Management Of Combined Fractures Of The Glenoid And Proximal Humerus

Matthias Königshausen, Eileen Mempel, Valentin Rausch, Alexander Von Glinski, Jan Gessmann, Thomas Armin Schildhauer, Dominik Seybold

University Bergmannsheil Bochum, Bochum, Germany

Aim

The aim of this study was to reveal the results of operatively and non-operatively treated combined fractures.

Background

Ipsilateral glenohumeral fractures (proximal humerus [PH] with anterior glenoid rim fracture [GRF]) are a rare fracture combination. There are no data and no therapeutic recommendations available about such combined fractures within literature.

Methods

n= 17 patients (64y. on average) with a combined fracture of a large anterior GRF and an ipsilateral PH-fracture were followed-up (47 month on average) after initial treatment. Patients with a GRF and only an isolated fracture of the major tubercle were not involved. The indication for surgery was depending on displacement of fragments at PH and size and displacement of the GRF. The Constant score [CS], Rowe Score [RS], Western Ontario Shoulder Instability Index [WOSI] and the Oxford Shoulder Score [OXS] were used and the radiographs were analysed. In all patients, the trauma mechanism was a direct impact on the glenohumeral joint.

Results

Of the 17 patients, there were n=13 3-part-, n=2 4-part- and n=2 subcapital PH-fractures. n=7 GRF were displaced (>3mm) and n=10 cases were non-displaced fractures (<3mm). In n=8 of the cases ORIF of the PH (plate osteosynthesis) and the GRF (screws/anchors) were performed and in n=7 cases only the PH-fracture was fixed while treating the GRF non-operatively (n=2 patients non-operative treated PH/GRF). We found a CS of 62 points, RS 70p, WOSI 70% and a OXS of 37p. As complications [24%] partial AVN (n=2), screw perforation of the humeral head (1) and screw loosening at the glenoid (1) were detected. N=2 patients showed osteoarthritis (III°/II°).

Conclusions

In case of an operative indication, the PH should be primarily addressed before refixation of the GRF via subscapularis tenotomy. Thus, acceptable results can be achieved. In contrast to the isolated GRF, the rare combined fractures are not caused by shoulder dislocations.



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15:02 - 15:10

529 Locked Plating For Displaced Proximal Humeral Fractures - Outcome And Complications In 1104 Consecutive Cases.**Ben Ockert**, Mark Daferner, Niklas Biermann, Georg Siebenbürger, Mirjam Lange, Tobias Helfen, Wolfgang Böcker

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Aim

To identify the functional outcome and the pattern of complications following locked plating of displaced proximal humeral fractures in a larger cohort of patients.

Background

Locked plating is a common procedure in the treatment of displaced proximal humeral fractures, however functional outcome varies and complication rates range from 5-35%.

Methods

Between 02/2002-12/2014, a total of 1104 displaced proximal humeral fractures were treated by means of open reduction and internal fixation with a locking plate at a double centre university hospital setting. Fractures were classified according to AO- and Neer's classification, and patients were prospectively followed clinically and radiographically in a longitudinal observational study.

Results

Of 1104 fractures (1093 patients, mean patient age: 67.3 years, 67.3% female) treated with locked plating by one of 28 individual senior surgeons, fracture healing following anatomic reduction was achieved in 874 (79.2%) of cases. Loss of fixation was observed in 142 cases (12.8%) due to secondary varus-/ posterior-varus displacement of the humeral head (screw cut out n=85). In 43 cases (3.9%) humeral head necrosis within 12 months of surgery, and in 18 cases (1.6%) late avascular necrosis of the head (>2 years from surgery), was noted. Overall functional outcome (Constant-Score) was 67.2 and 82.7% to the uninjured side of 583 patients (52.8% clinical follow-up). An unplanned second surgery other than routine hardware removal was necessary in 124 cases (11.2%), of which revision osteosynthesis (43.5%) and arthroplasty (30.6%) were performed most frequently.

Conclusions

Following locked plating of displaced proximal humeral fractures, minor and major complications related to the osteosynthesis were observed in 18%, and revision surgery was required in 11% of this larger cohort study, over a 12-year period. Complications may be classified according to the presence of typical patterns (i.e. degree of varus displacement, presence of screw cut out) and relate to the management that was conducted.



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14:38 - 14:46

425 Is Central Skeleton Bone Quality A Predictor Of The Severity Of Proximal Humeral Fractures?**Jae-Hoo Lee**, In Park, Hwan-Sub Hyun, Yoon-Sang Jeon, Sang-Jin Shin

Ewha Womans University Mokdong Hospital, Seoul, South Korea

Aim

This study aimed to evaluate the correlation between bone attenuation around the shoulder joint assessed on conventional computed tomography (CT) and bone mineral density (BMD) based on dual-energy X-ray absorptiometry (DEXA) of the central skeleton and the correlation between the bone quality around the shoulder joint and the severity of the fracture pattern of the proximal humerus.

Background

Whether the BMD of the central skeleton adequately reflects the bone quality of the proximal humerus is not clear.

Methods

200 patients with proximal humeral fracture who underwent preoperative shoulder CT as well as DEXA within 3 months of the CT examination were included. Fracture types were divided based on the Neer classification. After reliability testing, bone attenuation of the glenoid, three portions of the humeral head, and metaphysis was measured. Partial correlation analysis was used to assess the correlation between the bone quality around the shoulder joint on CT and the BMD on the central skeleton. And partial correlations between fracture classification and CT/DEXA results were also evaluated.

Results

Bone attenuation measurements of the glenoid and humeral head showed good to excellent reliability (intraclass correlation coefficient, 0.623–0.998). Bone attenuation of the central portion of the humeral head on CT showed a significant correlation with the BMD of L1, L4, the femoral neck, and trochanter (correlation coefficient, 0.269–0.431). Bone attenuation of other areas showed a lower correlation with BMD by DEXA. As the level of the Neer classification increased from a 2 to 4-part fracture, bone attenuation of the central humeral head decreased significantly ($r=-0.150$, $p=0.034$).

Conclusions

DEXA examination of the central skeleton may not reflect the bone quality of the proximal humerus and severity of proximal humeral fracture. Direct assessment of the bone quality of the proximal humerus is recommended to determine the osteoporotic nature of the fracture.



14:46 - 14:54

666 Can The Knowledge Of The Glenohumeral Relationship Be Helpful In The Treatment Of Proximal Humeral Fractures?

Alexander Gallant, Thomas Van Isterdael, Lieven De Wilde, Alexander Van Tongel

University Hospital Gent, Gent, Belgium

Aim

The aim of the study is to evaluate the glenohumeral relationship in 4-part proximal humeral fractures.

Background

In displaced 4-part proximal humeral fractures, a common described surgical technique is to perform a joy-stick maneuver to reduce the varus or valgus deformity. No surgical guidance exists on the reduction of the rotational deformity in these fractures.

Methods

32 3D-images of 4-part proximal humeral fractures with full scapula and humerus were included in the study. The angles between the plane of the humeral head and the glenoid plane were measured in three dimensions using the software program Mimics. These angles correlated with varus-valgus, endorotation-exorotation and retroversion-anteversion of the humeral head with reference to the glenoid.

Results

In 29 cases the humeral head was positioned in varus and in 3 cases the humeral head was positioned in valgus compared to the glenoid. There was a significant correlation between varus/valgus and endo-/exorotation ($P < 0,01$) and between varus/valgus and ante-/retroversion ($P < 0,01$). When the humeral head is positioned in varus, it is positioned in endorotation and retroversion. On the other hand, when the humeral head is positioned in valgus, it is also positioned in exorotation and anteversion.

Conclusions

When evaluating the glenohumeral relationship in 4-part proximal humeral fractures, there is a significant correlation between varus/valgus, endo-/exorotation and ante-/retroversion. This information can be helpful when using the joystick maneuver in the reduction of 4-part proximal humeral fractures. When the position of the humeral head is in varus, the surgeon not only has to reduce the varus but also the endorotation and retroversion of the humeral head. Likewise, when the humeral head is positioned in valgus, the surgeon will have to reduce the valgus as well as the exorotation and anteversion.



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15:10 - 15:18

122 Applicability And Clinical 1-Year-Results Of An Evidence-Based Treatment Algorithm For Proximal Humerus Fractures – A Prospective Analysis

Christian Spross, Jan Meester, Ruben Angiolo Mazzucchelli, Vilijam Zdravkovic, Gabor Puskas, Bernhard Jost

Kantonsspital St. Gallen, St. Gallen, Switzerland

Aim

To assess the applicability and the clinical outcome of an evidence-based treatment-algorithm for proximal humerus fractures (PHF).

Background

To help with the decision making for PHF, we developed a treatment-algorithm which includes patient's demands, bone quality and fracture morphology.

Methods

In the years 2014 and 2015, patients with isolated, non-pathologic PHF were included. At the time of fracture, the quality of life (EQ-5D) and the level of autonomy before the injury were recorded. The fractures were classified and the local bone quality measured. If possible, the patients were treated according to the algorithm including: conservative treatment, ORIF, hemi- (HA), reverse shoulder arthroplasty (RTSA). Radiographic and clinical follow-up took place after 3 months and 1 year. Complications and revisions were analysed.

Results

193 patients (mean age: 66y, 135 female) could be included. 161/83% patients were treated according to the algorithm. We classified 84/44% 1-part, 76/39% 2-part, 16/8% 3-part and 18/9% 4-part fractures. 132/68% patients were treated conservatively, 38/19% with ORIF and 24/13% with prosthesis. Overall, the mean EQ-5D was the same before trauma and 1y after the treatment (0.9-0.9) and the mean 1-year clinical scores were: CS: 73pts and Subjective Shoulder Value: 84%. The overall complication rate was 17%(n=33), with a revision rate of 14%(n=28). Only 3%(n=4) of the conservatively treated patients needed later surgery. Most of revision surgeries (n=23) were needed in the ORIF and the HA group, whereof most were plate removals (n=11).

Conclusions

The algorithm turned out to be a helpful clinical tool for a teaching hospital. The patient specific treatment helped to achieve good quality of life and mainly good clinical results after 1 year. The pathways for conservative treatment seem to be successful. Patients selected for ORIF or HA, still have a high revision rate, thus the surgical technique and the algorithm might be improved in this regard.



15:34 - 15:42

312 Early Versus Late Reverse Shoulder Arthroplasty For Proximal Humerus Fractures: Does It Matter?

Adam Seidl¹, Daniel Sholder², William Warrender², Michael Livesey², Gerald Williams², Joseph Abboud², Surena Namdari²

1. University of Colorado, Aurora, Co, United States
2. The Rothman Institute, Philadelphia, Pa, United States

Aim

The purpose of this study is to compare the outcomes between patients who underwent early reverse shoulder arthroplasty (RSA) for proximal humerus fracture (PHF) to those patients who underwent an alternative initial treatment for their fracture and subsequently required RSA.

Background

There is recent support in the literature for the use of RSA for treatment of displaced PHF in elderly patients. Despite this recent enthusiasm, there is currently no study comparing outcomes when this operation is performed early for acute fracture or late for failed alternative treatment (non-operative, open reduction internal fixation (ORIF), hemiarthroplasty).

Methods

Patients who underwent RSA for acute PHF, PHF sequelae, failed hemiarthroplasty for PHF, and failed ORIF for PHF were identified. Two year follow-up was required for inclusion. Patients were grouped based on timing of RSA. The "early RSA" group underwent RSA within 4 weeks of fracture while the "late RSA" group underwent RSA greater than 4 weeks after fracture. The late RSA group was subdivided by initial treatment (non-operative, hemiarthroplasty, ORIF). Clinical and radiographic outcomes were compared.

Results

Forty-seven patients met inclusion criteria with 15 in the early RSA group and 32 in the late RSA group (non-operative (15), hemiarthroplasty (10), ORIF (7)). The early RSA group demonstrated better external rotation (29° vs 13° , $p=0.002$) regardless of initial treatment and better forward elevation (130 vs 107 , $p=0.047$) than those initially treated with hemiarthroplasty. The early RSA group showed a trend towards better SANE scores (80.9 vs 69 , $p=0.070$). Tuberosity healing rate was higher in the early RSA group (100% vs 40% , $p<0.001$).

Conclusions

While early and late RSA can yield successful outcomes, early RSA results in a higher tuberosity healing rate and improved external rotation. Late conversion of hemiarthroplasty to RSA may not result in the overhead elevation that is typically attained after early RSA for PHF.



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15:42 - 15:50

788 Reverse Shoulder Arthroplasty For Fracture Sequelae With Minimum 5-Year Follow-Up**Brian L. Seeto**¹, Mikaël Chelli¹, Gilles Clowez¹, Lionel Neyton², Christophe Trojani¹, Pascal Boileau¹

1. IULS - Hôpital Pasteur 2, Nice, France
2. Centre Médical Santy, Lyon, France

Aim

To assess the mid-term results and prognostic factors of RSA in fracture sequelae (FS).

Background

Reverse Shoulder Arthroplasty (RSA) has shown relatively satisfying results in the treatment of acute proximal humerus fractures, and can be used for fracture sequelae.

Methods

Multicenter, retrospective study of patients who underwent RSA for proximal humerus fracture sequelae (minimum six weeks from fracture). Radiographs were classified according to the Boileau classification. Patients were assessed with a minimum 5-year follow-up. Radiologic and clinical evaluation was performed with a mean follow-up of 8 years (5 to 14).

Results

Between 1993 and 2010, 118 RSA were implanted for FS. Sixty-two (53%) had a postoperative complication. At last follow-up, there were 51 cases of greater tuberosity (GT) compromise (i.e. migration, excision or resorption) and 13 cases of humeral loosening. Fourteen patients (12%) were reoperated on and 2 no longer possessed a RSA. The mean Constant score increased from 24 to 53 ($p < 0.01$), and was lower (41) in type II (chronic dislocations). Lack of an anatomical GT at final radiographic followup (migration, excision, resorption or osteotomy) was associated with a poorer clinical result (Constant score = 50 vs 56, ER1 = -4° vs 12° , external rotation lag sign = 67% vs 12%; $p < 0.05$) and worse radiological result (humeral loosening = 56% vs 11%; $p < 0.02$). A missing or atrophic teres minor was associated with a worse active external rotation and a higher rate of surgical revision (16% vs 1.4%; $p < 0.02$).

Conclusions

Functional results of RSA for FS are worse than those for other indications and are subject to a higher complication rate. The absence of an anatomical GT or lack of a functional posterior cuff are poor prognostic factors and should be considered in surgical planning.



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15:50 - 15:58

485 INTRAMEDULLARY NAILING IN THE TREATMENT OF HUMERAL SHAFT FRACTURES: DISTAL INTERLOCKING OR NOT?**Romain Colombi**, Adrien Bevand, Ludovic Labattut, Brice Viard, Pierre Martz, Emmanuel Baulot

Dijon university hospital, Department of Orthopaedic surgery, Dijon, France

Aim

Is the distal interlocking necessary for intramedullary nailing in humeral shaft fractures treatment?

Background

The gold standard for intramedullary nailing (IMN) in humeral shaft fractures treatment is the bipolar interlocking. The distal interlocking for IMN increase several morbid parameters: surgical time, fluoroscopy time, number of incisions and neurovascular risks. But there is no study comparing IMN with or without distal interlocking in the treatment of humeral shaft fractures. Our study's goal is to show that isolate proximal interlocking means no significant differences with bipolar interlocking for consolidation and clinical results.

Methods

A continuous and comparing retrospective study was performed in our department. 121 consecutive patients from 2009 to 2016 with acute humeral shaft fracture treated with antegrade IMN, were retrospectively studied. The 6-month fracture union was the primary outcome. The second one was final clinical outcome, at minimum 6-month follow-up, using usual scores for shoulder (Constant, Subjective Shoulder Value) and elbow (Mayo Elbow Performance Score, Subjective Elbow Value). Other parameters were analysed: Pain evaluation with Visual Analogic Scale (VAS), operating and radiation time.

Results

Both two groups were not significantly different for population, fractures, or immobilization duration. No significant difference was found for bone union ($p=0.51$), shoulder functional outcomes, elbow functional outcomes or pain with VAS. Nevertheless, there were significant differences for operating time ($p<0.01$) and fluoroscopy time ($p<0.01$) during the surgery.

Conclusions

This study showed that isolate proximal interlocking for humeral shaft fractures means no significant differences with bipolar interlocking for consolidation and clinical results, while avoiding additional operating and fluoroscopy time and risks linked to distal approaches.



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Thursday 14 September

ELBOW I (INSTABILITY & OTHERS)

16:30 - 18:09

PAVILLON

17:50 - 17:58

791 Vascularity Visualized By Doppler Sonography As A Predictor Of Healing Potential Of The Osteochondritis Dissecans Of The Humeral Capitellum

Yoshikazu Kida, Toru Morihara, Yoshihiro Kotoura, Tsuyoshi Sukenari, Ryuhei Furukawa, Yukichi Kabuto, Okihiro Onishi, Masataka Minami, Hiroyoshi Fujiwara, Toshikazu Kubo

Department of Orthopaedics, Graduate School of Medical Science, Kyoto Prefectural University of Medicine, Kyoto, Japan

Aim

The objectives of this study were twofold: 1) to evaluate the relationship between Doppler ultrasound (US) signals observed in osteochondritis dissecance of the humeral capitellum (OCDC) and X-ray stage; 2) to determine if the presence of Doppler US signals in OCDC could be the predictor of healing potential.

Background

The significance of vascularity visualized by Doppler sonography in OCDC is unclear.

Methods

Fifty patients with OCDC treated conservatively were enrolled. During the conservative treatment, Doppler sonography was performed to assess the presence of vascularity in the OCD lesion, and radiographic examination were evaluated to determine the X-ray stage (stage I: radiolucent stage, stage II: fragmentation stage, and stage III: loose body stage) of the OCDC. Radiographic examination of the elbow was examined after 6 weeks to evaluate the healing of the lesion. If the size of the lesion decreased or new bone formations were observed, the healing of the lesion was considered to be improved. The χ^2 test was used for statistical evaluation.

Results

The Doppler US signals in OCD lesion were positive in 23 patients and negative in 27 patients.

The healing of OCD lesions improved in 78.2% for the positive Doppler US signal group, but only 18.5% for the negative Doppler US signal group. The presence of the Doppler US signal was significantly related to the improvement of healing ($P = 0.00002$). The Doppler US signal were positive in 78.9% for stage I, 36.4% for stage II, and 0.0% for stage III. The presence of Doppler US signal was significantly related to early X-ray stage ($P = 0.0002$) \square

Conclusions

The presence of vascularity in the OCD lesion is important for the improvement of healing during the conservative treatment period. The vascularity visualized by Doppler sonography could be a useful predictor for healing potential of the OCDC when treated conservatively.



17:26 - 17:34

935 The Majority Of Isolated Coronoid Fractures And Fracture Dislocations Can Be Treated Conservatively

Antonio M Foruria, Jesus Cobos, Begoña Gutierrez San Jose, MAria Valencia Mora, Diana Morcillo, Emilio Calvo

Fundacion Jimenez Diaz, Madrid, Spain

Aim

1-Evaluate the outcome of a conservative treatment protocol designed for isolated coronoid fractures and fracture-dislocations (ICF), and focused on soft tissue healing and 2- Characterize the fractures with a dedicated image analysis protocol

Background

After description of varus posteromedial instability complex elbow instability injury pattern, the preferred method of treatment for isolated coronoid fractures and fracture-dislocations (ICF) remains unclear. We Hypothesize: conservative treatment of ICF focused in soft tissue healing can provide good clinical results in the majority of patients

Methods

30 consecutive patients sustaining and ICF were prospectively evaluated. All cases underwent elbow CT. Triplanar and tridimensional CT reconstructions from raw dicom files were created according to a specific protocol based on Three specific axis referenced to the proximal ulna. A set of variables were obtained from CT reconstructions. Patients were immobilized in a long arm cast during 3 weeks, and 3 more weeks with a Sling and performing protected mobilization exercises. Last Follow up X-rays were obtained at least one year after injury

Results

16 males and 14 females were included, with a mean age of and a mean follow up of 27 ± 24 months (53-12). Fifty-seven percent had an associated dislocation. Mean coronoid fracture height was $5.7 \pm 1,3$ mm (3,7-7,9). Mean percentage of coronoid height fractured was 32 ± 6 (20-43). Mean fracture displacement was 3 ± 2 mm (1-9). The fracture plane had a medial tilt in 80% of cases and exited at the anterior margin of the sublime tubercle in 60%, and inside the tubercle in 6%. Fracture bed was concave in 40% of cases, and a posteromedial humeral impaction fracture was encountered in 20%. Mean MEPS score was 95 ± 9 (70-100). Mean DASH Score 7 ± 13 (0-57). Mean flexion-extension 2-140 and pronosupination 72-84. 78% rated their elbow as being normal or nearly normal.

Conclusions

Specific conservative treatment for ICF can provide good results in the majority of cases



16:38 - 16:46

531 Effect Of Capsule Repair On Rotational And Varus Stability In PLRI Reconstruction

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2. VA Long Beach Healthcare System, Long Beach, United States

Aim

Investigate ROM and varus angle and subluxation after reconstruction of the lateral collateral complex.

Background

During reconstruction surgery of posterolateral rotatory instability (PLRI). the joint capsule is repaired, but its biomechanical influence on elbow stability has not been described.

Methods

Six fresh frozen cadaveric elbow specimens were used. Varus laxity in supination, pronation and neutral forearm rotation with 1 Nm load and forearm ROM with 0.3 Nm torque were measured using a Microscribe 3DLX digitizing system (Revware Inc, Raleigh, NC). Each specimen was tested under four different conditions: Intact, Complete Tear with LUCL, RCL and capsule tear, LUCL/RCL reconstruction + capsule repair and LUCL/RCL reconstruction only. Reconstruction was performed according to the docking technique (Jones, JSES, 2013). Each condition was tested in 30°, 60° and 90° elbow flexion.

Results

Total ROM of the forearm significantly increased in all flexion angles from intact to Complete tear ($p < 0.001$). ROM was restored to normal in 30° and 60° elbow flexion in both reconstruction conditions ($p > 0.05$). LUCL/RCL Reconstruction +/- capsule repair in 90° elbow flexion was associated with a significantly lower ROM compared to intact ($p = 0.0003$ and $p = 0.015$ respectively). Varus angle increased significantly from intact to complete tear ($p < 0.0001$) and restored to normal in both reconstruction conditions ($p > 0.05$) in 30° and 60° elbow flexion. In contrast varus angle was significantly lower in 90° elbow flexion in both reconstruction conditions compared to intact (both $p < 0.0001$).

Conclusions

Reconstruction of the lateral collateral complex restores elbow stability, ROM and varus laxity independent of capsular repair. Over tightening of the elbow joint occurred in 90° elbow flexion, which was aggravated by capsular repair. This overtightening causes stress to the transplant and might cause failure of the reconstruction. Therefore, postoperative rehabilitation should avoid high degrees of elbow flexion to protect the reconstruction from wearing out.



17:58 - 18:06

921 Role Of The Lateral Collateral Ligament In Posteromedial Rotatory Instability Of The Elbow

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2. Mayo Clinic, Department of Orthopedics, Minnesota, United States

Aim

The aim of this study was to test the hypotheses that, first, the lateral collateral ligament (LCL) tear is responsible for the elbow subluxation in posteromedial rotatory instability (PMRI); second, that an elbow affected by an anteromedial subtype 2 coronoid fracture and a pMCL tear exhibits articular contact pressures (CP) that are significantly different from both an intact elbow and an elbow affected by PMRI

Background

PMRI is typically characterized by subluxation causing joint incongruity under varus load and high risk of early onset arthritis. The role of soft tissues in PMRI is poorly understood.

Methods

Six cadaveric elbows were tested under gravity varus stress using a custom-made machine designed to simulate muscles loads and to passively flex the elbow from 0° to 90° and measure joint contact pressures using the Tekscan sensor and software. After testing the intact specimen (INTACT-elbow), an anteromedial subtype-2 coronoid fracture with a PMCL tear (COR+PMCL-elbow) was tested. Testing was repeated after performing an LCL tear to simulate a PMRI injury (PMRI-elbow). The highest values of mean contact pressure were used for the comparison among the 3 groups.

Results

The specimens showed a progressive decrease of coronoid surface contact, and a progressive increase in CP proportional to the progression of the testing steps. The LCL tear caused the PMRI-elbow to subluxate while the COR-PMCL-elbow was never characterized by subluxation. The contact pressure in the COR+PMCL-elbow was significantly higher than in the INTACT-elbow ($P < .03$) and significantly lower than in the PMRI-elbow ($P < .001$)

Conclusions

The LCL lesion in PMRI is necessary for the elbow to subluxate and causes marked elevations in contact pressures. However, even without subluxation, the COR+PMCL-elbow showed higher contact pressures compared to the INTACT-elbow. The subluxation subsequent to the LCL tear caused a further increase in contact pressure.



17:10 - 17:18

348 The Stiff But Unstable Elbow: Midterm Results After Arthrolysis And Ligament Stabilization

Stephanie - Geyer¹, Christian - Schoch², Michael - Geyer²

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2. St. Vinzenz Klinik Pfronten, Pfronten, Germany

Aim

Associated instability in stiff elbows is hard to detect. Arthroscopic instability diagnostics during arthrolysis are necessary to determine the residual instability and can indicate an additional or secondary stabilization. Midterm results after arthrolysis and ligament stabilization are now presented.

Background

From 2005 to 2015 86 patients in our clinic had an arthrolysis of the elbow due to elbow stiffness. 30 patients (34,9%) showed an additional instability in the arthroscopic diagnosis and required a stabilization. 21 were stabilized in the same session; 9 patients had primarily the arthrolysis and secondarily the stabilization.

Methods

61 months (min: 14; max.:140) postoperatively a clinical examination with a follow-up rate of 86,2% (n=25/29) was done. In this survey the Mayo-Elbow-Performance-Index (MEPI), the Oxford-Elbow-score (OES) and our own subjective elbow questionnaire (SEQ) were evaluated. In addition the range-of-motion (ROM) pre- and postoperatively were measured.

Results

In the MEPI 80 points (min.:50; max.:100) and in the OES 38 points (min.:18; max.:48) were achieved. In the SEQ an improvement from 53 (min.:28; max.:77) to 70 points (min.: 55; max.: 98) postoperatively was found. The postoperative ROM was 110° (min.:40; max.:140). Patients with a traumatic ligament instability gained postoperatively 17,5° (n=6), patients with an additional bone lesion to the ligament lesion gained 7,5° (n=14). Patients with atraumatic instability and arthrosis (n=5) had a reduced ROM of 10° to preoperative. 5 patients had another arthrolysis after the stabilization. All but 2 patients would have done the surgery again.

Conclusions

The stiff but unstable elbow is a complex clinical picture which needs arthroscopic instability diagnostics to be detected and understood. The postoperative results after arthrolysis and stabilization justify the additional stabilization after traumatic ligament lesion with or without bone lesions. The ligament stabilization of atraumatic instability needs to be discussed.



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16:54 - 17:02

754 Transcatheter Arterial Embolization Of Abnormal Vessels As A Treatment For Lateral Epicondylitis Refractory To Conservative TreatmentYuji Okuno¹, Wataru Iwamoto¹, Hiroyasu Ikegami²

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2. Toho University, Tokyo, Japan

Aim

To describe the safety and efficacy of transcatheter arterial embolization (TAE) for lateral epicondylitis that was resistant to conservative treatment.

Background

Abnormal vessels and accompanying nerves are possible sources of pain with lateral epicondylitis. With the advent of new technology in the field of interventional radiology, intra-arterial embolization of abnormal neovessels becomes possible, and appear to be a potential target to treat chronic pain.

Methods

This prospective study was conducted in 24 patients with lateral epicondylitis that was resistant to conservative treatments for more than 3 months, symptom duration longer than 6 months, and with moderate to severe pain who were treated by TAE between March 2013 and October 2014. Two patients were lost to follow-up and remaining 22 patients were followed up for 2 years after TAE.

Results

Abnormal vessels were identified in all of the patients. No major adverse events were observed. The Quick Disability of the Arm, Shoulder and Hand scores significantly decreased at 1, 3, 6, and 24 months post-treatment (50.8 vs. 23.4, 8.3, 5.3, and 2.7 respectively; all $P < 0.001$). There was a statistically significant ($P < 0.0001$) change from baseline to the last observed value in all of the clinical parameters, including the pain visual analog scale scores, Patient-Rated Tennis Elbow Evaluation (PRTEE) pain scores, PRTEE total scores, and pain free grip strength. Magnetic resonance imaging that were obtained 2 years after TAE showed an improvement in tendinosis and tear scores compared to baseline, and no patients showed bone marrow necrosis, obvious cartilage loss, or muscle atrophy.

Conclusions

TAE is one possible treatment option for lateral epicondylitis who failed to improve with conservative treatments.



17:34 - 17:42

220 Clinical Outcome Following Reconstruction Of Subacute Distale Biceps Tendon Ruptures

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Aim

Aim of this study was to compare the clinical results of subacute (> 3 weeks) reconstructions of distal biceps tears (DBT).

Background

Prolonged reconstruction might lead to inferior clinical results and higher complication rate

Methods

In this retrospective analysis patients from 01/2005 until 12/2014 with reconstruction of distal biceps tears were included. Out of n=92 patients that had a primary anatomical reconstruction n=45 (m=45; Øage 45.6±9.5 years) could be evaluated and divided into two groups: acute reconstruction (AR) were operated within 3weeks after tear and subacute reconstruction (SR) with more than 3weeks until surgical intervention.

Range of motion, Hook-Test and proximalisation of the biceps belly were evaluated. The Subjective-Elbow-Value (SEV), DASH-Score, Mayo and Oxford-Score were raised and complications were documented. Heterotopic ossifications were detected using conventional x-rays. Furthermore strength testing for flexion/extension and pronation/supination in contrast to the contralateral side were conducted.

Results

Out of these patients n=29 (Øage 44.4±9.6 years) had an acute reconstruction within 9.2±3.7 days and 16 patients (Øage 47.8±9.2 years) with a subacute reconstruction within 31.4±16.2 days (p<0,001). Average FU was 42.5±28 months. The global ROM for E/F and P/S did not show significant differences (E/F Ø138.8±13.0°vs.137.5±8.2°, P/S165.2±19°vs.164.4±14.5°). A tendency to better results was seen in SEV with AR group had 89±16.0 and SR group had 78.8±19.7% (p=0,059). Besides this no significant differences were seen in DASH, Mayo and Oxford Score. A pathologic Hook-Test was detected in one patient of the SR-group. Heterotopic ossifications were found in 27.6vs.18.8%. Flexion strength reached 105% in AR-group and 98% in SR-group compared to the contralateral side (n.s.) and supination strength 90.1vs.94.1% (n.s.).

Conclusions

No significant differences were detected following subacute reconstruction of DBT compared to the acute intervention. Still there seems to be a tendency to subjective inferior results after prolonged reconstruction, underlining the necessity for a surgical intervention at an early stage.



16:30 - 16:38

491 Relevant Anatomy Of The Lateral Collateral Ligament Of The Elbow. An Anatomic Study

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2. San Luigi Gonzaga Hospital, University of Turin Medical School, Turin, Italy

Aim

The aim of our study was to report the relationship between the Kocker approach and the elbow lateral collateral ligament (LCL).

Background

Iatrogenic LCL tears have been reported in the literature in case of surgery in the lateral side of the elbow. A generally accepted method to avoid this complication is to use the Kocker approach, since it is considered to be anterior to the ulnar component of the LCL (L-UCL).

Methods

Twenty specimens were investigated. The interval between the anconeus and the extensor carpi ulnaris (i.e. Kocker interval) was identified by direct visualization after skin removal. The interval was explored from the area of lateral epicondyle to the posterior border of the ulna and was marked with two needles placed in these two points. The interval was then bluntly dissected. The bellies of the anconeus and EUC muscles were detached from the ulna without damaging the underlying capsuloligamentous structures. The anatomy of the LCL was observed and described, with a special focus on its relationships with the previously marked Kocker interval. The capsuloligamentous structures were then incised in line with the Kocker interval.

Results

In 13 out of 20 cadavers the Kocker interval incision resulted in a tear of the capsuloligamentous structures together with the L-UCL tear. In 4 cadavers a well-defined L-UCL was not found. In 3 elbows the Kocker interval was anterior to the L-UCL. In 15 specimens the posterolateral drawer test was positive after opening the Kocker interval. The instability consisted in a subluxation rather than a dislocation in all these 15 elbows.

Conclusions

Although the L-UCL is generally considered to be anterior to the Kocker interval, this study showed a high risk of iatrogenic damage when the Kocker approach is used. This study suggests caution during the Kocker interval opening or the use of more anterior surgical approaches.



16:46 - 16:54

664 Tennis Elbow: A Psychological Condition?

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2. Fedris, Brussel, Belgium
3. University Gent, Gent, Belgium

Aim

We hypothesised that there is a psychological factor ("tennis elbow personality") in the etiology of tennis elbow.

Background

Despite several therapeutic options, there is no standardized protocol for treating tennis elbow and there is still insufficient evidence of effectivity for each of the conservative therapies. After all, it remains unclear if the treatments offer any benefit on the long-term, compared to watchful waiting. Together this makes that one fifth of patients keeps experiencing significant complaints, despite several treatment attempts, with mostly prolonged absenteeism as a consequence.

Methods

The psychological profile of tennis elbow patients was compared with that of healthy controls, using a questionnaire about personality, perfectionism, anxiety, depression, work satisfaction and working conditions. Patients who consulted at the Ghent University Hospital between September 2015 and January 2017 and who met the clinical diagnosis of tennis elbow, were offered the questionnaire. The controls have never had a tennis elbow, but belong to the same risk group (same age category and professional disciplines).

Results

63 patients and 100 controls were recruited. Patients score significantly lower on the personality trait altruism. Patients, especially men, score significantly higher on perfectionism and are more likely to develop a depression. Both groups score relatively high on anxiety. Concerning work, patients indicate a significantly higher workload (especially men), and a significantly lower autonomy (especially women). Female patients also indicate less contact with colleagues. On the other hand, work satisfaction is relatively high in both groups.

Conclusions

The results suggest that there is a relationship between tennis elbow related complaints and psychological characteristics. Nonetheless, the results were not strong enough to define a specific "tennis elbow personality".



17:02 - 17:10

192 Two Year Follow Results Of Arthroscopic Lateral Collateral Ligament Imbrication To Treat Posterolateral Rotatory Instability Of The Elbow

Neil Jarvis¹, Roger Van Riet²

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2. AZ Monica and University of Antwerp, Antwerp, Belgium

Aim

To study the results of a new arthroscopic technique to plicate the lateral collateral ligament in patients with grade 1 or 2 posterolateral rotatory instability of the elbow.

Background

Posterolateral instability (PLRI) of the elbow is the most common encountered elbow instability. Open reconstruction and repair of the lateral collateral ligament (LCL) provides consistently good results at long term follow up. Here we present the technique of arthroscopic imbrication of the LCL and short to mid-term follow up.

Methods

20 consecutive patients were treated with arthroscopic imbrication of the lateral collateral ligament complex using two PDS sutures. Average age at the time of surgery was 40.1 (20-61), with a mixture of traumatic and iatrogenic causes. Delay between onset and final surgical treatment was 48 months. Follow up was a mean of 24.1 months (14 -33).

Results

There were no complications related to the arthroscopic technique. Elbow stability and resolution of PLRI was achieved in 95% of cases, with one failure due to pain, requiring open revision using allograft. Range of motion was maintained or improved post operatively from a mean of 5 - 132 degrees to 2 - 141 degrees. Mayo Elbow Performance Score improved from 47(20-75) to 92, (70-100) and Quick Disabilities of the Arm Shoulder and hand improved from 53 (25-82) to 11 (0-36).

Conclusions

Arthroscopic LCL imbrication is a reliable method of treating mild to moderate PLRI and improving patients function and pain at short to mid-term follow up without the morbidity of the standard open surgical technique, which is still recommended in severe cases.



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17:18 - 17:26

589 Treatment Of Pediatric Chronic Posterior Radial Head Dislocations

Dave R. Shukla, Maegan Shields, Anthony Vaichinger, Andrew Assenmacher, James S. Fitzsimmons, **Shawn W. O'Driscoll**

Mayo Clinic, Rochester, United States

Aim

Our aim was to evaluate the outcomes after the operative management of chronic posterior radial head dislocations.

Background

Pediatric and adolescent radial fractures are commonly missed, and when diagnosed, are commonly managed non-operatively. Small series have reported an association with these entities leading to delayed instability and rapid progression of arthritis.

Methods

The records of 51 pediatric patients with chronic posterior radial head subluxations due to Salter-Harris types III or IV fractures were reviewed. 20 patients did not have the minimum 2 years of follow-up, leaving 31 patients. The mean age at surgery was 14 (7-17) years. Some patients required one or more of the procedures in conjunction. 27 patients required specific radial head procedures: 5 metallic arthroplasties, 4 underwent ORIF, 4 had partial excision, 7 complete excision alone, 5 interposition arthroplasties, and 2 osteotomies. 4 required capitellar microfractures. 14 patients underwent a contracture release, and 2 patients underwent ulnar osteotomies and 2 patients had LCL repair or reconstruction.

Results

At a mean follow-up of 7 (2 - 22) years, 27 / 31 patients reported themselves as normal (6), almost normal (8), greatly improved (8), or improved (5). All motion significantly improved: flexion by 3°, extension by 13° ($p=0.0006$), pronation by 16° ($p = 0.014$) and supination by 13° ($p = 0.008$). Pain improved from a mean of 2.4 to 0.5 ($p = 0.002$). 6 / 31 (19%) ultimately had revision procedures.

Conclusions

Pediatric chronic posterior radial head dislocations are secondary to undetected Salter-Harris types III and IV radial head fractures. Early detection of adolescent radial head fractures may prevent sequelae such as deformity, subluxation and early arthritis. Given the promising results observed in our series, we recommend early operative intervention when detected.



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17:42 - 17:50

714 Fragment-Specific Double Locking Plate Osteosynthesis And Osteosuture Augmentation Of Complex Triceps Avulsion Fractures In The Elderly Patient

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2. Center for Trauma, Elbow and Hand Surgery, University Clinic Cologne, Cologne, Germany
3. TOC, AKA, Hamburg, Germany

Aim

Complex triceps avulsion fractures in the elderly patient pose a major challenge for the upper extremity specialist. They consist of comminuted fractures of the olecranon tip, multifragmentary destruction of the proximal ulna, osteoporotic bone quality and great tension exerted by the triceps tendon.

Background

Conventional osteosynthesis frequently shows secondary dislocation and wound healing problems that both lead to reoperation and in severe cases can lead to proximal ulna resection and loss of active function. 18 patients with this type of injury were prospectively treated with the aforementioned technique and were reexamined regarding functional and patient specific outcome.

Methods

Average patient age was 75 years (68-86). After initial soft immobilization in elbow splint and preoperative diagnostics (X-ray and 3D-CT) an individually adapted ORIF (double locking plate osteosynthesis, MedArtis Aptus Hand 2.0 mm) and additional augmentation of the triceps tendon (proximal Fiberwire suture in Krackow's technique with ulnar fixation using a cannulated 4.0 mm screw) was performed. Postoperatively a protective splint was administered in 45 degrees of flexion for 2-3 weeks. Patient satisfaction, the ulnar nerve status, development of posttraumatic osteoarthritis and the outcome using qDASH was investigated with an average follow up of 9 months.

Results

In all cases the fracture healed without signs of dislocation or soft tissue irritation. The average arc of motion exceeded 110 degrees in all patients. Patient satisfaction was high, the average qDASH score was 20. All patient stated they would undergo the procedure again.

Conclusions

The surgical technique shows solid and repeatable results, leads to good and consistent functional outcome, a high level of patient satisfaction and appealing patient specific outcome without secondary complications. Despite the increased implant costs the financial equation is positive.



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Thursday 14 September

SHOULDER INSTABILITY

16:30 - 18:00

POTSDAM

17:50 - 17:58

705 Management Of Recurrent Posterior Shoulder Instability Initially Voluntary That Became Secondarily Involuntary: A Multicentric Study Of 37 Patients.

Marie-Beatrice Hardy¹, Arnaud Godenèche², Pierre Mansat³, Pascal Boileau⁴, Olivier Gastaud⁴, Geoffroy Nourissat⁵, Jérôme Garret⁶

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2. Centre Orthopédique Santy, Lyon, France
3. Centre Hospitalier Universitaire, Toulouse, France
4. Centre Hospitalier Universitaire, Nice, France
5. Clinique de Maussins, Paris, France
6. Clinique du Parc, Lyon, France

Aim

The goals of this study were 1/ to analyze epidemiology 2/ to analyze surgical results of voluntary instability that became involuntary.

Background

We distinguish three types of recurrent dynamic posterior shoulder instability: 1/voluntary instability 2/ involuntary instability 3/ initially voluntary instability that became secondarily involuntary. This study focuses on this third group.

Methods

We performed a prospective and retrospective multicentric study involving patients with voluntary posterior instability that became involuntary. Prospective patients were analyzed to evaluate pre operative data and early failure (before 2 years). We included 32 patients in the retrospective part of the study, and 5 in the prospective one. Clinical data, hyperlaxity, imaging specificity, Constant score, SSV, Walch Duplay and Rowe score were reported for all patients. Result of treatment was analyzed comparing soft tissue procedure, bone block procedure and rehabilitation.

Results

Clinically 100% of patients had subluxations that were associated with dislocations in 14% of cases. In 54% of cases we found a triggering or aggravating trauma. In all cases subluxations were reproducible. In 70% of cases the instability was painful. Only 55% of patients were hyperlax. 71% of patients had bony lesion and 59% had posterior Bankart lesion. 69% had a bone block procedure and 31% had soft tissue procedure. At a mean follow-up of 39 months, 81 % of patients were very satisfied or satisfied with statistically significant improvement ($p < 0.001$) in Constant score, VAS pain, SSV. 84% of patients had a stable shoulder. 16% of patients remained painful. No pre operative clinical or imaging factor or surgical technique influences this result in this population.

Conclusions

Recurrent posterior instability initially voluntary that became secondarily involuntary is a really specific kind of instability. This multicentric study reports encouraging results for its surgical treatment while most surgeons still refuse to operate on these patients.



16:54 - 17:02

219 Analysis Of Complications After Open Coracoid Transfer As Revision Surgery Following Arthroscopic Soft Tissue Stabilization – 2 Years Follow Up

Christian Gerhardt, Julia Wolke, Marvin Minkus, Herrmann Diem Anh, Markus Scheibel

Charité Universitätsmedizin Berlin, Centrum für Muskuloskeletale Chirurgie, Berlin, Germany

Aim

Aim of this study was to evaluate the complication rate of coracoid transfer as revision surgery following failed arthroscopic soft-tissue stabilization.

Background

The Latarjet procedure is an adequate intervention to treat recurrent anteroinferior shoulder instability.

Methods

In this prospective, non-randomized cohort study 37 patients (5female, 32male, øage28 years) with a FU of ø25 months were included. Complications were divided according to their temporal appearance into early (<3months postoperatively) and late (>3months) as well as need for revision and no need for revision. Clinical scores were raised preoperatively and at final FU (Constant Score (CS), Rowe Score (RS), Walch-Duplay-Score (WDS), Western-Ontario-Shoulder-Instability-Index (WOSI) and Subjective-Shoulder-Value (SSV)).

Results

The overall complication rate was 27% (all late complications). 9 of 10 patients needed revision surgery.

Recurrent instability occurred between 9-24 months in n=3(8%) patients of which two received a revision surgery (n=1 iliac-crest, n=1 labral-repair).

Due to persistent pain n=5 received (5-25 months postoperatively) an arthroscopic implant removal. A pathomorphological correlate was found in one patient with an irritation of the infraspinatus / suprascapular nerve due to a posterior prominent screw. One low-grade infection (*Propionibacterium acnes*, *Staph. epidermidis*) led to revision 10 months postoperatively and was treated with antibiotics. At revision surgery with implant removal one patient revealed a distinct chondrolysis and narrowing of the joint space. Although the microbiological analysis was negative this case was rated as highly suspicious for infection. The evaluated scores increased significantly from pre- to postoperatively (CS 66-87 points, RS 25-88 points, WDS 15-80 points, WOSI 42-67% and SSV 42-83% (p<0,05))

Conclusions

The complication rate of coracoid-transfer as revision surgery following failed soft-tissue stabilization reveals good clinical results. Still, due to our results and the published complication rate we believe that the indication for a coracoid transfer should be carefully judged and possible alternatives like an iliac crest augmentation should be considered.



17:02 - 17:10

497 Arthroscopic Latarjet Bankart: Specific Glenoid And Coracoid Guide And Double Cortical Endobutton Fixation. Clinical And CT-Scan Results Of The First 46 Cases.

Philippe Patrick Valenti, Marco Cartaya, Jean David Werthel

paris shoulder unit, Paris, France

Aim

To evaluate whether specific coracoid and glenoid guides associated with fixation of the coracoid bone block by a double cortical endobutton could be an alternative to screw fixation and free-hand positioning of the bone block.

Background

Arthroscopic Latarjet is a challenging technique especially for the positioning of the coracoid graft. Fixation of the graft is obtained with two screws and a portal medial to the coracoid is required in order for these screws to be parallel to the joint line.

Methods

Between January 2014 and June 2015, 46 arthroscopic Latarjet procedures combined with a Bankart repair were performed with a specific glenoid and coracoid guiding system. A double compressive self-blocking fixation system with two suture buttons enables control of the fixation of the bone graft and does not require a medial portal. Clinical examination was performed routinely. Bone graft union and positioning accuracy were assessed by postoperative computed tomography imaging.

Results

At a mean 12-month follow-up (range, 8-16 months), 45 of the 46 patients had a stable shoulder. Mean Walch-Duplay score was 93.91 (range, 75-100), mean Rowe score was 94.02 (range, 75-100) and mean Subjective Shoulder Value (SSV) was 95.43 (range, 80-100). The coracoid graft was positioned strictly tangential to the glenoid surface and below the equator in 100% of the cases. The coracoid graft healed completely in 35 cases (76%). There were no neurological complications and no patient was revised for hardware removal.

Conclusions

The use of specific glenoid and coracoid guides improves accuracy of the placement of the coracoid bone graft. The use of a double compressive self-blocking fixation system avoids the use of a medial portal and is a satisfactory alternative to screw fixation. Better preparation of the coracoid and glenoid bone surfaces should improve the healing rate of the bone.



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17:18 - 17:26

820 Arthroscopic Latarjet Restores Glenoid Track And Provides Superior Postoperative Stability Over Arthroscopic Bankart In "off-Track" Unstable Shoulders.

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Hospital Fundación Jimenez Diaz, Madrid, Spain

Aim

To evaluate if Latarjet restores glenoid track and results in superior postoperative stability over Bankart repair in "off-track" unstable shoulders

Background

While "off-track" bone lesions constitute a risk factor for recurrent postoperative instability, the optimal technique to restore glenoid tracking is to be elucidated

Methods

Fifty-six patients (mean age, 29,6 years) diagnosed with anteroinferior shoulder instability and "off-track" bone lesions that underwent arthroscopic stabilization between 2010 and 2015 were evaluated. Sixteen of them were Bankart procedures and 40 arthroscopic Latarjet. Glenoid track was calculated on pre- and postoperative MRI or CT scan (diGiacomo 2014) using specific software by measuring Hill-Sachs and/or bony Bankart lesions. Recurrence of instability (dislocation or subluxation) was evaluated at a minimum follow-up of two years

Results

Preoperatively measurement disclosed 27 "off-track" Hill-Sachs lesions, 13 "off-track" bony Bankart defects and 16 "off-track" bipolar (Hill-Sachs and bony Bankart) lesions, with an overall glenoid-track of 20,9 (SD2,2)mm. Arthroscopic Latarjet restored glenoid track in 32 (80%) patients from 19,1 (SD2,3)mm preoperatively to 28,2 (SD2,7)mm postoperatively ($p < 0,001$). The 8 remaining off-track patients after Latarjet showed extense Hill-Sachs lesions. The rate of postoperative instability was lower after Latarjet (7,5%) over Bankart (7,5%) (3 vs 2 patients).

Conclusions

Arthroscopic Latarjet restores glenoid track and provides superior postoperative stability over arthroscopic Bankart in "off-track" unstable shoulders, either due to humeral head or glenoid bony lesions. However, it might be necessary to add an additional procedure in a small number of patients with large Hill-Sachs lesions that preclude complete glenoid track reconstruction.



16:38 - 16:46

**157 Can The ISIS Score Be Improved?
A Retrospective Study Of Arthroscopic Bankart Repair In Patients
Over 30 Years Of Age.
Clinical And Radiologic Results At More Than 10 Years Follow-Up**

Damien Delgrande¹, Jean-David Werthel¹, Grégoire Ciais¹, Shanhaz Klouche¹, Guillaume Lonjon², Philippe Hardy¹

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2. Hôpital Européen Georges Pompidou University of Paris Descartes, Boulogne Billancourt, France

Aim

The objective of this study was to report long-term results of arthroscopic Bankart repair in patients aged 30 years or older and to analyze risk factors of failure to improve the decision-making process

Background

Even with the help of the ISIS Score, long-term failure rates of arthroscopic Bankart repair are higher than those of Latarjet procedures. We hypothesized that by analyzing risk factors of recurrence in patients aged 30 and older, we would be able to reveal other potential risk factors than age

Methods

Between 1999 and 2003, 41 patients aged 30 years or older who underwent arthroscopic Bankart repair were included. Patients who had voluntary instability and associated lesions were excluded. Outcome measures included pain, range of motion, postoperative Walch-Duplay and WOSII scores, complications, failure rate and risk factors of failure. Failure was defined as recurrence of dislocation or subluxation.

Results

At a mean 12-year follow-up, the failure rate was 37%. The mean postoperative Walch-Duplay score was significantly higher in patients who had no recurrence compared to those who had had recurrence of instability (100 versus 90, $p=0.02$). This difference was significant ($p=0.02$). The ISIS score, a lesion of the glenoid and a Hill-Sachs lesion $>15\%$ defect, $>20\%$ defect were all risk factors of recurrence.

Conclusions

Arthroscopic Bankart repair is a valid technique in the management of recurrent instability. However, to obtain failure rates comparable to those Latarjet procedure, patients need to be very carefully selected using the previously described ISIS Score modified to include both the depth of the Hill Sachs lesion and the assessment of glenoid lesions on Bernageau views. A very low risk of recurrence can be expected in patients with an ISIS Score <3 and with no glenoid lesions on the Bernageau views and with Hill-Sachs lesion $<15\%$ or 20% .



17:34 - 17:42

221 Mid- To Long-Term Results Of Arthroscopic Glenoid Reconstruction Using An Arthroscopic, Autologous Iliac Crest Bone Grafting Technique.

Marvin Minkus, Elisabeth Böhm, Natascha Kraus, Philipp Moroder, Markus Scheibel

Center for Musculoskeletal Surgery (CMSC), Charité Universitaetsmedizin Berlin, Berlin, Germany

Aim

Open bone block procedures for glenohumeral stabilization have been used for several years. With the advancement of arthroscopic techniques the insertion of the bone block can be performed by an all-arthroscopic approach.

Background

The aim of this study was to evaluate the clinical and radiologic mid- to long-term results after arthroscopic anatomic glenoid reconstruction using an all-arthroscopic, autologous tricortical iliac crest bone grafting technique.

Methods

Twelve patients [1f/ 11m, mean age 32.6 years (17-49)] were enrolled in this prospective cohort study who underwent reconstruction of substantial glenoid defects in cases of recurrent anterior shoulder instability by the aforementioned technique. The patients were followed up clinically [ROM, subscapularis tests, Subjective Shoulder Value (SSV), Constant Score (CS), Rowe Score (RS), Walch Duplay Score (WD), Western Ontario Shoulder Instability Index (WOSI)] and radiographically (true a.p., Bernageau, axillary views, CT 3D reconstruction).

Results

After a mean follow-up of 6.5 years (range 4.5-9.3) the SSV averaged 87.3% (65-100%), the CS averaged 94.2 points (83-100), the RS averaged 89.2 points (30-100), the WD averaged 83.8 points (25-100) and the WOSI averaged 72.7% (47-87). One patient underwent an arthroscopic capsular plication due to a persistent feeling of instability without recurrent shoulder dislocation. At the time of the final follow-up examination all patients showed a clinically stable glenohumeral joint. The subscapularis tests were negative without pathological findings. Radiographically, a dislocation arthropathy developed in three cases (n= 2 grade I, n=1 grade II). The CT imaging showed a consolidated autograft in all cases. The glenoid index increased from a mean of 0.77 (0.67-0.84) preoperatively to 1.01 (0.81-1.19) at the time of the final follow-up examination.

Conclusions

The arthroscopic reconstruction of anteroinferior glenoid defects using an autologous iliac crest bone grafting technique yields excellent clinical and radiological long-term results. CT imaging shows a re-creation of the pear-shaped anatomy of the glenoid.



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17:10 - 17:18

755 Arthroscopic Latarjet Procedure: Can A Standardized Technique Decrease Complications ?

Pascal Boileau, Patrick Gendre, David Saliken, Brian Seeto, Thomas D'Ollonne, Olivier Gastaud, Jean-François Gonzalez

IULS - Hôpital Pasteur 2, Nice, France

Aim

To evaluate the short- and mid-term complications, bone block incorporation/positioning, and clinical outcomes using a standardized and guided arthroscopic Latarjet procedure.

Background

Arthroscopic Latarjet is a reliable but difficult technique, with a steep learning curve and a high rate of complications (up to 30%, at 3 months' FU). In addition, technique of coracoid transfer, capsule and subscapularis management, and type of fixation are not standardized.

Methods

Between 2012 and 2015, 162 patients (130 males, mean age 27 years) underwent a standardized arthroscopic Latarjet procedure and were prospectively followed. Guiding instruments were used to drill the glenoid and coracoid process; specific spreaders were used to split the subscapularis muscle and protect the brachial plexus; cortical buttons were used to fix the bone block, and capsular repair was systematically performed. All complications were recorded. Postoperative CT-scans were performed 2 weeks and minimum 6 months after surgery to evaluate bone positioning and healing.

Results

Five temporary postoperative haematoma were observed, but no neurologic complications, infections and or hardware failures were recorded. Failure to obtain coracoid bone block healing was recorded in 11% (18/162): 14 nonunions (8%), 1 fracture, 1 migration and 2 osteolysis. Smoking was a risk factor associated with nonunion ($p < 0.001$). The coracoid graft was positioned flush to the glenoid surface in 95% (154/162) and below the equator in 93% (151/162). At a mean 2-year follow-up, five patients (3%) had a traumatic recurrent shoulder instability episode (1 dislocation and 4 subluxations); three (2%) were reoperated for additional Hill-Sachs remplissage and capsule re-repair; 93% returned to preinjury level of sports.

Conclusions

Standardization of the arthroscopic Latarjet procedure is successful at preventing short-term complications with high rate of return to sport. The high rate of bone block incorporation, accurate positioning and low instability recurrence rate are encouraging.



17:42 - 17:50

606 Outcomes Of Latarjet Versus Distal Tibia Allograft For Anterior Shoulder Instability Repair: A Prospective Matched Cohort Analysis

Rachel M. Frank¹, Catherine J. Richardson¹, Michael C. O'Brien¹, Jon M. Newgren¹, Nikhil N. Verma¹, Brian J. Cole¹, Mathew T. Provencher², **Anthony A. Romeo¹**

1. RUSH University Medical Center, Chicago, United States
2. The Steadman Clinic, Vail, United States

Aim

To compare the clinical outcomes for patients undergoing DTA to a matched cohort of patients undergoing Latarjet.

Background

Fresh distal tibia allograft (DTA) for the treatment of anterior shoulder instability with glenoid bone loss has recently been described; however, it remains unclear as to how outcomes following DTA compare to those following Latarjet.

Methods

Consecutive patients with $\geq 15\%$ anterior glenoid bone loss undergoing DTA were matched by age, sex, number of prior ipsilateral shoulder surgeries, and body mass index (BMI) to patients undergoing Latarjet in a 1-to-1 format. Patients were evaluated preoperatively and at a minimum 2 years postoperatively with American Shoulder and Elbow Surgeons (ASES), Single Assessment Numeric Evaluation (SANE), and Western Ontario Shoulder Instability Index (WOSI) outcomes assessments.

Results

A total of 90 patients (45 DTA, 45 Latarjet) with an average age of 25.8 ± 6.2 years were analyzed at an average 45.3 ± 19.9 months following surgery. Twenty-eight patients (62.2%) in each group underwent 1.5 ± 0.6 ipsilateral shoulder surgery (range, 1 to 3) prior to DTA or Latarjet. There were no statistical differences in age, sex, number of prior surgeries, or BMI between the groups. Patients in both groups experienced significant improvements in ASES, SANE, and WOSI scores following surgery ($P < 0.05$ for all). When comparing outcomes of DTA versus Latarjet patients, no significant differences were found in postoperative ASES, WOSI or SANE scores between the groups ($P > 0.05$ for all). Two patients required reoperation in both the DTA (1 revision for hardware failure, 1 subscapularis repair) and Latarjet cohorts (1 debridement for infection, 1 decompression for impingement). There were 3 other transient complications in each group that did not require reoperation.

Conclusions

Fresh DTA reconstruction for recurrent anterior shoulder instability results in a clinically stable joint with similar clinical outcomes, reoperation rates, and complication rates compared to Latarjet.



16:30 - 16:38

851 Long-Term Outcome Of The Arthroscopic Bankart Procedure

Marianne Larsen Van Gastel¹, Nienke W. Willigenburg¹, Lea Dijkman², Rob Lindeboom³, Michel P.J. Van Den Bekerom¹, Victor P.M. Van Der Hulst¹, W. Jaap Willems⁴, Derek F.P. Van Deurzen¹

1. OLVG, Amsterdam, Netherlands, The
2. St Antonius ziekenhuis, Nieuwegein, Netherlands, The
3. Academisch Medisch Centrum, Amsterdam, Netherlands, The
4. Shoulder and Elbow Unit, Laresse Kliniek, Amsterdam, Netherlands, The

Aim

This study aims to determine the long term (≥ 10 year) functional outcome and prevalence of post-operative recurrent instability and glenohumeral arthropathy after the arthroscopic Bankart procedure.

Background

After an anterior traumatic shoulder dislocation patients frequently develop recurrent instability, with re-dislocations, persistent symptomatic subluxations, apprehension and arthropathy. A clear definition of recurrent instability is still lacking, which makes it difficult to compare the results of the few available studies.

Methods

A total of 107 patients who underwent an arthroscopic Bankart procedure using suture anchors between January 1999 and the end of December 2005 met the inclusion criteria. Of these patients, 74 completed a set of patient reported outcome measures on shoulder function and instability. Of these, 56 patients underwent clinical and radiological assessment using the Constant Murley score, apprehension, relocation and release test. The Samilson-Prieto classification was used to assess arthropathy using X-rays.

Results

After a minimum of 10 years follow up forty-two percent of the patients experienced recurrent instability, with 10% reporting full re-dislocations and 32% reporting subluxations. X-rays revealed glenohumeral arthropathy in 35 of the 58 shoulders (60%). Twenty-eight (48%) of these showed signs of mild arthropathy, 5 (9%) showed moderate arthropathy and 2 (3%) severe arthropathy. The median WOSI score was 251 (range 0-1284; IQR 468) and the median score of the normalized Constant Murley score was 103 (range 25-112; IQR 12). Patient satisfaction rate was 93% and the WOSI score was equivalent to 88% of a normal functioning shoulder joint.

Conclusions

Despite a substantial amount of re-dislocations and subluxations the scores on shoulder function and patient satisfaction are high. A differentiation between the high recurrent instability and the high satisfaction rate, together with a clear definition of instability is essential when defining the arthroscopic Bankart procedure as a failure or a success.



17:26 - 17:34

774 Clinical And Radiological Long-Term Results After Implant-Free Autologous Iliac Crest Bone Graft Transfer Procedure For The Treatment Of Anterior Shoulder Instability

Philipp Moroder¹, Fabian Plachel², Johannes Becker², Eva Schulz², Alexander Auffarth², Herbert Resch²

1. Charité Universitaetsmedizin, Berlin, Germany
2. PMU, Salzburg, Austria

Aim

The aim of this study was to analyze the long-term results after the implant-free J-bone graft procedure for treatment of anterior shoulder instability.

Background

Only mid-term follow-up results are currently available.

Methods

A total of 46 patients (47 shoulders) with anterior shoulder instability, who received a J-bone graft between 1993 and 2000 and who were previously subjected to a mid-term follow-up, were included in this study. 35 of 47 cases (75%) were clinically and radiologically assessed after an average follow-up of 19 years (15 to 23 years). In addition to pain and exercise, the WOSI, the Rowe Score, and the SSV were assessed and an Apprehension Test was performed. Radiological imaging included bilateral radiographs (a.p. and axillary view) to determine the grade of instability arthropathy.

Results

At follow-up, an average WOSI of 295 (0 to 1765), Rowe score of 94 (55 to 100), SSV of 90 (20 to 100), and a pain level of 1.5 (1 to 5) were noted. Slight differences in range of motion between the affected side and the opposite side were detected: flexion 178 ° vs. 179 ° ($p = 0.325$), abduction 177 ° vs. 179 ° ($p = 0.325$), external rotation 63 ° vs. 67 ° ($p < 0.05$), high external rotation 79 ° vs. 82 ° ($p < 0.05$), high internal rotation 70 ° vs. 74 ° ($p < 0.05$). No significant power deficit in the affected side was determined. No recurrence of instability occurred during the follow-up period. The average degree of instability arthropathy was 0.9 on the affected and 0.4 on the opposite side ($p < 0.05$).

Conclusions

The J-bone graft procedure for the treatment of recurrent anterior shoulder instability shows excellent results with regard to stability and function after an average follow-up period of 19 years.



16:46 - 16:54

488 Clinical And Radiological Outcomes Of Open Latarjet Procedure In Patients Older Than 40 Years

Peter Domos¹, Enricomaria Lunini², Lionel Neyton³, Arnaud Godeneche³, Gilles Walch³

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2. Orthopaedic Unit, Hospital of Guastalla, Reggio Emilia, Italy
3. Centre Orthopedique Santy and Hôpital Prive Jean Mermoz, Lyon, France

Aim

Retrospective review of patients over 40 years of age, who underwent open Latarjet surgery.

Background

Recurrent anterior glenohumeral instability has been studied in the younger population and limited evidence is available for older patients especially with open Latarjet procedure.

Methods

99 patients were identified, who underwent open Latarjet procedure between 1988 and 2014. Clinical outcomes were assessed by Walch-Duplay score (WDS), Rowe score (RS), Constant-Murley score (CMS) and Subjective Shoulder Value (SSV). Radiographs were reviewed for osteoarthritis (OA), complications. Subgroup analysis was carried out between patients with 46 or younger age (Group A) and over 46 years of age (Group B).

Results

The mean age of patients was 46 years (40-67), 22% required rotator cuff repair. The mean follow up time was 13 years (3-23). The mean postoperative movements showed recovered elevation and external rotation (56°) but internal rotation (IR) showed some limitation (T10). 90% of patients returned to regular sport activities with 58% returned to same level of their sport. Clinical outcomes showed WDS 83, RS 87, CMS 75 points and SSV 87%. Overall complication rate was 41%. 20% of patients described postoperative pain and/or stiffness. Other complications included: 9% apprehension, 6% recurrence, 2% haematoma, 3% transient nerve injury, 1% superficial infection. 30% of patients had preoperative and 76% of cases had postoperative OA. Radiological assessment showed 4% graft fracture and 5% nonunion. 2 patients had inferior subluxation, another 1 had avascular necrosis due to static anterior subluxation. The overall reoperation rate was 9%. Subgroup analysis revealed statistically more postoperative pain, OA and less elevation, IR and lower WDS, CMS, RS in Group B.

Conclusions

Open Latarjet procedure is a satisfactory treatment in these patients with acceptable recurrence but higher complication rates. Patients should be advised about these results, which are less satisfactory than in younger.



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Friday 15 September

ELBOW II (ARTHROPLASTY & FRACTURES)

09:00 - 10:30

PAVILLON

09:32 - 09:40

354 Radial Head Arthroplasty: Is Stem Size Of Matter To Prevent Loosening?Pierre Laumonerie, Vadim Azoulay, Stéphanie Delclaux, David Ancelin, Nicolas Bonnevalle, **Pierre Mansat**

University Hospital of Toulouse, Toulouse, France

Aim

Demonstrate that stem size can be correlate to the risk of stem loosening.

Background

Radial head arthroplasty is indicated for complex radial head fracture non-amenable for fixation. Mid-term and long-term results are satisfactory with metallic bipolar radial head prosthesis. However, loosening is not uncommon and can vary according to the type of implant used.

Methods

Between 2002 and 2014, 64 radial head arthroplasties were performed on 43 men and 21 women of 52 years on average. Indications were acute radial head fractures in 44, and chronic lesion in 20. There were 56 Mason III fractures, 2 Mason II, and 6 radial neck fractures. Three type of prosthesis were implanted: 31 GUEPAR (Depuy-Synthes) (cemented stem size=30mm), 18 EVOLUTIVE (Aston Medical) (cemented stem size=30mm), and 15 rHead (SBI-Stryker) - 9 rHead RECON and 6 rHead STANDARD (uncemented stem size=16-22mm). All patients were reviewed clinically and radiographically with 2-year minimum follow-up.

Results

At 65 months average follow-up, revision rate was higher for short stem prostheses vs long stem prostheses (6 cases or 40% vs 9 cases or 18%, $p<0.2$). Loose stems were shorter than non-loose stems (25.5 mm vs 28 mm, $p<0.1$). Peri-prosthetic osteolysis was also more frequent around short stem prosthesis vs long stem (12 cases or 80% vs 23 cases or 47%, $p<0.05$). Malposition of the prosthesis was noted in 37 cases, short stem mainly in valgus ($p<0.01$) and long stem mainly in varus ($p<0.01$). Clinical results were comparable among all 3 groups of prosthesis with MEPS equal to 88 pts and quick-DASH score to 17 pts.

Conclusions

If clinical results were similar among all 3 groups of radial head prosthesis, loosening rate was significantly higher for short stem implants compare to longer stem implants.



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09:00 - 09:08

616 Arthroscopic Reduction And Fixation Of Radial Head Fracture: A Repruducible Surgical Technique

Enrico Guerra¹, Alessandro Marinelli¹, Marco Cavallo¹, Graziano Bettelli¹, Alice Ritali¹, Michelle Floter², Roberto Rotini²

1. Rizzoli Orthopaedic Institute, Bologna, Italy
2. Rizzoli Orhopaedic Institute, Bologna, Italy

Aim

Describe the surgical technique (the tips, tricks, pitfalls and the better portals) that has made reproducible the arthroscopic reduction and synthesis of the radial head fracture

Background

Radial head fractures are extremely common. When is possible ORIF enables a better recovery of articular stability and therefore will certainly be the best choice when there is a combined lesion of the medial collateral ligament. Arthroscopy allow to perform the reduction and synthesis without cutting the annular ligament.

Methods

From 2007 to 2016 28 Mason I and II with mechanical block radial head fracture have been treated arthroscopically by the same surgeon. A total of 37 subjects were rewied and compared (19 ORIF Vs 18 ARIF). Three anterior portals were routinely performed. A dedicated cannula (designed for arthroscopic insertion of cannulated headless screws) inserted through antero medial portal allowed multiple screw fixation (if needed) in different direction (parallel or toll bar)

Results

Average follow-up time of all patients was 17,63 months (SD \pm 21,8/ range 1-73 months). The mean MEPI score value was 98,077 (SD \pm 4,34 for ARIF) and 91,57 (SD \pm 11,67 for ORIF); the second mean score BMRS obtained was 95,61(SD \pm 5,99 for ARIF) and 92,06 (SD \pm 8,66 for ORIF). Surgical time results comparable ($p < 005$)

Conclusions

The surgical technique described is reproducible and suit to the different fracture patterns. The fracture reduction and the osteosynthesis is possible by the only use of the anterior-medial, anterior-lateral and anterior lateral proximal portals. Perform the synthesis by anteromedial portal gives a better perspective and make the synthesis really easier than previously described (despite the number and direction of the screws needed). The better intra-articular cleaning/evaluation and the respect of the lateral muscle, ligaments and capsule seems to allow a better outcomes in comparison to the open procedure



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09:40 - 09:48

747 Stress-Shielding Around Press-Fit Radial Head Prosthesis: Comparative Study Between Bipolar And Anatomic Monopolar Implants.Giuseppe Giannicola, **Marco Scacchi**, Paolo Spinello

Sapienza University of Rome, Rome, Italy

Aim

To quantify the stress-shielding (SS) in two groups of patients treated with press-fit bipolar and anatomic monopolar radial head arthroplasty (RHA) and analyze its clinical influence.

Background

Little is known about SS in press-fit RHA and if it affects the clinical outcome. Moreover the influence of the implant design on SS is unknown.

Methods

We analyzed prospectively 45 patients (28 F, 17 M) with a mean age of 56 years who underwent RHA following trauma or post-traumatic sequelae. Press-fit bipolar and anatomic monopolar RHA were performed in 25 and 20 cases, respectively. The SS under the prosthetic stem collar was evaluated radiographically in the four quadrants of the radial neck during the follow-up and rated as mild (<3mm), moderate (3-6mm) and severe (>6mm). The clinical evaluation was performed with the MEPS, Q-DASH and m-ASES scores. The student's T-test and the Pearson's correlation analysis were performed.

Results

The mean follow-up was 28 months (range, 12-84). SS started 1-2 months after surgery and appeared to stabilize within the first year in both groups. No differences were observed between the two implants concerning the resorption pattern except for the posterior quadrant which was higher in the bipolar implant. At the final follow-up the mean resorption was 3.1mm and was observed in 39 out of 45 cases never exceeding the radial tuberosity, with a significant difference only between genders (F>M). A mild, moderate and severe resorption were observed in 15, 21 and 3 cases, respectively. The mean MEPS, Q-DASH and m-ASES were 93.8, 11.7 and 86.6 points respectively without differences between the two groups. No correlation was observed between SS and functional scores.

Conclusions

SS around RHP is a common finding after press-fit RHA and doesn't seem to be influenced by the implant design. Moreover it is typically minor, nonprogressive and with insignificant clinical consequence at short-medium term follow-up.



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09:48 - 09:56

203 Clinical And Radiographic Outcome Of Revision Surgery Of Radial Head Arthroplasty

Jetske Viveen, Izaak F Kodde, Koen Lm Koenraadt, Annechien Beumer, Bertram The, Denise Eygendaal

Amphia Hospital, Breda, Netherlands, The

Aim

The aim of this study was to report on the clinical and radiographic outcome of revision arthroplasty of the elbow with a bipolar metallic radial head prosthesis.

Background

Little is known about revision surgery of radial head arthroplasty with another radial head prosthesis (RHP). Revision is favorable in unstable elbows with good quality of the capitellum to prevent proximal migration of the radius, resulting in forearm instability with derangement of the distal radio ulnar joint.

Methods

Between 2006 and 2013 we used either the press-fit or cemented RHS bipolar radial head prosthesis for revision surgery of radial head arthroplasty in 16 patients. Patients were prospectively enrolled in the study. Differences on outcome parameters before and after revision surgery were compared.

Results

At a mean follow-up of 75 months (range, 36-116), none of the revised RHP needed a 2nd revision. None of the stems showed radiographic signs of loosening. In 1 patient the head was dissociated from the prosthesis. The average flexion-extension arc was 127° (range, 105°-140°) and the average pronation-supination arc was 138° (range, 90°-160°). Stability scores improved after revision surgery, resulting in 13 stable elbows ($p=0.01$). According to the Oxford Elbow Score (OES), 8 patients scored between 37-48 points. Combined excellent and good results of the Mayo Elbow Performance Score represented 63%. The mean score of the EQ-5D was 80 (range 63-100) and the VAS pain in rest and activity improved both to 3 (range 0-9) and 4 (range 0-9) ($p<0.001$). All but one patient was satisfied with the result of the revision procedure.

Conclusions

The clinical and radiographic outcome of patients who received revision surgery for their RHP can be considered favorable. We suggest considering radial head revision arthroplasty for failure of primary RHP in unstable elbows with limited erosion of the capitellum.



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09:24 - 09:32

454 Triceps On, Alignment Off? A Comparison Of Total Elbow Arthroplasty Component Positioning With A Triceps Preserving Approach And A Triceps Split And Reflecting Approach.

Simon John Booker, Andrew King, William Thomas, Chris Smith

Royal Devon and Exeter Hospital, Exeter, United Kingdom

Aim

This retrospective review investigates if the triceps on approach obtains alignment of total elbow arthroplasty (TEA) implants equivalent to a triceps off approach.

Background

The triceps preserving approach or 'triceps on' approach has the perceived advantage of maintaining the triceps envelope, which reduces the risk of extensor mechanism failure and should allow earlier mobilisation. The criticism of this approach is that the exposure generated is poorer, which could make component alignment difficult.

Methods

The last 30 consecutive TEA's performed by the senior author were reviewed to identify the approach used and pathology treated. Initially a triceps split and reflection approach was used, then a triceps preserving approach. Two blinded reviewers measured the component alignment in standardised radiographs. Pearson's correlation coefficient was calculated to investigate inter/intra-observer and error. The two groups were compared using an unpaired Student t-test.

Results

13 elbows were in the triceps off group, 17 in the triceps on. Pearson's coefficient was 0.75 for inter-observer error, 0.89 for intra-observer error. There was no statistical difference between the achieved alignment. All ulna components were flexed with a mean angle deviation of 4.5 degrees in the triceps off group and 5.7 degrees in the triceps on. 2(15%) ulna components in the triceps off group were placed in over 5 degrees of flexion, compared to 7(44%) in the triceps on group.

Conclusions

These results demonstrate no statistical difference in the achieved alignment between the two groups. Surgeons should beware the tendency to place the ulna component in a flexed position, especially in the triceps on approach.



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09:56 - 10:04

486 Parallel Plating For Distal Humeral Fractures – Radiographic And Clinical Outcomes**Hanna Cecilia Björnsson Hallgren**, Birgitta Svernlöv, Jens Nestorson, Lars Evert Adolfsson

Institution for Clinical and Experimental Medicine, Division of Orthopaedics Linköping, Linköping, Sweden

Aim

To investigate radiographic union, ulnar nerve function and extension strength following parallel plating of distal humeral fractures.

Background

Parallel plating is one leading concept for internal fixation of distal humeral fractures. Currently there are few reports on outcomes.

Methods

In our database all surgically treated distal humeral fractures in adults between 2003 and 2015 were identified. For 124 patients with a minimum follow-up of one year that had sustained fractures AO types A and C, parallel plating had been chosen. 22 patients were deceased and 13 lacked late radiographic examinations. 89 had been followed until radiographic union. Patients with serious medical conditions or dementia were excluded. 78 patients were eligible for follow-up and offered clinical examination consisting of DASH, Mayo Elbow Performance Score (MEPS), ROM, extension strength using a myometer and ulnar nerve function according to Dellon. Extension strength was correlated to olecranon osteotomy or triceps splitting approach. The uninjured arm was used for comparison.

Results

55 patients, 36 women and 19 men, mean age 59 years (range 18-90) attended clinical follow-up at a mean of 43 months (12-115). Mean MEPS was 81 points (good) (range 40-100), DASH 27 (range 0-84), total ROM 133°, extension deficit 24°. Mean extension strength was 85% of the uninjured arm and no correlation was found related to the approach. Ulnar nerve affection was diagnosed in 16 patients (29%), 6 mild, 5 moderate and 5 severe. Twenty reoperations including 15 hardware removals, 7 ulnar neurolysis, 3 HO resections and 2 out of 89 (2%) non-unions.

Conclusions

Parallel plating for distal humeral fractures appears reliable in terms of bone healing. Extension strength was relatively preserved regardless of triceps split or olecranon osteotomy. Ulnar nerve affection was a common problem and reoperations relatively frequent.



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10:04 - 10:12

586 Double-Plating Of Comminuted Proximal Ulnar Fractures: A Retrospective Multicenter Study

Gauthier Menu, Etienne Boyer, Julien Boudard, Clément Menez, Sébastien El Rifaï, François Loisel, Séverin Rochet, Antoine Adam, Daniel Lepage, Laurent Obert

Department of Orthopaedics, Trauma, Plastic Surgery, Reconstruction and Hand Clinic CHRU Jean Minjoz, Besançon, France

Aim

The aim was to evaluate the fixation reliability and to compare the bone union rate, elbow joint function, and plate-related complications with those reported in similar studies.

Background

We performed a retrospective, single-center study to evaluate the outcomes after treating comminuted fractures of the proximal ulna with a double-plating technique.

Methods

24 patients (age = 45 yo (32–67) who had sustained a comminuted proximal ulna fracture during 10 years were included in the study. The fractures were associated with a Monteggia type lesion (5 cases), elbow dislocation (2 cases), and a Mason 3 radial head fracture (4 cases). 4 patients had an open fracture. 4 fractures were open, 9 were classified Mayo Clinic IIIB fractures. Bone fixation was performed using one third tubular plates on each side of the proximal ulna. Parameters of subgroups were compared using the non-parametric Mann and Whitney test, Student 95% confidence interval.

Results

With a mean follow up of 40 months (24–56 months), 21 of the 24 patients achieved bone union after a mean of 3.5 months without septic complications. The Morrey score was good to excellent in 72% of cases (mean score of 84). Mean flexion was 128° (90°–140°), extension deficit was 15° (0°–35°), pronation was 84° (65°–90°), supination 70° (10°–90°). 2 cases of nonunion with stiffness were treated by arthrolysis and new fixation with significant bad results.

Conclusions

In published studies of plate fixation of proximal ulna fractures (13 series), 20% to 40% of patients needed the plate removed. Placing a single straight plate on the dorsal crest is not logical due to the posterior angulation of the proximal ulna ((PUDA : .6° over the first 6 cm of the ulna in 96% of patients). This simple fixation double the fixation points and provides stable anatomic reconstruction of the ulna.



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10:12 - 10:20

418 Implant Survival For Elective Elbow Arthroplasty, A Study From The Swedish Elbow Arthroplasty RegisterHans Rahme¹, Louise Hedenstedt², Björn Salomonsson²

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2. Karolinska Institutet Danderyd Hospital, Stockholm, Sweden

Aim

The aim was to evaluate and compare implant survival for elbow prosthesis for implants, concepts, diagnoses, gender and age. In addition we aimed to investigate the frequency of and reasons for revision, all data from the Swedish Elbow register.

Background

The Swedish Elbow Arthroplasty Register was established in 1999. The elbow replacement procedure aims to relieve pain and improve function in the joint. The most common indication has been rheumatoid arthritis. The yearly incidence of total elbow replacements (TEA) is low, in Sweden less than 100 per year.

Methods

All elective TEA surgery until 2015-12-31 (n = 1103) was included in the study. Acute fracture cases were excluded. Implant survival was presented with Kaplan-Meier curves and risk of revision (RR) was calculated using the Cox proportional Hazards model. Reasons for, and frequency of, revisions for TEA was noted.

Results

The overall implant survival rate was 88% at 5 years, 83% at 10 years, and 75% at 15 years. The Coonrad-Morrey implant had a 2.6 times lower RR compared to the other implants (p = 0.027). Patients with osteoarthritis and pseudarthrosis had worse implant survival compared to rheumatoid arthritis (p = 0.001). In addition 61 (20%) of the patients with prior elbow surgery had revision surgery compared to 68 (10%) without prior elbow surgery (p = 0,001). Men had a higher RR, but there was no significant difference (p=0.06) between the genders, and age below 60 year had a 1.6 higher RR than 60 year or older (p=0.005).

Conclusions

The Coonrad-Morrey implant had a better survival compared to other implants. With regard to implant survival, rheumatoid arthritis is a suitable indication for TEA while osteoarthritis and pseudarthrosis show less good results. The explanation may be that the patient's level of activity also is related to the diagnosis.



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10:20 - 10:28

356 Can We Reasonably Suggest A Total Elbow Prosthesis To Patients Below The Age Of 55?

Madhi Siala, Marine Arboucalot, Fanny Elia, Stéphanie Delclaux, Nicolas Bonneville, Pierre Mansat

University Hospital of Toulouse, Toulouse, France

Aim

To evaluate the results and the survival rate of total elbow arthroplasty (TEA) on patients younger than 55 years.

Background

It is allowed that the indication of TEA must be avoided among young patients, because of a potentially high rate of complications.

Methods

From 1997 to 2015, 178 TEA were performed in our department, 34 on patients younger than 55 years. Inclusion criteria: primary TEA, for RA or traumatic context, with minimum 2 years follow-up. Exclusion criteria: revision TEA, tumors, less than 2 years follow-up. 17 patients with 19 TEA were included in our study: 13 women and 4 men of 46 years on average (29-54). A Coonrad-Morrey prosthesis was performed in all cases. Etiologies were: RA in 15, and traumatic sequela in 4.

Results

At 111 months average follow-up (29-189), MEPS reached 84 points (55-100) with 15 satisfactory results (79%) and 4 unsatisfactory results (21%). Radiographic analysis found humeral lucent lines in 6 including one complete, and ulnar lucent lines in 6 cases, all complete. Bushing wear was moderate in 4 and severe in 3. There were 12 (63%) complications leading to a revision surgery in 7 (37%): 2 TEA removal for infection, 1 axle changing, 2 bipolar revision, and 2 revision of the ulnar component. Survival rate was 84% at 5 years and 79% at 10 years.

Conclusions

TEA on patients younger than 55 years is associated with a 64% survival rate at 111 months. The survival rate decrease significantly after the 5th year, even clinical results at follow-up stayed satisfactory in 79% of the cases. Indication of TEA must be limited in young patients and must be discussed with other therapeutic options.



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09:08 - 09:16

878 Surgical Revision Of Radial Head Fractures - A Retrospective Multi-Center Analysis Of 466 Cases

Michael Hackl, **Kilian Wegmann**, Lars Peter Müller

Uniklinik Köln, Köln, Germany

Aim

This study aimed to evaluate complications following conservative or operative treatment of radial head fractures leading to surgical revision.

Background

While the overall clinical outcome of radial head fractures is satisfactory, complications are frequently observed. Thus far, comprehensive clinical data regarding the most common complications of radial head fractures leading to surgical revision are missing.

Methods

A retrospective, multi-center chart review was performed to identify patients who underwent surgical revision following conservative or operative treatment of a radial head fracture. The patients' age, sex, side of the injury and the time from injury to revision were recorded. Moreover, the initial diagnosis and treatment, the cause(s) for revision (up to 3 per case) and the revision procedure(s) (up to 3 per revision) were recorded.

Results

466 patients undergoing a total of 500 revisions were identified. The mean age at the time of revision was 44.5 ± 16.3 years with a mean time to revision of 68.3 ± 158.0 months. 55.7% of patients were male and the left side was injured in 65.0%.

In 444 cases, the initial diagnosis could be obtained:

Mason I 57
Mason II 64
Mason III 100
Mason 93
Essex-Lopresti 9
Monteggia-like lesion 58
Terrible triad 57

In 457 cases, the initial treatment was as follows:

ORIF 205
Conservative 138
Radial head arthroplasty 76
Radial head resection 17
Others 21

The following causes for revision were observed:

Joint stiffness 314
Instability 170
Malunion/loss of reduction/hardware related complications 159
Symptomatic osteoarthritis 136
Non-union 43
Complications due to radial head arthroplasty 31 (16 overstuffing)
Ulnar neuropathy 28
Infection 12
Others 3

The most common revision procedures included:



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Arthrolysis 196 (arthroscopic 104, open 92)

Ligament repair/reconstruction 128

Arthroplasty 116

Implant removal 110

Arthroscopic debridement 66

(Re-)ORIF: 38

Radial head resection 36

Conclusions

Complications are seen following all types of radial head fractures. Joint stiffness, instability, implant-related issues and symptomatic osteoarthritis present the most common causes of complications. Arthrolysis, ligament repair/reconstruction, (partial) joint replacement and removal of implants are the most frequently performed salvage procedures.



09:16 - 09:24

336 Contact Mechanics Of Anatomic Radial Head Prosthesis: Comparison With Native Radial Head And Anatomic Radial Head Prosthesis In Dynamic ModeYucheng Sun¹, Arnold Adikrishna², Hanpyo Hong², Inho Jeon², **Sungjoon Lim**³

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2. Department of Orthopedic Surgery, Asan medical center, College of Medicine, University of Ulsan, Seoul, South Korea
3. Asan Medical Center, Seoul, South Korea

Aim

We compared and analyzed the biomechanical characteristic of native radial head and anatomic radial head prosthesis in dynamic mode.

Background

Anatomic radial head prosthesis is becoming popular nowadays, though biomechanical characteristics of anatomic radial head prosthesis has not been properly investigated yet. Even some authors believe the anatomic radial head prosthesis could mimic the native radial head mechanics and reduce the capitellar erosion in the long term.

Methods

Ten fresh cadavers (mean age 76.6 years) were included in this study. A simulating dynamic motion mode from 0° to 130° range of motion was applied. Radio-capitellar contact pressure and area were measured by real-time digitalized sensor with intact radial head and with anatomic radial head prosthesis. Contact area and pressure curves were obtained during the flexion.

Results

The mean contact area, contact pressure and peak contact pressure of native radial head were measured 39mm², 76kPa and 121kPa, respectively. The mean contact area size, contact pressure and peak contact pressure of anatomic radial head prosthesis were 33mm², 91kPa and 145kPa, respectively. There was no significant difference between the native radial head and the anatomic radial head prosthesis in terms of mean contact area ($P=0.2881$), contact pressure ($P=0.1815$) and peak contact pressure ($P=0.1416$). The contact area and pressure curves were represented as parabolic non-linear in anatomic radial head prosthesis and near linear in native radial head during flexion.

Conclusions

Anatomic radial head prosthesis mimics the mechanics of native radial head in terms of mean contact area size, mean contact pressure and peak contact pressure, but showed different contact pressure and area curves during elbow flexion-extension, which may explain the capitellar erosion in the long term.

**Friday 15 September**

ROTATOR CUFF - II
09:00 - 10:30
POTSDAM

09:08 - 09:16

256 Clinical Outcome, PROM's, Power And Structural Integrity After Arthroscopic Subscapularis Tendon Repair

Jörn Kircher, Knut Schwalba, Milad Farkhondeh Fal, Achim Hedtmann

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Aim

Hypotheses: one year postop arthroscopically repaired subscapularis (SCP) lesions (SICK-stitch technique) show (1) a good restoration of shoulder function and (2) power with (3) intact (healed) tendons; (4) repaired isolated SCP lesions do better than combined lesions.

Background

There is little information about results of SCP repair as described here esp. with the used arthroscopic technique.

Methods

Study design: prospective-monocentric

inclusion criteria: SCP lesions with arthroscopic repair. Minimum FU 1y.

exclusion criteria: irreparable and massive cuff tears, osteoarthritis

time: 12-2013 to 12-2015.

Patients: n=30 included patients. n=9 with isolated and n=21 with additional SSP lesion.

Traumatic: n=12. Fox/Romeo: II n=17, III n=10, IV n=3. Mean age 63.3 (45-80); mean FU 18m (12-23)

assessment: ROM, Constant Score, SST, SSV, DASH, ultrasound

power: IsoForce Control EVO2 (Fstart, Fmax, Fend, Fd) in two positions (pos. 1: standing, pos. 2: sitting) for SCP and one position for SSP (standing).

Results

No complications. Significant improvement [mean pre;post] Flex (122.3;167), Abd (116.3;167), ERO (28;63), IRO (38;66.7), CS (39.2;92.32), SST (3.5;10.4), SSV (46.6;88.2), DASH (69,3;34). All tendons showed full integration in ultrasound.

N=18 and n=22 patients with normalization of preop positive lift-off and bear hug test respectively. There was no significant difference for gender, history of trauma, size of the lesion (Fox/Romeo grade) or additional SSP lesions.

DASH and SST show moderate correlation with power whereas Constant Score and SSV do not. Good restoration of power in comparison to contralateral side in pos. 1 and 2 (only Fmax sign. different).

Conclusions

The results one year after arthroscopic repair of subscapularis tendon lesions using the SICK-stitch technique are generally good with restoration of shoulder function and power and good patient perception. Additionally treated lesions did not significantly affect the outcome. The single use of the constant score does not adequately reflect the restoration of power of the SCP tendon.



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09:00 - 09:08

587 Partial Subscapularis Tears – Should We Repair?**Barbara Wirth**, Hans-Kaspar Schwyzer, Matthias Flury, Maximilian Lenz, Laurent Audigé

Schulthess Clinic, Zurich, Switzerland

Aim

The purpose of this study was to compare the outcome of repaired and non-repaired partial tears of the subscapularis tendon and facilitate intraoperative decision-making.

Background

Supraspinatus tears are often associated with a partial superior third lesion of the subscapularis tendon (Lafosse I). There is no consensus on whether these lesions should be treated or not.

Methods

From our rotator cuff register, we included all patients with a supraspinatus repair and a documented partial tear of the superior subscapularis tendon. Patients with and without a repaired subscapularis tear were distributed into two groups. Baseline data as well as clinical and patient-rated outcomes of the Constant Score (CS), Oxford Shoulder Score (OSS), Subjective Shoulder Value (SSV) and satisfaction at 6- and 24-months post-surgery were compared. Mixed models were used to adjust for baseline differences in age and gender.

Results

Of 47 patients, 31 did not undergo subscapularis repair versus 16 subscapularis repairs with one suture anchor. All but one patient in each group had a treated biceps tendon. Surgery time was significantly shorter in the non-repair group ($p = 0.001$). Patients with a subscapularis repair were younger and had better baseline function. At 6 months, the mean CS [71.2 vs. 73.9] and OSS [37.2 vs. 35.6] were similar in the non-repair and repair groups. The 6-month SSV and its mean change from baseline were significantly higher in the non-repair vs. repair group [85.3% vs. 71.2% and 39.1% vs. 20.2%] ($p \leq 0.015$).

Conclusions

There was no overall difference in clinical outcome between the groups at 6 and 24 months, although the repair group had better baseline function. Patients in the non-repair group appeared to be more satisfied with their shoulder condition. Despite the limited patient numbers, these observations do not support the repair of Lafosse I subscapularis tears.



09:32 - 09:40

512 Factors Associated With Atraumatic Posterosuperior Rotator Cuff TearHyung Bin Park¹, Ji-Yong Gwark¹, Mincheol Kam¹, Dong Kyu Moon²

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2. Department of Orthopaedic Surgery, Gyeongsang National University Hospital, Jinju, South Korea

Aim

The purpose of study was to determine the risk factors for atraumatic posterosuperior rotator cuff tear (PSRCT) by investigating the strengths of associations with recently proposed metabolic factors and with metabolic syndrome (MetS).

Background

The causes of PSRCT are multifactorial and still under investigation. Recently, certain metabolic factors have been proposed as risk factors. Although MetS is of increasing concern in modern industrialized societies, little information exists regarding its association with musculoskeletal problems.

Methods

This study involved 634 shoulders of 634 subjects from the general population. Each subject received a questionnaire, physical examinations, blood tests, simple radiographs and MRI evaluations of both shoulders, and an electrophysiological study of both upper extremities. Using logistic regression analysis, we calculated the odds ratios for various factors, including general physical factors, comorbidities, and serum metabolic parameters. P value was set at 0.05. The general physical factors were age, sex, dominant side, body mass index (BMI), and participation in manual labor. The comorbidities were diabetes, hypertension, dyslipidemia, thyroid dysfunction, and MetS. The serum metabolic parameters were serum lipid profile, glycosylated hemoglobin A1c, and thyroid function tests. PSRCT diagnoses were based on the MRI findings.

Results

Age, BMI, dominant side, manual labor, diabetes, hypertension, hypo-high-density lipoproteinemia (HDLemia), and MetS were significantly associated with PSRCT in univariate analyses. Because MetS has possible multicollinearity with diabetes, hypertension, BMI, and hypo-HDLemia, we performed two different multivariate analyses. The first multivariate analysis included diabetes, hypertension, BMI, and hypo-HDLemia, while excluding MetS; we found that age, dominant side, diabetes, BMI, hypo-HDLemia, and manual labor were significantly associated with PSRCT. The second multivariate analysis excluded diabetes, hypertension, BMI, and hypo-HDLemia, but included MetS; we found that age, dominant side, manual labor, and MetS were significantly associated with PSRCT.

Conclusions

Age, dominant side, manual labor, diabetes, BMI, hypo-HDLemia, and MetS are significantly associated with PSRCT.



10:04 - 10:12

178 What Is The Best Type Of Arthroscopic Fixation Technique For The Latissimus Dorsi Transfer?

Jean Kany¹, Jean David Werthel², Jean Grimberg³, Philippe Valenti², Bassem Elhassan⁴

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Aim

The objective of this study was to compare two types of arthroscopic fixation of the latissimus dorsi transfer (LDT) onto the humeral head on standard radiographs using metal clips.

Background

Several arthroscopic techniques have been described to fix the TLD in irreparable posterior-superior cuff tear. A high rate of rupture at the bone-tendon interface (guillotine effect) has been reported (27.6%) after transosseous fixation in a tunnel before the third month postoperatively. We hypothesized that this high rate of rupture could be improved by modifying the technique of fixation

Methods

Between 1/1/2015 and 31/12/2016, 79 consecutive TLDs for irreparable posterior-superior cuff tears were performed by a single surgeon. All transfers were arthroscopically-assisted and fixed in a transosseous tunnel and an endobutton (Group 1, 31 TLDs), and "over the top" with three suture-anchors (Group 2, 47 TLDs). Three metal clips were placed systematically intraoperatively in the intubulated tendon at a fixed distance of 2, 4 and 6 cm from its insertion onto the humerus. Immediate postoperative standard anteroposterior radiographs were performed and the position of the metal clips was compared to their position on radiographs performed on the 3rd postoperative months to evaluate the rate of rupture.

Results

The rate of ruptured TLD was significantly higher in Group 1 (10/31 cases) than in Group 2 (9/47 cases): 32.3% versus 19.6%, $p < 0.05$.

Conclusions

These results confirm the high risk of "guillotine effect" at the bone-tendon interface with the transosseous technique. The "over the top" technique appears to decrease the rate of ruptured TLDs.



09:24 - 09:32

171 Latissimus Dorsi Transfer For Irreparable Subscapularis Tendon Tears**Chang Hee Baek**, Sang Won Mun, Ji Young Kim, Seung Hoon Yi

Yeosu Baek hospital, Yeosu, South Korea

Aim

We introduced a latissimus dorsi (LD) transfer technique for irreparable subscapularis tears and evaluated its short-term clinical outcomes.

Background

Several tendon transfers to reconstruct irreparable subscapularis tears have been described. The LD could be one of the candidates for transfer because its direction and function are similar to that of the subscapularis.

Methods

Twenty-four consecutive patients with irreparable subscapularis tears who underwent an LD transfer were enrolled. Their clinical and functional outcomes were evaluated using the Constant score, American Shoulder and Elbow Surgeons (ASES) score, visual analogue scale for pain, and range of shoulder motion before surgery and at 1 year postoperatively. The lift-off and belly-press tests were performed to assess the integrity and function of the subscapularis. MRI was performed preoperatively and at 1 year postoperatively to evaluate the tendon's integrity.

Results

The mean Constant scores improved significantly from 46.5 ± 6.6 preoperatively to 69.8 ± 5.2 at the last follow-up ($p=0.008$). The mean ASES scores and pain scores improved from 40.2 ± 3.5 to 70.4 ± 5.4 ($p=0.008$) and from 6.5 ± 0.5 to 2.2 ± 1.3 ($p=0.006$), respectively. The mean range of motion for forward elevation and internal rotation significantly increased from $135.5^\circ \pm 17.2^\circ$ to $166.0^\circ \pm 15.8^\circ$ ($p=0.016$) and from L5 to L1 ($p=0.010$), respectively. However, there was no significant improvement in the range of motion for external rotation ($51.5^\circ \pm 7.9^\circ$ to $68^\circ \pm 7.9^\circ$, $p=0.062$). At the final follow-up, the belly-press test was negative for 18 of 24 patients, and the lift-off test was negative for 16 of 20 patients. No complications related to the tendon transfer, including axillary and radial nerve injuries, were found. There was no retear of the transferred LD on postoperative MRI.

Conclusions

The LD transfer for irreparable subscapularis tendons resulted in pain relief and restoration of range of motion and function of the shoulder. Thus, LD transfer could be considered an effective and safe salvage treatment method for irreparable subscapularis tears.



09:40 - 09:48

245 Poor Short-Term Outcomes Of The Biodegradable Subacromial Spacer In Patients With Massive Rotator Cuff Tears. A Prospective Study.

Miguel Angel Ruiz Ibán, Alejandro Lorente Gomez, Jorge Díaz Heredia, Raquel Ruiz Díaz, Roselyn Alvarez Sciamara

Hospital Universitario Ramón y Cajal, Madrid, Spain

Aim

To evaluate prospectively the short-term outcomes of a biodegradable subacromial spacer in patients with irreparable massive rotator cuff tears.

Background

The reported efficacy of this new device is excellent, but independent reports are scarce.

Methods

A prospective study was performed including all patients with irreparable rotator cuff tears managed with a biodegradable subacromial spacer (Inspace®) between December 2014 and February 2016. Patients were evaluated preoperatively and at 12-months follow-up with the Simple Shoulder test and the Constant and QuickDASH scores. All data was considered non-parametric and expressed in median [first quartile-third quartile]. Comparisons were made using the two-tailed Mann-Whitney U-test.

Results

Sixteen patients were initially included. One had a severe worsening of her Parkinson's disease three months after surgery and was excluded from the study. A total of 15 subjects (11 females/4 males; age 69.4[66.3-73.8]) were available for 1-year follow-up. Of these, four had some degree of rotator cuff arthropathy (Seebauer's type 1 in 3 and type 2 in 1) and three had previous failed rotator cuff repairs. Three subjects (two of these with previous rotator cuff arthropathy) required conversion to a reverse shoulder arthroplasty due to persistent symptoms (at 6,7 and 7 months postop.), in these the final functional status was assessed immediately before the shoulder replacement.

There were no significant variations in the Constant score (preoperative: 30.0[22.0-37.0] versus 1-year: 47.0[33.0-61.0]), the Simple Shoulder Test score (preoperative: 3.0[2.0-4.0] versus 1-year: 4.0[2.0-6]) and the QuickDASH general score (preoperative: 36.0[31.0-41.0] versus 1-year: 31.0[27.0-37.0]). Only eight patients (53.3%) had clinically relevant improvements in the Constant score (>10 points).

Conclusions

The 1-year outcomes of biodegradable subacromial spacer insertion are not encouraging. Only half the patients benefited for surgery. The indications of this device should be more clearly defined.



09:16 - 09:24

817 Arthroscopic Versus Open Repair Of Large Isolated Subscapularis Tendon TearsChristoph Bartl¹, Florian Elser², Janna Dolde³, Stefan Eichhorn⁴, Florian Gebhard³

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4. Technical University Munich, Munich, Germany

Aim

In this prospective study clinical results following arthroscopic (group 1) and open (group 2) repair of isolated, large subscapularis tendon tears were evaluated.

Background

Outcomes in large SSC-tears, comparing arthroscopic versus open techniques are rare.

Methods

31 patients at an average age of 51(26-65) years were evaluated 18(13-24) months after arthroscopic (15-G2) or open (15-G2) reconstruction of isolated subscapularis tendon tears. In group 1 there were 8 x type-3 tears and 7x type-4 tears according to Fox and Romeo. In group 2 there were 9 x type-3 and 7x type-4 tears. Outcomes were measured with the Constant-Score, specific subscapularis tests and a subscapularis strength measurement. Postoperative tendon integrity was evaluated with ultrasound and MRI.

Results

The Constant-Score in group 1 increased from 45 to 81 points postoperatively and in group 2 from 42 to 85P(each $p < 0.01$; G1 vs G2 $p > 0.05$). The average belly press angle in both groups could be improved significantly by the procedure (group 1: 45° to 16° ; groups 2: 50° to 14° - each $p > 0.01$) with no significant differences between the groups. Postoperative subscapularis strength measurement in the belly press position showed comparable results for both groups (G1: 68 N and G2: 72 N - $p > 0.05$ ns), but both groups showed a significant strength deficit compared to the contralateral healthy shoulder. The rate of postoperative intermediate positive belly press tests was 33% in G2 and 31% in G 2, but these shoulders achieved similar Constant Scores compared to patients with negative tests. Increased tear size, in combination with increased tendon retraction and a delayed surgery showed inferior functional results. Ultrasound and MRI revealed a postoperative retear rate of 7% in group 1 and 6% in group 2.

Conclusions

Arthroscopic reconstruction of large isolated subscapularis tendon tears achieved comparable functional results as open reconstruction in the short term follow up.



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09:48 - 09:56

908 2-Year Results After Implantation Of The Inspace Balloon

Lukas Bauer, Alexandra Pokorny-Olsen, Dominik Meraner, Peter Buxbaumer, Ulrich Lanz, Christian Wurnig

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Aim

Is the Inspace balloon a suitable therapy for irreparable rotator cuff tears?

Background

In literature there is no consensus of treating patients with irreparable rotator cuff tears without osteoarthritis. Especially younger patients don't want a shoulder prosthesis and older patients are often multimorbid. The Inspace balloon is a new minimal invasive opportunity and we tried to find out, if it is a suitable therapy option for these people.

Methods

Preoperatively, the Constant Score, Oxford Score and the Subjective Shoulder Value were collected.

Furthermore, classification of the tear configuration according to Bateman, Patte, Thomazeau and Goutallier was carried out through MRI. The Acromion Index and Critical Shoulder Angle were also determined according to Gerber through conventional X-rays.

All patients underwent an arthroscopic implantation of the InSpace balloon.

Postoperatively, the clinical scores mentioned above were obtained after 6 weeks, 3, 6, 12, 24 months.

Results

Interim results of 17 patients (19 shoulders) and 2-year results of six patients are currently available.

Preoperatively, Constant Score averaged 33, Oxford Score 37 points, and Subjective Shoulder Value was 38%. Average 1-year follow up Constant Score increased up to 64, Oxford Score decreased to 20 points. SSV stagnated to 68 percent in the period from 6 to 12 months. 2-year results of

6 patients showed only minimal changes in the clinical scores.

Five patients had complications so far: One patient received an inverse STEP, two patients had to be diagnosed with an infected balloon and two balloons dislocated and had to be lanced.

On average, there was no increase in power among patients in the 2-year follow up.

Conclusions

Due to high complication rate of more than 25 percent we do not implant the Inspace balloon at our clinic any more and do not recommend it as a standard therapy for irreparable tears of the rotator cuff.



09:56 - 10:04

565 Arthroscopic Superior Capsule Reconstruction Eliminates Pseudoparalysis In Patients With Irreparable Rotator Cuff Tears

Teruhisa Mihata¹, Thay Q Lee², Akihiko Hasegawa¹, Takeshi Kawakami³, Kunimoto Fukunishi⁴, Yukitaka Fujisawa⁵, Mutsumi Ohue⁶, Masashi Neo¹

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6. Katsuragi hospital, Kishiwada, Japan

Aim

Objective of this study was to evaluate whether arthroscopic SCR reversed preoperative pseudoparalysis in patients with irreparable rotator cuff tears.

Background

We have developed the superior capsule reconstruction (SCR) technique for surgical treatment of irreparable rotator cuff tears.

Methods

The 90 patients with irreparable rotator cuff tears underwent arthroscopic SCR using fascia lata autografts. They were allocated into 3 groups according to their preoperative active shoulder elevation: (1) no pseudoparalysis: more than 90° of active shoulder elevation (48 patients); (2) moderate pseudoparalysis: no shoulder stiffness, less than 90° of active shoulder elevation, patients maintained more than 90° elevation once the shoulder was elevated passively (27 patients); and (3) severe pseudoparalysis: no shoulder stiffness, less than 90° of active shoulder elevation, patients had a positive drop-arm sign (15 patients). Mean follow-up was 48 months (24 to 88 months).

Results

ASES score, active elevation, active external rotation, and acromiohumeral distance increased significantly after arthroscopic SCR in patients with no pseudoparalysis, moderate pseudoparalysis, or severe pseudoparalysis. The graft healing rate was 96% (43 of 45) in patients with no pseudoparalysis, 96% (26 of 27) in those with moderate pseudoparalysis, and 87% (13 of 15) in the severe pseudoparalysis group. Postoperative ASES score, active elevation, active external rotation, acromiohumeral distance, and healing rate did not differ among the 3 patient groups. Pseudoparalysis was reversed in 96% (26 of 27) of patients with moderate pseudoparalysis and in 93% (14 of 15) patients with severe pseudoparalysis. Patients with residual moderate or severe pseudoparalysis had graft tears postoperatively.

Conclusions

Arthroscopic SCR improved shoulder function and achieved superior stability in patients with previously irreparable rotator cuff tears both with and without pseudoparalysis. Providing that the graft did not tear postoperatively, arthroscopic SCR reversed preoperative pseudoparalysis. The graft healing rate after arthroscopic SCR did not differ between patients with and without pseudoparalysis.



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10:12 - 10:20

498 Latissimus Dorsi Transfer Isolated Versus Combined With A Partial Cuff Repair In MassiveFelipe Reinares¹, Marco Cartaya², Jeandavid Werthel², Philippe Valenti²

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2. Paris shoulder unit, Paris, France

Aim

To compare the clinical results of two groups of patients: group A treated with isolated arthroscopic latissimus dorsi transfer and group B treated with arthroscopic latissimus dorsi transfer combined with partial cuff repair.

Background

The surgical treatment of massive posterosuperior cuff tears remains controversial. Debridement, partial repair, superior capsule reconstruction, tendon transfer and joint replacement are possible alternatives.

Methods

35 patients with a massive postero superior cuff tear were included between 2011 and 2013. The rupture was defined as irreparable when anatomical reinsertion of the tendons was impossible despite complete release. Patients were excluded if the subscapularis or the teres minor were involved. Twenty-one had had an isolated transfer (Group A) and 14 had had a transfer combined with a partial cuff repair (Group B). Rotator cuff lesions were not significantly different in both groups in terms of number of tendons involved, retraction, muscle atrophy and fatty infiltration. The transfer was fixed through a bony tunnel at the posterior insertion of the supraspinatus and the partial repair was done by advancing the supraspinatus and by side-to-side sutures. Outcome measures included pain (VAS=visual analogue scale), range of motion, strength, Constant Scores and Subjective Shoulder Value (SSV).

Results

The results in the Group B were significantly better for the Constant Score (58 +/- 4 in Group A versus 64 +/-8 in Group B, $p<0.03$), range of motion (29+/-5 points in Group A versus 33+/-5 points in Group B, $p<0.03$) and strength in 90° of abduction (1.9kg +/-0.9 in Group A versus 2.5kg +/-1 in Group B, $p<0.029$). Pain scores, SSVs and active external rotation were not significantly different in the two groups.

Conclusions

Results were significantly better for range of motion and strength when the transfer was combined with a partial repair of the cuff.



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10:20 - 10:28

741 Isolated Loss Of Active External Rotation (ILER): A Distinct Entity And Results Of L'Episcopo Tendon TransferPascal Boileau¹, Mohammed Baba², Walter B. McClelland³, **Charles-Edouard Thélu**⁴,
Christophe Trojani¹, Nicolas Bronsard¹

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3. Peachtree Orthopedics, Atlanta, United States
4. Polyclinique du Bois, Lille, France

Aim

To characterize a subgroup of cuff-deficient patients with isolated loss of active external rotation (ILER) but preserved active elevation, and to evaluate the outcomes of L'Episcopo procedure to restore horizontal muscle balance of the shoulder.

Background

Posterosuperior cuff deficiency can lead to ILER with loss of spatial control of the arm and difficulties with Activities of Daily Living (ADL).

Methods

Between 2003 and 2013, 26 consecutive ILER patients (14 males, 12 females) with massive irreparable posterosuperior cuff tear were treated with a modified L'Episcopo tendon transfer. Patients were evaluated clinically at minimum two-year follow up, and radiographs were obtained at most recent follow-up. The mean follow-up was 52 months (range 24-104).

Results

Preoperatively, compared to contralateral safe side, there was an average deficit of -57.4° in AER1, and -60° in AER2. Patients presented with Hornblower, ER Lag, Drop, and Dropping signs. On CT-scan or MRI, there was severe fatty infiltration of infraspinatus and absent/atrophic teres minor. The mean age at surgery was 64.5 years (29 to 83). After L'Episcopo transfer, 84% of patients were satisfied. The ADLER score (patient's ability to perform ADLs in which active ER is required) increased from 10.2 to 23.1 points ($p < 0.001$). The gain was $+26^\circ$ in AER1 and $+18.5^\circ$ in AER2. Adjusted Constant and SSV scores increased from 65% to 86% and 36.5% to 69%, respectively ($p < 0.001$). At last follow up, two patients with advanced arthropathy (Hamada III) required conversion to reverse shoulder arthroplasty (7 and 9 years postoperatively).

Conclusions

ILER is a cause of severe handicap because of loss of spatial control of the upper limb related to the complete absence of ER muscles (absent/atrophied infraspinatus and teres minor). In properly selected cases (Hamada stage I or II), the modified L'Episcopo transfer is effective at restoring both AER and shoulder function.



BERLIN 2017 • GERMANY • SEPTEMBER 13-16

Friday 15 September

ANATOMICAL SHOULDER ARTHROPLASTY

11:00 - 12:30

POTSDAM

11:16 - 11:24

950 3D Pre-Operative Planning And PSI For Correction Of Highly Deformed Glenoids: Can We Avoid Reverse Arthroplasty In Primary OA ?**Olivier Verborgt**, Wouter Jak, Alexander Vervaecke, Annemieke Van Haver

AZ Monica, Antwerp, Bélgica

Aim

We hypothesized that accurate assessment and correction of glenoid deformity and precise positioning of an anatomical glenoid component may be feasible using 3D pre-operative planning and PSI.

Background

Highly deformed glenoids in primary OA are difficult to correct with standard instrumentation and an anatomical prosthesis. Therefore, a reverse prosthesis is often used despite patient's young age and intact cuff. Using 3D pre-operative planning and PSI accuracy of planning of an anatomical glenoid component may be improved.

Methods

Ten consecutive patients with primary OA and intact cuff but highly deformed glenoids were scheduled for arthroplasty. Pre-operative 3D planning and PSI was used to correct glenoid inclination and posterior wear of the native glenoid and the goal was to implant an anatomical glenoid component. Per-operative antero-posterior stability of the anatomical prosthesis was assessed. Post-operative correction of the glenoid inclination and version was measured and the deviation between pre-operative planning and post-op position of the glenoid baseplate was assessed on CT scans and 3D reconstructions.

Results

The mean age of the patients was 62 years (range, 46 to 69). Pre-op inclination was 3° (range, -4° to 12°) ; version was -15° (range, -10 to -19). Per-operatively the anatomical prosthesis was stable in all cases. Postoperative inclination was corrected to 0,6 (range, 0 to 4), version to -3° (range, 0 to -5). The mean deviation for the final position from the planning for inclination was 4° (range, 2 to 7) and 5° for version (range, 4 to 7).

Conclusions

3D pre-op planning and PSI guided correction of highly deformed glenoids results in good per-operative antero-posterior stability of the an anatomical prosthesis, accurate postop correction of the glenoid deformity and low deviation from the planned position. Long-term follow-up will determine if this technique results in better clinical outcome than a reverse prosthesis.



12:12 - 12:20

308 After Total Shoulder Arthroplasty, Is Long Term Glenoid Component Loosening Really Worse With A B2 Glenoid.

Godfrey Brais¹, **Simon Nicholas Bell**², Jennifer Coghlan¹

1. Melbourne Shoulder and Elbow Centre, Melbourne, Australia
2. Monash University, Melbourne, Australia

Aim

To assess the incidence of glenoid component radiolucent lines following total shoulder arthroplasty, and compare with the Walch classification of the glenoid prior to index surgery.

Background

It has been suggested that the rate of loosening and development of radiolucent lines is worse with a B2 glenoid

Methods

A prospective study of a total shoulder replacement prosthesis system with a cemented double pegged polyethylene glenoid component was commenced in 2006, with yearly post-operative X-Rays. The incidence of glenoid radiolucent lines was recorded in these using the Lazarus score. These scores were compared with the preoperative CT scan assessment of the Walch types

Results

In 40 patients, 43 shoulders met the inclusion/exclusion criteria. Three revision operations were necessary, one in an A1, A2, and B2 patient. Average radiographic follow up was 70 months.

The patient demographics in the 5 Walch classification type subgroups were similar. The overall interrater variability rate of glenoid radiolucency grading was similar ($\kappa \approx 0.986$). There was no statistical difference in the Lazarus scores between the Walch types. Lazarus 2 or higher scores were present with type A1- 14%, A2 - 29%, B1- 18%, B2 - 22%, and C - 0%.

Conclusions

At 6 years there was no increased incidence in glenoid radiolucent lines in patients with a type B2 glenoid, compared with the other types. This suggests similar long term outcomes for the patients with different Walch glenoid types.



11:00 - 11:08

110 Accuracy Of Patient Specific Instruments For Positioning Of Humeral And Glenoidal Components In Shoulder Arthroplasty - An In Vitro StudyPeter E. Müller¹, Mathias A. Zumstein², Bernhard Jost³, Christophe Monnin⁴, Ralph Hertel⁵

1. Department of Orthopaedic Surgery, Munich, Germany
2. Physical Medicine and Rehabilitation, Bern, Switzerland
3. University of Munich, St. Gallen, Switzerland
4. Shoulder, Marcq-En-Baroeul, France
5. Elbow & Orthopaedic Sports Medicine, Bern, Switzerland

Aim

Accurate positioning is a very important Point for the outcome of shoulder arthroplasty. This cadaver study shows a very low within- and between-surgeon variability and a high accuracy of implantation of a shoulder arthroplasty by CT-based patient specific instruments (PSI)

Background

Malpositioning of glenoidal or humeral components in shoulder arthroplasty can result in limited range of motion, increased loosening rate and secondary rotator cuff tears. Experimental studies show that navigation improved the positioning, but with a high percentage technical problems. Patient specific instruments (PSI) are established in knee arthroplasty.

Methods

Five shoulder surgeons positioned CT-based PSI for the humerus and the glenoid five times non-consecutive. The within- and between-surgeon variability was checked by navigation. Afterwards the prosthesis was implanted and the accuracy of the position was controlled by a CT-scan and compared to the preoperative planning.

Results

On the glenoid side the pooled standard deviation was 0.5 mm for the supero-inferior and antero-posterior position, 1.2° for the retroversion and 0.3° for the inclination. The within- and between-surgeon variability was below 1 mm eccentricity and below 1° of version and inclination. For the humeral side, we found an pooled standard deviation of 1.1 mm for resection height, 1.9° for inclination and 1.8° for retrotorsion. The within-surgeon variability was 1.1 mm for resection height, 1.6° for retrotorsion and 1.9° for onclination. The CT-scan after implantation showed a correct positioning of the prosthesis according to the planning.

Conclusions

Patient specific instruments have the potential to transfer the planning of a shoulder arthroplasty to an exact intraoperative implantation. Further clinical studies must show the effectiveness and the superiority concerning the results compared to conventional implantation technique.



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11:32 - 11:40

188 Periprosthetic Bone Remodeling After Stemless Shoulder Arthroplasty Using A Finite Element Analysis And SPECT/ CT Imaging

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2. Department of Radiology and Nuclear Medicine Otto-von-Guericke-University, Magdeburg, Germany
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4. Institute for Bioprocessing and Analytical Measurement Techniques e.V., Heiligenstadt, Germany
5. Department of Orthopaedic Surgery, Otto-von-Guericke-University,, Magdeburg, Germany

Aim

This study evaluates bone remodeling process in the proximal humerus induced by the implantation of a stemless shoulder prosthesis with regard to time response and type and extent of bone turnover.

Background

The short- and midterm results of stemless shoulder arthroplasty were encouraging. Today, several types of stemless implants with different designs with reference to metaphyseal fixation are used in clinical practice. The resulting bone remodeling process in the proximal humerus after the implantation of a stemless shoulder prosthesis have not been investigated so far.

Methods

28 patients with primary osteoarthritis undergoing a stemless shoulder arthroplasty were prospectively evaluated. The local metabolic periprosthetic activity was analyzed using single-photon emission computed tomography (SPECT / CT) in 5 regions of interest (ROI) around the implant. The CT- data were used to create a FE- model of the humeri. By simulating the virtual impaction of the short stem in the created FE -model of the proximal humerus the transferred forces in the surrounding bone were evaluated by estimation of the strain energy density (SED), a scalar valued function that relates to the deformation gradient of the bone. Correlation between the data of the local metabolic periprosthetic activity and the values of the estimated SED values were investigated using Pearson`s correlation coefficient.

Results

Different patterns of the metabolic bone activity were found in the 5 ROI`s adjacent to the prosthesis ($F = 8.941$, $p < 0.000$). A correlation were found between the local metabolic periprosthetic activity and the values of the estimated SED value ($r = - 0,5213 \pm 0,0576$).

Conclusions

The different patterns of metabolic activity in the ROIs during the follow up are probably due to different loading of the bone. Further studies are required to determine the consequences of the mechanically induced bone remodeling process on the clinical and radiological long term result results.



11:24 - 11:32

217 3D Planning And Targeting Guides For Glenoid Component Positioning In Total Shoulder Arthroplasty. Comparative Study About 34 Cases.

Adrien Jacquot¹, Marc-Olivier Gauci², Jean Chaoui³, Pascal Boileau², Daniel Mole¹, Gilles Walch⁴

1. Centre Chirurgical Emile Gallé, Nancy, France
2. Hopital Pasteur - CHU de Nice, Nice, France
3. Imascap, Brest, France
4. Centre Orthopédique Santy, Lyon, France

Aim

To evaluate the efficiency of a novel 3D pre-operative planning system for glenoid component positioning in anatomical shoulder arthroplasty, and assess the proper role of associated patient-specific targeting guides.

Background

Glenoid loosening after TSA is a serious concern after 10 years, and is reported to be influenced by the glenoid component position. 3D planning softwares and targeting guides have previously shown promising results, regarding positioning accuracy, and thus could improve component survivorship.

Methods

Thirty-four patients scheduled for TSA, for primary gleno-humeral arthritis, were enrolled in this comparative study. Every patient had a pre-operative planning, based on a CT-scan, using Glenosys Software (Imascap, Brest, France). Ideal position of the glenoid implant was virtually determined for each case. For 17 patients, glenoid component implantation was performed freehand, based on 3D views from the software, and for 17 others, a patient-specific 3D-printed device was used to position the guide-wire used for glenoid reaming and keel preparation. Actual position of the glenoid component was determined by manual segmentation of post-operative CT-scan, and then compared to the pre-operative planned position.

Results

The mean variation of the entry point of the pin-guide was 2,1mm (sd. 0,86) with a targeting guide, versus 2,89mm (sd. 1,36) with freehand method ($p=0,05$). The mean variation of version was 4,87° (sd. 3,61) with a targeting guide, versus 4,82° (sd. 3,12) with freehand method ($p=0,97$). The mean variation of inclination was 4,39° (sd. 3,36) with a targeting guide, versus 4,2° (sd. 2,14) with freehand method ($p=0,85$). High pre-operative retroversion influenced accuracy with freehand method, but not with a guide. There were less badly placed components with a targeting guide than without (12vs41%).

Conclusions

Glenosys system allowed accurate glenoid component positioning. Results obtained with freehand method underlined the importance of 3D pre-operative planning. Targeting guides improved reliability for the entry point but not for the orientation.



11:08 - 11:16

105 Version And Inclination Obtained With 3D Planning In Total Shoulder Arthroplasty: Do Different Programs Produce The Same Results?

Patrick Joel Denard¹, Matthew T Provencher², Alexandre Lädermann³, Anthony A Romeo⁴, Joshua S Dines⁵

1. Southern Oregon Orthopedics, Medford, United States
2. The Steadman Clinic, Vail, United States
3. Division of Orthopaedics and Trauma Surgery, La Tour Hospital, Meyrin, Switzerland
4. Rush, Chicago, United States
5. Hospital for Special Surgery, New York, United States

Aim

The aim was to compare version and inclination values obtained with preoperative three-dimensional (3D) planning for TSA using the Blueprint (Wright Medical Inc.) and VIP (Arthrex Inc.) systems. The hypothesis was that there would be no difference in version or inclination measurements obtained with the two systems.

Background

In recent years there has been a proliferation of commercially available preoperative planning systems and corresponding patient specific instrumentation (PSI) for total shoulder arthroplasty (TSA). While the goal of these tools is to improve implant position, no study has compared the preoperative measurements obtained with different systems.

Methods

Preoperative CTs in 63 consecutive patients undergoing TSA or RSA were analyzed in the Blueprint and VIP systems. Version and inclination obtained by each system were recorded and compared.

Results

The mean version obtained with Blueprint was $-10.9^\circ \pm 9.0^\circ$ (range 14 to -41) compared to $-9.3^\circ \pm 8.2^\circ$ (range 8 to -36) with VIP ($p = .04$). The mean inclination was $9.0^\circ \pm 8.8^\circ$ (range 29 to -12) obtained with Blueprint compared to $9.7^\circ \pm 6.1^\circ$ (range 22 to -6) obtained with VIP ($p = .463$). In 19 cases (30%) the difference in measured version between the two systems was 5° or greater. In 29 cases (46%) the difference in measured inclination between the two systems was 5° or greater. In 12 cases (19%) both version and inclination varied by 5° or greater between the two systems. In 35 cases (56%) either varied by 5° or greater, and in 15 cases (24%) either varied by 10° or greater.

Conclusions

There is considerable variability in preoperative measurements obtained for 3D planning of TSA using the Blueprint or VIP systems. Given that the goal of PSI is precise implant positioning, further study is needed to evaluate the accuracy of preoperative measurements obtained with different commercially available systems.



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11:56 - 12:04

902 Clinical And Radiological Results Of Fully Uncemented Glenoid Component In Total Shoulder Arthroplasty: A Long-Term Follow Up**Nader Dayerizadeh**, Alexander Van Tongel, Matthijs Jacxsens, Lieven De Wilde

University Hospital, Gent, Belgium

Aim

The aim of the study was to evaluate the long-term clinical and radiological results of all-polyethylene fully uncemented glenoid component.

Background

Glenoid component loosening still remains an issue in total shoulder arthroplasty. Short-term results of an uncemented all polyethylene glenoid component showed good clinical results and no signs of loosening in 88% of the patients on computed tomography scan. However no long-term results have been described.

Methods

A consecutive series of 38 shoulders (in 34 patients) were evaluated clinically with the Constant-Murley score (CMS) and the SF-12 Health Survey score. Fixation of the glenoid component was evaluated with CT-scan.

Results

2 patients were lost for follow-up (deceased and CVA). 2 patients were revised because of symptomatic glenoid loosening. Thirty-four shoulders (in 30 patients), with a mean follow-up of 8.4 years, were evaluated.

The CMS improved from 40.2 (range,13-73) preoperatively to 72 (range,54-93) at two year follow-up and 68.5 (range,19-87.3) at latest follow-up. The SF-12 Physical Component Summary score was 43.9 (23.8-56.6), and the SF-12 Mental Component Summary score was 53.4 (36.3-60.8). Full osteo-integration of the component was observed around the pegs in 31 shoulder arthroplasties. Signs of loosening were seen around the central and peripheral pegs in 3 shoulders, however there was no statistical difference in clinical outcomes compared to other patients.

Conclusions

The long-term clinical and radiological evaluation follow-up of uncemented glenoids remains promising, with good clinical results and a survival rate of 94%. There were no signs of glenoid loosening in 86% of the patients on CT-scans.



12:20 - 12:28

678 Hemiarthroplasty Versus Total Shoulder Arthroplasty. A Retrospective Cohort Study

Meaghan D. Rollins¹, Caleb Netting¹, Carl Van Walraven², Meltem Tuna³, Anan Badar Eddeen³, Peter L.C. Lapner⁴

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2. University of Ottawa, Ottawa Hospital Research Institute, Institute for Clinical Evaluative Sciences, Ottawa, Canada, Ottawa, Canada
3. Ottawa Hospital Research Institute, Institute for Clinical Evaluative Sciences, Ottawa, Canada, Ottawa, Canada
4. Division of Orthopedics, Ottawa Hospital Research Institute, The Ottawa Hospital, University of Ottawa, Ottawa, Canada

Aim

To compare survivorship between total shoulder arthroplasty (TSA) and hemiarthroplasty (HA) and to determine which factors correlate with implant failure.

Background

Both TSA and HA have demonstrated good long-term survivorship. No large-scale studies have directly compared survivorship of TSA with HHR.

Methods

All patients who underwent shoulder arthroplasty in Ontario, Canada, were identified at the Institute for Clinical Evaluative Sciences (ICES) between April 2002-March 2015.

Demographic variables included time to revision surgery (or death), age, sex, Charlson comorbidity index, income quintile, presence of rheumatoid or osteoarthritis (OA) and surgeon factors. Cumulative incidence function, and Fine and Gray's sub-distribution hazard model (time to event analysis) were used with death as a competing risk.

Results

During study period, 8,006 patients underwent either HHR or TSA and 424 (5.3%) underwent revision. Mean age at index surgery was 69.1 years. There were no differences in demographics between groups. There was no difference between groups in regards to revision rate. Higher patient age was associated with a decreased hazard of revision (HR: 0.79, 21% lower for every 10 years in non OA patients, $p < .001$). At age 50, hazard of revision for OA patients was 18% higher than patients without OA. At 80 however, the hazard of revision for OA patients was 36% lower than patients without OA (HR: 1.18, $p = 0.017$ and OA Age Interaction HR: -0.02, $p = 0.007$). Surgeon experience was associated with decreased risk of revision (hazard of revision 24% lower if surgeon had >25 years of experience (HR: 0.76, $p = 0.045$)).

Conclusions

There was no statistical difference in revision rate between HHR and TSA. Long-term survival of shoulder arthroplasty was found to be significantly related to age at index surgery, diagnosis of osteoarthritis and surgeon experience. Surgeons may use these associations to discuss prognosis and revision rates with patients.



11:48 - 11:56

895 High Survival Rates Of Anatomical Total Shoulder Arthroplasty Used For Glenohumeral Osteoarthritis.**Jeppe V Rasmussen**¹, Steen L Jensen², Yilmaz Demir³, Randi Hole⁴, Trygve Metlie⁴, Björn Salomonsson³

1. Herlev university Hospital, Copenhagen, Denmark
2. Aalborg university Hospital, Aalborg, Denmark
3. Danderyds Sjukhus AB, Stockholm, Sweden
4. Haukeland University Hospital, Bergen, Norway

Aim

The aim was to compare the 10-year survival rates of different shoulder arthroplasty types used for osteoarthritis and to evaluate age as a possible risk factor for revision

Background

The outcome of anatomical total shoulder arthroplasty is superior to that of hemiarthroplasty, but the risk of glenoid loosening has been worrying. The majority of previous studies reporting survival rates and indications for revision are, however, either based on older arthroplasty designs, or on small series with less than 200 cases.

Methods

This study is based on a dataset from the Nordic Arthroplasty Registry Association (NARA). Data from 2004-2013 was prospectively collected by the national registries in Denmark, Norway and Sweden and merged into a common dataset in 2014. The minimal dataset was defined as a set of variables containing only data that all registries could deliver and where consensus regarding definition of the variables and related values could be made. Revision was defined as removal or exchange of any component or the addition of a glenoid component.

Results

6,871 arthroplasties were used for osteoarthritis. The estimated survival rates at 10 year after resurfacing hemiarthroplasty (n=1,923), stemmed hemiarthroplasty (n=1,587), and total shoulder arthroplasty (n=2,340) were 0.85, 0.93 and 0.96 respectively (p<0.001, Log rank test). Loosening of the glenoid component in total shoulder arthroplasty as indication for revision was rare (0.5%). The relative risk of revision (RR) for patients younger than 55 years was 3.9 (2.7-5.3 95% CI), p<0.001 compared with patients older than 75 years (gender, year of surgery and arthroplasty design were included in the cox regression model).

Conclusions

We found highest survival rates for total shoulder arthroplasty and recommend this as the treatment of choice for end-stage of osteoarthritis. Young patients have, independently of the arthroplasty type, a high risk of revision. The treatment of this subpopulation remains a challenge.



12:04 - 12:12

829 Impact Of Radiolucent Glenoid Lines On Clinical Outcomes In Anatomic Total Shoulder Arthroplasty

David Collins¹, Curtis Noel², Sean Grey³, Thomas Wright⁴, Joseph Zuckerman⁵, Pierre-Henri Flurin⁶, Chris Roche⁷

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2. Crystal Clinic, Akron, United States
3. Ortho Center of the Rockies, Fort Collins, United States
4. Univ of Florida, Gainesville, United States
5. Hospital for Joint Diseases, New York, United States
6. Bordeaux-Merignac Clinic, Bordeaux, France
7. Exactech, Inc, Gainesville, United States

Aim

This study quantifies outcomes of 427 patients who received a primary aTSA with one specific prosthesis and were sorted based upon the radiographic presence of a radiolucent glenoid line with 2yr minimum follow-up.

Background

The clinical impact of radiolucent glenoid lines is controversial, where the presence of a radiolucent glenoid lines has been suggested to be an indicator of clinical glenoid loosening.

Methods

576 patients (mean age: 66.5yrs) with an average follow-up of 48.1 months were treated with aTSA for OA by 13 fellowship trained orthopaedic surgeons. 425 patients (mean 66.5 yrs; 222F/203M) did not have a radiolucent glenoid line (avg follow-up = 45.2 months); whereas, 151 patients (mean 66.6 yrs; 91F/60M) had a radiolucent glenoid line (avg follow-up = 56.3 months). Outcomes were scored using SST, UCLA, ASES, Constant, and SPADI metrics; active ROM was also measured. A two-tailed, unpaired t-test identified differences ($p < 0.05$) in pre-operative, post-operative, and pre-to-post improvements.

Results

The rate of radiolucent glenoid line formation was 26.2%. Pre-operatively, no difference was noted between patients with or without radiolucent glenoid lines. However post-operatively, patients with radiolucent glenoid lines had significantly poorer clinical outcome scores according to all 5 clinical metrics and significantly less active abduction, forward flexion, and external rotation. Additionally, patients with glenoid radiolucent lines had significantly lower improvements in all 5 outcome metrics and forward flexion and external rotation. Finally, 42 complications were reported (7.3%), 22 for patients without radiolucent glenoid lines (5.2%) and 20 for patients with radiolucent glenoid lines (13.2%), which was significantly different ($p = 0.0010$).

Conclusions

This study demonstrated that aTSA patients with radiolucent glenoid lines had significantly poorer clinical outcomes and a higher complication rate as compared to aTSA patients without radiolucent glenoid lines. Additional and longer-term follow-up is needed to confirm these conclusions.



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11:40 - 11:48

357 Long-Term Results Of Resurfacing Shoulder Arthroplasty In Osteoarthritis : Retrospective Monocenter Study Of 100 Cases**Julie Lebon**, Fanny Elia, Amélie Faraud, Julien Toulemeonde, Nicolas Bonnevalle, Pierre Mansat

University hospital of Toulouse, Toulouse, France

Aim

Mid-term evaluation of resurfacing shoulder arthroplasty.

Background

Despite the satisfactory results published by Steve Copeland, several national registries have shown the degradation of clinical results after resurfacing shoulder arthroplasty with follow-up, with increase revision rate.

Methods

A resurfacing shoulder arthroplasty has been performed on 100 patients (47 men/53 women) of 58 years (29-84) for primary OA (55) or secondary OA (45). According to Walch classification, glenoid wear was centered in 60 (46 A1 and 14 A2), non centered in 35 (27 B1 and 8 B2), excentered anteriorly in 2, and dysplastic in 3. Fatty infiltration index was 1.16.

Results

At 5-years (2-10) average follow-up, there were 32 complications : 23 symptomatic glenoid wear, 6 cuff lesions, 1 biceps synovitis, 1 capsulitis, and 1 nerve involvement. Survival rate without complication was 28.7% at 8 years. A revision was performed on 15 patients, including 14 for glenoid wear, and one for cuff tear. Survival rate without revision was 59% at 8 years. No lucent lines were observed. According to Neer rating score there were: very satisfactory in 52, satisfactory in 23 and unsatisfactory in 25. SSV was 69%. Pain reached 2.7 compared to 6.8 preoperatively. Constant score reached 64.3 points, and quick-DASH score 26 points. Anterior elevation was 132°, external rotation 32° and internal rotation to L2. Radiographic evaluation showed implants in varus with increase lateral offset. There was no correlation between implant positioning and glenoid wear, complication and revision rates.

Conclusions

Functional results of resurfacing shoulder arthroplasty deteriorated with follow-up with only 75% satisfactory results at 5 years. Main concerns are related to recurrence of pain related to glenoid wear necessitating in most of the cases a revision procedure. Resurfacing implants must be abandoned and other therapeutic options must be chosen.

**Saturday 16 September**

REVERSE SHOULDER ARTHROPLASTY - I
09:00 - 10:30
POTSDAM

09:16 - 09:24

43 Does The Glenosphere Size Influences Mid To Long Terms Clinical Results Of Reversed Shoulder Arthroplasties - 36 And 42 Glenospheres

Philippe Clavert¹, Agathe Kling¹, François Sirveaux², Luc Favard³, Gilles Walch⁴

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2. Shoulder and Elbow Service, Nancy, France
3. Shoulder and Elbow Service, Tours, France
4. Centre Orthopédique Santy, Lyon, France

Aim

Compare clinical and radiological results of 2 cohorts of patients with a minimum follow-up of 5 years. The null hypothesis is that there is no difference between 36mm vs 42mm glenospheres. Primary objective: compare clinical and radiologic results. Secondary objective: compare complication rate.

Background

The effect of choosing smaller or larger glenosphere diameter on shoulder ROM and stability has already been studied.

Methods

On the 1035 patients included in this multicentric study (FU over 5 years), we have retrospectively analyzed the results of the RSA of 2 groups of patients: 885 patients with a 36mm Glenosphere and 126 patients with a 42mm Glenosphere. Clinical results (active and passive motion, SSV and Constant Score) and radiographic results were analyzed.

Results

Comparison of the last follow-up SSV (69.82 for the 36mm and 65 for the 42mm) showed a statistical difference $p < 0.05$. Except the pain and the strength items of the constant score, results were better for patients with a 36mm glenosphere for the items activity and mobility. The complication rate was comparable: 18% in the group of the 36mm and 15.1% in the 42mm group ($p > 0.05$). In terms of stability the rate of dislocation was higher in the 36mm group than in the 42mm group ($p = 0.6203$). The revision/reoperation rate was different (7.2 % for the 36mm vs. 12.2 % for the 42mm), but not significant ($p > 0.05$).

Radiographic results:

Glenoid notching: in the 36 mm group the rate of notching was 36.3% and was only 17% in the 42mm group ($p < 0.02$). On the humeral side, there was a significant effect of 42mm glenosphere on proximal bone narrowing and osteopenia rate (19.1 % vs. 4.8 %, $p < 0.05$).

Conclusions

Increasing implant diameter has an influence on patient subjective and clinical results. The implant size doesn't modify patient ROM. The implant size choice is not correlated to the patient morphology.



10:20 - 10:28

811 Mid-Term Results Of Metallic Lateralization In Reverse Shoulder Arthroplasty.

Jean-David Raphael Werthel¹, Ali Maqdes², Philippe Valenti³

1. Hôpital Ambroise Paré, Boulogne-Billancourt, France
2. Al Razi Orthopaedic Hospital, Kuwait City, Kuwait
3. Kuwait City, Paris, France

Aim

The goal of this study was to prospectively evaluate mid-term results of reverse shoulder arthroplasty (RSA) with metallic lateralization.

Background

Several drawbacks (instability, limited external rotation, glenoid notching) due to excessive medialization in the initial Grammont-design RSA have been reported. To address these problems, some authors have proposed to lateralize the offset of the RSA using either a bone graft or a metallic lateralization.

Methods

We report a monocentric prospective study of 142 RSA with metallic lateralization implanted between 01/2006 and 12/2011 with a minimum 5-year follow-up. Eleven patients died and 38 were lost to follow-up therefore, 85 patients (mean age 69 years old) were included. Average follow-up was 89 months. Outcome measures included pain, range of motion, satisfaction, subjective shoulder value (SSV) and Constant score.

Results

All measures improved significantly ($p < 0.0001$). The score for pain on the visual analog scale improved from 7 to 1. Forward flexion increased from 69° to 126°, external rotation with the arm on the side increased from 11° to 26° and external rotation in abduction increased from 15° to 48°. SSV and Constant scores improved significantly from 40 to 70 and from 27 to 58 respectively. 70% of the patients rated the outcome as good or excellent, 20% were satisfied, and 10% were dissatisfied. There were a total of 14 complications (16.4%): infection(2), instability(2), polyethylene wear(3), humeral loosening(3) hardware removal(3) mechanical dismantling of the polyethylene(2), and Type 1 glenoid notch in 4 patients (4.7%).

Conclusions

In this series, metallic lateralization of the center of rotation in RSA did not cause any glenoid loosening or impaired clinical results, with patients achieving satisfactory recovery of range of motion especially in external rotation with a low rate of scapular notching.



09:32 - 09:40

628 Not Repairing The Subscapularis In Reverse Shoulder Arthroplasty Does Not Change The Final Outcome: A Prospective Controlled Study.

Sabri Dlimi¹, Stefano Tognon¹, Renato Salvador², Diego Carniel¹, Roberto Ferrante¹, Francesco Bisco¹, Camobrecco Domenico¹, Oreste Arduin¹, Camille Saffaye¹, Paolo Piovani¹

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2. Department of Surgery, School of Medicine, University of Padua, Italy, Padova, Italy

Aim

This study aimed to investigate the clinical and radiological results and final outcome after reverse total shoulder arthroplasty (RSA) with subscapularis repair (WSR) compared with a RSA without subscapularis repair (NSR) in two cohorts of patients with degenerative shoulder joint disease.

Background

The value of reinserting the subscapularis in RSA for the treatment of degenerative shoulder joint disease is still controversial.

Methods

Patients who underwent WSR and NSR at our institution between 2011-15 were prospectively enrolled in the study. The same surgical procedure and postoperative protocol were used for all patients. Surgery was always done by the same two surgeons (SD, ST). Tenotomy and resection of the subscapularis or transosseous repair were done via the deltoid-pectoralis. Preoperative shoulder radiography, CT and MRI were performed and the findings were described according to the Walch and Hamada classification. Range of motion (ROM), Constant score, and VAS were included in the pre- and postoperative clinical evaluation.

Results

The study population was 42 patients: 23 had a NSR and 19 had a WSR. Patients' demographic, clinical and radiological parameters were comparable in the two groups. The median follow-up was 36 months (IQR 32-48). The surgical time was statistically difference: 90 minutes in the NSR and 107 minutes in the WSR ($p < 0.05$). One patient in each group was classified as a treatment failure. After surgery, there were significant improvements in both groups' Constant score, VAS, external-internal rotation, abduction and forward elevation ($p < 0.001$), with no statistically significant differences between the two groups in all postoperative parameters. The only difference that emerged concerned the improvement in the Constant score from before to after surgery, which was higher for NSR group: 35 vs 26 ($p = 0.04$).

Conclusions

Reinsertion of the subscapularis is unnecessary in RSA because final outcome, improvement in ROM, pain relief and dislocation rate are similar with or without it.



09:56 - 10:04

55 Survivorship Analysis Of 1953 Reverse Shoulder Arthroplasties (RSA) Followed For Five To Twenty-Two Years: Predictive Factors Of Revision.

Luc Favard¹, Julien Berhouet¹, Mikael Chelli², Pascal Boileau³, Gilles Walch⁴

1. CHU Tours, Tours Cedex, France
2. CHU Amiens, Amiens, France
3. CHU Nice, Nice, France
4. Santy, Lyon, France

Aim

The purpose of this study was to investigate the medium and long-term results of RSA and to look for factors that influence their survival rate.

Background

The risk of long term revision for RSA is not well known.

Methods

We carried out a retrospective multicenter study including 1953 RSA in 1745 patients implanted before December 2010. The follow-up was 5 to 22 years (avg. 8.2 years). Indications for surgery included cuff tear arthropathy (CTA; 54%), revision (Rev; 15%), fracture sequelae (FS; 11%), primary osteoarthritis (OA; 8%), acute fracture (Fr; 7%), rheumatoid arthritis (RA; 3%), and pathologic etiologies (TUM; 2%). Cumulative survival curves were generated with revision of the prosthesis as the end point.

Results

At the time of the review, 330 patients had died, 564 were lost to follow up, 101 had been revised and 958 were available for a clinical and radiological assessment. The 101 revisions occurred for infection (38 cases), for glenoid-related issues (29), for humeral-related issues (19), for instability (14), and 1 for stiffness. The overall survival rate of the series was 91% at 10 years and 87% at 15 years. The survival rate at 10 years was significantly lower for males (85%, as compared to 94% for women). Overall survival based on etiology at 10 years was 100% for Fr, 98% for RA, 95% for CTA, 90% for OA, 80% for Rev and 67% for TUM. For CTA and OA, 55% of revisions took place during the first 3 years mainly for infection, instability and glenoid issues. Conversely, 84% of revisions for the humeral component took place after 4 years.

Conclusions

The risk of revision is increased in males and in young patients. Revisions during the first 3 years are due to infection, instability and glenoid issues. After 4 years, they are due to humeral issues.



09:40 - 09:48

125 Long-Term Results Of Reverse Total Shoulder Arthroplasty For Massive Irreparable Rotator Cuff Tears In Patients Younger Than 60 Years

Lukas Ernstbrunner, Aline Suter, Sabrina Catanzaro, Stefan Rahm, Christian Gerber

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Aim

It was the aim of this study to analyze long-term outcome of reverse total shoulder arthroplasty (RTSA) for irreparable rotator cuff tearing in patients younger than 60 years.

Background

RTSA is well accepted for elderly patients, whereas serious concern regarding longevity of RTSA in younger patients exists.

Methods

Twenty patients (23 shoulders) with a mean age of 57 (range, 47-60) years were reviewed after a mean follow-up of 11.7 (range, 8-19) years. Fifteen patients (65%) underwent previous nonarthroplasty surgery. Longitudinal clinical and radiographic outcome were assessed.

Results

At final follow-up, the absolute and relative preoperative CS had improved from 24 (± 9) to 59 (± 19) points ($p < 0.001$) and from 29% (± 11) to 69% (± 21 ; $p < 0.001$), respectively. Average SSV had increased from 20% (± 13) to 71% (± 27 ; $p < 0.001$). Active anterior elevation (64° to 117°), abduction (58° to 111°), pain scores and strength were significantly improved ($p < 0.001$). Clinical outcomes did not significantly deteriorate over 10 years and the functional results of patients with previous surgeries were not significantly inferior to those with primary interventions. The grade and number of radiographic notching increased over time. One or more complications occurred in nine shoulders (39%), with two failed RTSAs (9%). If the RTSA could be retained, patients with complications had a decreased relative CS (60% vs. 74%; $p = 0.332$), postoperative pain levels (10 vs. 14 points; $p = 0.025$) and SSV (51% vs. 80%; $p = 0.047$) compared with those without complications.

Conclusions

RTSA in patients younger than 60 years provides substantial improvement of shoulder function and pain without clinical deterioration beyond 10 years of follow-up. Considering that two thirds of the procedures were revisions of previously failed operations, the failure rate was high but reasonable. Complications which allow to retain the implants are associated with slightly compromised shoulder function and inferior subjective outcome.



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10:04 - 10:12

372 Resurfacing Hemiarthroplasty Versus Reverse Shoulder Arthroplasty In Treatment Of Cuff Tear Arthropathy - A Matched-Pair Analysis**Mette Ammitzbøll**, Amin Baram, Jeppe Vejlgard Rasmussen, Bo Sanderhoff Olsen

Herlev Hospital, Copenhagen, Denmark

Aim

The aim of this study is to compare the patient-reported outcome and the number of revision between resurfacing hemiarthroplasty and RSA for CTA.

Background

Resurfacing hemiarthroplasty has previously been used for cuff tear arthropathy (CTA). Reverse shoulder arthroplasty (RSA) has, however, emerged to be the treatment of choice for CTA. RSA does not depend on an intact rotator cuff status and it can be used in patients with glenoid wear. The efficacy and risk of revision of RSA have, however, never been compared with resurfacing hemiarthroplasty. Thus, the purpose of the study was to compare the patient-reported outcome and the number of revision between resurfacing hemiarthroplasty and RSA for CTA.

Methods

We included all CTA patients from the Danish Shoulder Arthroplasty Registry (DSR) from 1st January 2006 to 31st December 2013 110 resurfacing hemiarthroplasties were matched by age and sex with 219 RSA controls. The Western Ontario Osteoarthritis of the Shoulder Index (WOOS) was used to evaluate the outcome 1 year postoperatively.

Results

The mean WOOS of resurfacing hemiarthroplasty and RSA were 53 (SD=28) and 70 (SD=25) respectively. The mean difference was 16, $p < 0,001$, 95% CI (9; 24). The revision rate of resurfacing hemiarthroplasty was 6% (n=6) and the revision rate of RSA was 7% (n=16). Differences in revision rates was not statistically significant, $p = 0,28$. Mean time to revision of resurfacing hemiarthroplasties was 86 months and 85 months for RSA.

Conclusions

In this nationwide cohort RSA had a statistically significant better patient-reported outcome compared with resurfacing hemiarthroplasty. Revision after both RSA and resurfacing hemiarthroplasty was rare. The results support the use of RSA in the treatment of CTA.



10:12 - 10:20

646 BIO-RSA With Allograft Bone Grafting Of The Glenoid Surface, With A Minimum Follow-Up Of 5 YearsTjarco D.W. Alta¹, Nicolas Morin-Salvo², Charles Bessière², Pascal Boileau²

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2. IULS - Hôpital Pasteur 2, Nice, France

Aim

1) verify if BIO-RSA with allogenic bone would provide similar benefits (clinical and functional) as with autologous bone; 2) see if the allograft incorporates with the native glenoid bone.

Background

Bony increased-offset reverse shoulder arthroplasty (BIO-RSA) grafts the glenoid surface with autologous bone (grafted from the humeral head) and a long-pegged baseplate, creating a long-necked scapula. Experience with allogenic bone grafting of the glenoid in shoulder arthroplasty is mainly based on its use with total shoulder arthroplasty (TSA).

Methods

Twenty-eight patients (23 female, 5 male) were included. Indications: fracture sequelae (n=7), revisions (n=11), 4-part fractures (n=1), rheumatoid arthritis (n=1) and cuff tear arthropathy (CTA) (n=8). Mean (\pm SD) age 72 ± 11 years (range, 44-87). Clinical evaluation: ROM, Constant scores, SSV and complications. Radiographic and/or CT scan evaluation: bone graft healing, bone graft resorption/lysis, glenoid component partial fixation or loosening, inferior scapular notching, spur formation and anterior/posterior scapular notching. Mean follow-up: 76 ± 12 months (60-105).

Results

Active anterior elevation improved from $64\pm 43^\circ$ (10-170 $^\circ$) to $126\pm 38^\circ$ (50-180 $^\circ$), external rotation $1.7\pm 20^\circ$ (-20-70 $^\circ$) to $10.4\pm 20^\circ$ (-20-40 $^\circ$), internal rotation 1.9 ± 2 (0-6) to 5.6 ± 3 points (0-8). Constant scores: 24 ± 15 (6-56) to 53 ± 18 points (18-81) and $30\pm 19\%$ (9-78%) to $78\pm 26\%$ (34-117%). SSV: $24\pm 16\%$ (0-50) to $68\pm 21\%$ (35-100%). One patient sustained an acromial fracture and one a breakage of the screws and complete loosening of the glenoid at 3 months, revised into a hemi. Twenty-seven cases demonstrated no lucent line between the allogenic disc of bone and native glenoid. Partial lysis of the bone graft (n=7), inferior scapular notching (n=5), spur formation (n=7), posterior notching (n=5).

Conclusions

BIO-RSA with allograft bone provides a good alternative in cases where humeral bone stock is not preserved and the allograft bone does incorporate with the native glenoid bone. However, it still needs to be used with caution, since long-term results are not yet available.



09:48 - 09:56

748 Long Term Results After Reverse Shoulder Arthroplasty : Glenoid Notch Or Glenoid Osteolysis?

Stéphane Jullion¹, Adrien Jacquot¹, Thomas Goetzmann¹, François Sirveaux¹, Pascal Boileau², Daniel Molé¹

1. Centre Chirurgical Emile Gallé, Nancy, France
2. Hôpital Pasteur 2, Nice, France

Aim

The aim of this study was to evaluate glenoid osteolysis rate after RSA, its functional consequences and its evolutivity.

Background

Notching is the most common radiographic complication after Reverse Shoulder Arthroplasty, but its evolution and functional impact are still debated. Moreover, osteolysis may not be limited to the inferior scapular pillar as seen on 2D Xrays

Methods

In a multicenter study, 1035 RSA were included with a minimum 5 years FU. Among them, 791 had a last FU Xray evaluation, with a mean 98,2 months follow-up. All the patients had a preoperative and last-FU physical exam including : Constant Score, Subjective Shoulder Value, Range of Motion, strength and pain. All Xrays were analysed by 2 independent observs. Glenoid osteolysis was assessed according to a new classification (4 grades).

Results

Glenoid osteolysis was detected in in 493 cases (62%) : grade 1 in 356 (45%), grade 2 in 115 cases (14.2%) and grade 3 in 22 cases (2.8%). Constant score was respectively 61, 61, 56 and 43 for grade 0,1,2 and 3 ($p < 0,001$). Mean Follow-up was respectively 89, 105, 114 and 128 months for grade 0,1,2 and 3 ($p < 0,001$). Humeral osteolysis was found in 171 cases (22%) and was significantly associated with glenoid osteolysis, with respectively 5, 21,64 and 86% rate for grade 0,1,2 and 3 ($p < 0,001$).

Conclusions

Glenoid osteolysis is a concern, because of its functional consequences, evolutivity over time and possible evolution towards glenoid loosening. Association with humeral osteolysis suggest a biological reaction secondary to polyethylen wear.



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09:24 - 09:32

846 Correlation Between The Humeral Component Retroversion And The Internal Rotation In Reverse Shoulder Arthroplasty**Christina - Garving**, Ulrich - Bechler, Ulrich H. Brunner

Krankenhaus Agatharied, Hausham, Germany

Aim

Is there a correlation between the intraoperative retroversion of the humeral component and the postoperative clinical internal rotation?

Background

There is no consensus in optimal retroversion orientation. The recommended 0° to 30° humeral retroversion for reverse shoulder arthroplasty (RSA) is currently based on expert opinion rather than anatomical or clinical evidence. A higher retroversion of the humeral component leads to an increase in external rotation but a decrease in internal rotation. Using anatomical shaped stems the natural retroversion has to be respected. We therefore analyzed retrospectively the correlation of the humeral retroversion and the internal rotation after surgery.

Methods

Forty-three patients who underwent RSA between 2013 and 2016 were reviewed retrospectively. For all patients the Aequalis Ascend Flex Shoulder System was used. The humeral component was inserted according to the anatomic position without a correction of the retroversion. After a mean follow-up of $15,8 \pm 8$ month with a minimum of 12 months, patients were invited for a study visit. Range of motion (ROM), strength and Constant-Murley Score (CS) were measured. The mean age was $76,7 \pm 4,66$ years.

Results

As expected, the ROM, strength and CS improved significantly after surgery. In average, internal rotation improved from buttock to lumbosacral ($p = 0.013$). There was no correlation between the retroversion and the postoperative internal rotation (Spearman correlation coefficient .009; $p = 0.955$). Even distinguishing the patient in two groups with a retroversion \leq and $\geq 20^\circ$ there was no correlation found regarding the internal rotation.

Conclusions

Range of motion improves after RSA. The humeral component retroversion angle does not seem to have a major influence on the internal rotation after surgery.



09:00 - 09:08

951 Effect Of Humeral And Glenoid Combination On Range Of Motion In Reverse Shoulder ArthroplastyPierrix Deransart¹, Gilles Walch¹, Alain Farron², Alexandre Lädermann³

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2. CHUV, Lausanne, Switzerland
3. La Tour Hospital, Meyrin, Switzerland

Aim

The purpose of this study was to analyze the effect of different combination of glenoid and humeral designs on arm position and range of motion (ROM) following RSA.

Background

The impacts of the combination between glenoid and humeral design after reverse shoulder arthroplasty (RSA) have not been well-studied.

Methods

Using a three-dimensional computer model of RSA, six different humeral configuration included one inlay and five onlay design were combined to five different glenoid design varying by glenoid sphere diameter and glenoid sphere center of rotation location. Several offsets including the Humeral Offset (HO), the acromiohumeral distance (AHD) and ROM were evaluated for each of the 30 configurations.

Results

Altering stem and glenoid design led to up to more than 11mm change in humeral offset, to 10mm change in glenoid offset and to nearly 19mm change in global offset. The AHD vary from slightly less than 19mm to nearly 32mm. Between extreme configuration the abduction improved of 28°, the flexion of 21° and the external rotation arm at side of 27° but, in each of the 3 motion, all configuration had a deficit compare to native shoulder. The adduction varied of 35° with only 14 out of 30 configurations achieving native amplitude. Similarly, the extension varied of 39° with only the 135° humeral configuration with a 36mm eccentric sphere achieving native amplitude. But that configuration was one of the 10 configurations presenting a large deficit of external rotation at 90° of abduction.

Conclusions

By varying the humeral and the glenoid implant, up to 30mm change are observed on the arm position and dramatic change are observed on all range of motion. Taking particular attention to the ratio between the humeral offset and the acromio-humeral distance is important as a ratio above 1.65 might lead to an impingement of the greater tuberosity on the acromion.



09:08 - 09:16

834 Can A Functional Difference Be Detected In Reverse Arthroplasty With 135° Vs. 155° Prosthesis For The Treatment Of Rotator Cuff Arthropathy: A Prospective Randomized Study

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3. Southern Oregon Orthopedics, Medford, United States
4. The Cleveland Shoulder Institute, Medfordcleveland, United States

Aim

To compared a 135° to a 155° neck-shaft angle construct, in a cohort of patients to determine if there are any significant differences in function or early notching rates.

Background

Reverse shoulder arthroplasty (RSA) has been an effective treatment for patients with rotator cuff arthropathy (RCA). The original Grammont design had a 155° neck-shaft angle. Recently, other designs with less valgus have become prevalent. However, there are few studies that compare the outcomes and complications of 155° to 135° RSA.

Methods

100 RSAs performed by a single surgeon for RCA were prospectively randomized to receive either a 135° or 155° humeral implant. Range of motion and functional outcome were compared at two years postoperative. In addition, scapular notching and complications were noted.

Results

Patients with 135° implants achieved active forward flexion improvement from 78° to 131° ($p < 0.005$), ASES score improvement from 37 to 74 ($p < 0.005$), VAS pain score improvement from 6.3 to 1.9 ($p < 0.005$), and SANE score improvement from 31.5% to 73.7% ($p < 0.005$). Patients with 155° implants achieved active forward flexion improvement from 76° to 135° ($p < 0.005$), ASES score improvement from 37 to 78 ($p < 0.005$), VAS pain score improvement from 6.6 to 1.2 ($p < 0.005$), and SANE score improvement from 35.9% to 75.6% ($p < 0.005$). Improvements did not significantly differ between varying neck shaft implant angles for any outcome measure evaluated. Scapular notching was observed in 16% of the 135° group compared to 36% of the 155° group.

Conclusions

This study did not demonstrate any significant difference in functional outcome between patients with a 155° or 135° RSA. Scapular notching is more common with a 155° implant. Further follow-up is required to determine if these results are maintained in the long-term.



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Saturday 16 September

REVERSE SHOULDER ARTHROPLASTY - II
13:40 - 14:20
POTSDAM

13:40 - 13:48

704 Outcome And Complications After Reverse Shoulder Arthroplasty In Patients With Parkinson`S Disease

Christian Jung, Hans-Kaspar Schwyzer, Matthias Flury, Laurent Audigé, Christoph Kolling

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Aim

To present the outcome of reverse shoulder arthroplasty (RSA) in patients with Parkinson`s Disease (PD) and cuff tear arthropathy (CTA) and to compare the functional outcome to CTA patients without PD.

Background

PD is one of the most common neurologic disorders, affecting 1% of the population aged >60 years. The main symptoms of PD (akinesia, rigidity, tremor, postural instability) impair patients activity levels and might influence the outcome after RSA.

Methods

Patients with PD and primary implantation of RSA for CTA were identified from our local shoulder arthroplasty register and were matched (1:10) by age and gender to a cohort of patients with RSA for CTA only. Outcome measures (ROM, Constant Score[CS], SPADI) were assessed at baseline and at 2-years follow-up. Patients with incomplete follow-ups were excluded. Complications and revisions were also recorded.

Results

Twelve consecutive cases of PD patients with implantation of RSA were identified between 07/2007 and 12/2014. The group comprised of 6 women & 6 men with a mean age at surgery of 75 years (range 65-85 years). PD patients showed a significant improvement in all outcome scores (CS: 36.5 to 57.8; $p < 0.01$, SPADI : 34.7 to 66.5; $p < 0.01$). The CS and SPADI values at the 2-years follow-up were significantly lower compared to non-PD patients (67.8 resp. 75.0, $p < 0.01$). Evaluation of the ROM revealed a noticeable deficit in internal rotation for the PD patients. One postoperative scapula fracture occurred and needed conversion to hemiarthroplasty. 9 out of the 12 MP patients would opt for the surgery again and 92% rated their outcome as better than preoperatively.

Conclusions

Patients with PD significantly benefit from RSA in the short-term, although the functional outcome was lower compared to CTA patients without PD.



13:56 - 14:04

925 Reverse Shoulder Arthroplasty For Failed Hemi, A 5 Year Minimum Follow Up Study

Thomas D Ollonne, Pascal Boileau, Toby Baring, Patrick Gendre

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Aim

To report outcomes of RSA for failed HA at a minimum of 5 years, describing reasons of Hemiarthroplasty failures, rate of complications after revision, and clinical results.

Background

Only short-term outcomes after RSA for Failed HA were reported. In 2006 Walch reported poor clinical results with 35% of intra operative complications, 32% of post operative complications, 26% of reoperations, with a mean follow up of 46 months.

Methods

We lead a retrospective multicenter study, including 76 RSA for failed HA with a mean follow up of 9.5 years (5 to 17), in patients with Clinical / Radiological examination, operated on between February 1993 and December 2010.

Age at RSA surgery was 67 years (33-81).

Time between HA & RSA was 48 months [8-60].

HA were initially indicated for Acute fractures (n=50,) Fracture sequelae (n=13) osteoarthritis (n=9), and CTA (n=4).

Results

Indications for revision were dominated by Cuff Tear/deficiency (55%) and Greater tuberosity "failure" (52%).

During RSA procedure, we observed 32% of intra-operative complications.

After RSA, the main complications were infection (13%), humeral loosening (12%), humeral fracture (9%).

33% of the patients were reoperated at 44 months post op.

At last follow up the mean Constant score was 48 points, and SSV was 60%, with a significant improvement ($P < 0.05$) compared to pre op examination.

Risk factors of poor outcomes were the presence of at least 1 complication and greater tuberosity migration or lysis ($p < 0.05$).

67% of the patients had significant humeral bone loss during revision surgery, with increasing bone loss clinical outcome deteriorates (lost of anterior elevation and external rotation, $p < 0.05$). Risk factors of bone loss were greater tuberosity excision, history of HA for fracture or fracture sequelae type 4 ($p < 0.05$).

Conclusions

At a min follow up of 5 years, even without complications results are poor. Complications rate is high.

Revision surgery leads to humeral bone loss and with increasing bone loss clinical outcome deteriorates



13:48 - 13:56

884 Are Convertible Platform Systems Really Revisable?

Albert Ferrando¹, Luis Natera², Paolo Consigliere², Caroline Witney-Lagen², Juan Bruguera², Giuseppe Sforza², Ehud Atoun², Ofer Levy²

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2. Reading Shoulder Unit, Reading, United Kingdom

Aim

To radiographically evaluate soft-tissue distraction when converting an anatomic total shoulder arthroplasty (aTSA) to a reverse total shoulder arthroplasty (rTSA) in a platform system.

Background

Revision shoulder arthroplasty may involve need to remove a well-fixed humeral stem. To avoid this potentially complex situation, the use of convertible platform systems is considered. The humeral osteotomy for a primary aTSA may substantially differ from the osteotomy level needed in rTSA. Therefore, may result in excessive soft-tissue distraction.

Methods

Radiographic analysis was performed to evaluate parameters of soft-tissue distraction: difference in acromiohumeral distance (D-AHD), difference in lateral humeral offset (D-LHO) and difference in lateroinferior displacement (D-LIDCT). These parameters were evaluated in aTSA and the converted rTSA of 6 different implants. X-rays of 10 non-deformed shoulders (best case scenario) were used. An image analysing software (Traumacad) used to simulate the conversion of an aTSA to a rTSA for the 6 different designs.

Results

The greatest increase in arm length found for Tornier Ascend Flex (26.8 ± 3.6 mm) while the smallest increase observed with Lima SMR (19.3 ± 4 mm). The humerus remained most lateralised with Zimmer Anatomical/Inverse (-1.4 ± 2.9 mm) while Lima SMR (-15.8 ± 2.7 mm) was more medialised. A group analysis, with group 1 onlay-type and group 2 inlay-type reverse prosthesis showed an increase in arm length of 41% in onlay compared to inlay systems ($p < 0.000$). The humeral offset was 83% more lateral with the onlay systems ($p < 0.000$). The onlay systems produced more lateroinferior distraction (139% increase) when compared to inlay systems ($p < 0.000$).

Conclusions

Independently of the design, the conversion of a primary aTSA to a rTSA using a convertible platform system may lead to significant increase in the radiographic parameters corresponding to the soft-tissue tension. This may significantly alter the biomechanics of the shoulder joint, and may restrict the convertibility even in the best-case scenario.



14:12 - 14:20

745 Outcomes Of Endoprosthetic Replacement For Massive Proximal Humeral Bone DeficiencyMohamed S. Galhoum¹, Simon P. Frostick², Amanda Wood³

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3. Musculoskeletal Science Research Group, Department of Molecular and Clinical Cancer, Liverpool, United Kingdom

Aim

The aim of the study is to prospectively report the short-term outcomes of proximal humeral reconstruction with modular endoprosthesis.

Background

Rate of total shoulder replacements has risen dramatically throughout the last decades subsequent to expanding indications and its leading outcomes in controlling pain, improving functions and life quality. Proximal humeral bone defects are considered one of the predominant difficulties in reconstructive surgeries which may be due to primary cause such as, (Post. tumour resection, post resection of osteomyelitis and highly comminuted fractures) or prior to failed previous shoulder replacement. Controversy has still existed regarding the ideal reconstructive procedure.

Methods

23 shoulder reconstructions were performed for 21 patients in same centre by single surgeon (11 males and 10 females). The Indications for reconstruction showed great discrepancies, 10 patients presented with one of the aforementioned primary causes and 13 revised their primary prosthesis due to multi-failure factors. Prostheses were evaluated radiologically. The outcomes were assessed using DASH score, pain experience, limitations and patient satisfaction.

Results

The mean follow-up period was 41.4 months with minimum of 6 months. Minor differences have been noticed in follow-up between preoperative and postoperative scoring because of complexity of the cases. The mean DASH score has improved from 78.5 ± 15 to 66 ± 19 . Average of pain intensity decreased from 6 ± 3.6 to 4.3 ± 3 . Patients' satisfaction found to be in average of 6 ± 2 . Major postoperative complications included dislocation in 6 patients which has been managed by linked prosthesis, deep infection, recurrent notching in one patient. Traumatic Periprosthetic fracture occurred in 2 patients. No radiological loosening detected throughout the follow-up.

Conclusions

Despite the complexity of patients, satisfactory results have been found for massive proximal humeral deficiency. Long term follow-up is required to assess survivorship of the prosthesis.



14:04 - 14:12

866 Reconstruction Of The Proximal Humerus With Massive Allograft And Reverse Shoulder Arthroplasty

Jean-Luc Raynier¹, Patrick Gendre¹, Yves Bouju², Olivier Gastaud¹, Thomas D'Ollonne¹, Christophe Trojani¹, Luc Favard³, Pascal Boileau¹

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2. Institut Main Atlantique, Nantes, France
3. Hôpital Trousseau, Tours, France

Aim

To evaluate the results after reconstruction of the proximal humerus by massive allograft combined with a reverse shoulder arthroplasty (RSA).

Background

The proximal humerus is a frequent area of massive bone loss, either in the case of tumor resection or secondary to prosthetic complications. The reconstruction of this area is a surgical challenge and several options have been proposed to restore limb function while limiting complications.

Methods

21 patients (11 women, 10 men; mean age 59 years (18-83 years)) with massive proximal humeral bone loss (mean 8cm; range 5-18cm) underwent RSA with humeral allograft in two centers. Average follow-up was 46 months (12-192). Eight patients had tumor lesions (6 primary and 2 secondary) while thirteen patients had complications following post-traumatic prosthetic surgery, including 8 cases of previous RSA.

Results

At last follow-up, the mean Constant score was 53 points. The mean SSV (subjective shoulder value) was 65%; 72% of patients were satisfied or very satisfied. The mean active forward elevation was 110°, active external rotation of 16° and active internal rotation to S1. The complication rate was 42% (instability 28%, sepsis 5%). Radiographic follow-up found scapular notching in 29% of the cases. Concerning the specific complications of allografts, resorption was identified in 35% of the cases.

Conclusions

The use of a massive humeral allograft associated with RSA is an acceptable option for the reconstruction of the proximal humerus, preserving function and providing acceptable mid-term longevity. However, complications are frequent and longer follow-up is needed to confirm this trend.



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Saturday 16 SeptemberRehabilitation I
14:00 - 15:00
PAVILLON

14:49 - 14:56

824 Changes In The Scapular Kinematics In Reverse Shoulder Arthroplasty: A Pilot StudyTaha Ibrahim Yildiz, Gazi Huri, Burak Ulusoy, Leyla Eraslan, Serdar Demirci, Dilara Kara, Elif Turgut, Egemen Turgan, **Irem Duzgun**, Mahmut Nedim Doral

institution of health sciences, Ankara, Turkey

Aim

The aim of the study was to evaluate the changes in the dynamic scapular control after reverse total shoulder arthroplasty over the rehabilitation period.

Background

Scapular motion is an essential part of the functional movements of the glenohumeral joint. There are some studies reporting increased scapular movement of the scapula on patients with reverse total shoulder arthroplasty for avoiding impingement problem. Studies including time-based changes of scapular dynamic control are needed for better understanding how reverse shoulder arthroplasty affects the biomechanics of the shoulder girdle.

Methods

Five patients with reverse total shoulder arthroplasty (Age: 56.4 years, Body Mass Index: 23.4 kg/m²) who were able to elevate their arm above 90° actively at post-operative three months were evaluated. At postoperative 3, 6 and 12 months, scapular kinematics of the patients were assessed with 3-D Motion Monitor Analysis System. Changes in the scapular internal-external rotation, upward-downward rotation, and anterior-posterior tilt were analyzed over time.

Results

Patients showed a greater scapular participation of scapula to the glenohumeral movements during early periods of post-operative rehabilitation ($p < 0.05$).

Conclusions

Shoulder kinematics shows significant alterations after reverse shoulder arthroplasty especially for upward rotation of the scapula. Scapular compensation is an essential part of the shoulder movements especially during early periods of the post-operative reverse shoulder arthroplasty. On postoperative 1 year, it was observed that the scapular compensation decreases and orientation of the scapular movements resembles normal scapular values.



14:42 - 14:49

775 The Efficacy Of Cryotherapy For Dysfunctions Primarily Developed From The Musculo Skeletal System - A Systematic Review

Ingrid Hultenheim Klintberg

Institute of Neuroscience and Physiology, Department of Health and Rehabilitation, Unit of Physiotherapy, Lerum, Sweden

Aim

The aim of the present systematic review was to update and evaluate the current certainty of evidence of cryotherapy.

Background

Cryotherapy to facilitate rehabilitation and a faster return to higher level function has widely been used both after acute injury as well as postoperatively. It is connected with low costs, easily accessible and easy to administer. Cryotherapy has been attributed to three main effects: reduce pain, anti-inflammatory effect and decreased swelling. Conflicting results have however shown that cryotherapy may be associated with adverse events.

Methods

A systematic literature search for systematic reviews and randomised controlled studies was conducted in four databases to identify original research published from January 2000 through July 2015. Methodological quality, risk of bias, of the systematic reviews was assessed using the instrument AMSTAR and for the RCT's the instrument by SBU was used. Results were synthesized using GRADE.

Results

Eight systematic reviews of medium and high quality and 26 RCT's of mainly medium risk of bias were included in the present systematic review. The results of the use of cryotherapy were summarized in three categories: acute injury, surgical procedures and long-term pain. In conclusion there is low to moderate certainty of evidence for the use of cryotherapy to reduce pain, swelling and blood loss, and to improve range of motion and function. More advanced forms of cryotherapy do not seem to accentuate the effect. The treatment seems to be tolerable by the patients and few adverse events are reported.

Conclusions

Cryotherapy may safely be used after shoulder or elbow trauma, surgery or in long-term pain and according to the patients' preference. However, future research is needed where timing, temperature for cooling, dose (time) and frequency are evaluated, using a standardized, valid and reliable measurements used consistently for different conditions, which would enable to make meta-analyses including effect sizes.



14:14 - 14:21

740 How Does Shoulder Immobilization Influence Daily Physical Activity – An Accelerometer Based Study

Dennis Liem, Monika Grabowski, Georg Gosheger, Kristian Schneider, Sebastian Klingebiel, Dominik Schorn, Carolin Rickert

University Hospital Muenster, Münster, Germany

Aim

To investigate the influence of shoulder immobilization on daily physical activity.

Background

The harmful effect of sedentary behavior does not receive much attention in orthopedic surgery even though immobilization, especially of the lower extremity, has been associated with reduced physical activity. Immobilization of the shoulder is common after reconstructive shoulder surgery and could also potentially lead to reduced physical activity and have a negative effect on a patient's general health.

Methods

A cohort of 21 healthy volunteers were immobilized in an orthosis (DJO Ultrasling III) for 10 hours on two consecutive days. In the following week activity was measured on the same days without the orthosis. Activity was measured by accelerometer based step count StepWatchTM Activity Monitor (SAM). Average age was 26 +/-3 years. A questionnaire was administered to evaluate subjective activity.

Results

Participants wearing the shoulder orthosis were significantly less active than without immobilization 2273,5 GesZyk ($p < 0,001$). Also, significantly more time was spent with sedentary behavior (<400 steps/h) when the shoulder was immobilized. Patients were significantly more active without shoulder orthosis in medium level activities (800-999 steps/h). Differences for low (400-799 steps/h) and high activity levels (>1000 steps/h) were not statistically significant. Die subjektive Einschränkung wurde insgesamt mit dem Grad Subjective limitations while wearing the orthosis were graded at 2,343 on a scale of 0 - 4.

Conclusions

Results of this study show that even in young healthy volunteers immobilization of the shoulder in an orthosis for two days lead to significantly reduced activity levels. A negative influence on general health, especially in older patients who are immobilized for up to 6 weeks, can be expected. Promoting physical activity during the immobilization period should be part of rehabilitation after injuries/surgery of the shoulder.



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14:07 - 14:14

147 Early Mobilization After Rotator Cuff Repair, Does It Really Matter?**Marwan Haddad**¹, Galit Daniel-Lavee¹, Wasim Mshiel¹, Yaniv Keren², Yaron Berkovich²

1. Galilee Medical Center, Naharyia, Israel
2. Rambam Medical CAMPUS, Haifa, Israel

Aim

The aim of our study was to observe the difference between early mobilization and late mobilization

Background

The rotator cuff repair surgery is the gold standard when a full thickness tear is diagnosed. The protocol of the rehabilitation is different between the surgeons but a long period of immobilization is widely accepted

Methods

Since January 2013 till December 2015, 217 shoulders with full thickness tear were treated. Group A: from January 2013 till June 2014, 96 shoulders followed a long period of immobilization protocol, and group B from July 2014 till December 2015, 121 shoulders follow a short period protocol for rehabilitation.

The long period of immobilization protocol: shoulder immobilizer for 6 weeks and after passive/active motion.

The short protocol: shoulder immobilization for 2 weeks. During this two weeks, pendular movements, passive elevation and assisted active. After 2 weeks, active movements starts. The constant score, the V.A.S., the short DASH were performed and an ultrasound was done 1 year after the surgery.

Results

These score were better in the group B at 6 weeks, 3 months and 6 months. The results were similar between the 2 groups at one year.

The re-rupture rate in group B was more than in group A but was not statistically significant.

Conclusions

Early mobilization can accelerate the return to work without damaging the cuff.



14:21 - 14:28

769 One-Year Follow-Up Of The Progressive Exercise Training For Patients With Rotator Cuff Related Shoulder Pain: Single Group Study To Investigate The Effects On Pain Severity And Disability Status

Elif Turgut, Irem Düzgün

Hacettepe University, Ankara, Turkey

Aim

This study aims to investigate the effects of a 12-week progressive stretching and strengthening exercise training on disability, and pain status in patients with rotator cuff related shoulder pain.

Background

Although exercise training are common part of the shoulder rehabilitation programs, the scientific rationale and long-term results for the inclusion of specific progressive exercises is less clear.

Methods

Twenty participants with shoulder pain lasted at least 6 weeks or more (32.6 ± 7.4 years old, symptoms duration 5.3 ± 4.8 months) were included. The supervised 12-week exercise program was performed. We evaluated self-reported shoulder pain severity by using visual analogue scale and disability status by using Shoulder Pain and Disability Index (SPADI) at baseline, after 6-week, 12-week training and at one-year follow-up.

Results

Comparisons showed that there was significantly less pain severity on activity and at night, and less SPADI pain and disability score reported starting from six-week after baseline and at 12-week and one-year follow-up ($p < 0.05$).

Conclusions

The findings of the study showed that pain severity and disability gains can be achieved with 6-week progressive exercise training for participants with rotator cuff related shoulder pain. However, high exercise compliance up to 12 weeks further supports the positive gains up to one year. Therefore, progressive stretching and strengthening training should be recommended to apply starting from early shoulder rehabilitation program.



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14:00 - 14:07

792 Sensomotoric Deficits Following Shoulder Surgery

Knut Beitzel¹, Stefan Buchmann², Robin Köhler¹, Fabian Stöcker³, Andreas B Imhoff¹, Sven Reuter²

1. Department of Orthopaedic Sportsmedicine, TU Munich, Munich, Germany
2. OFZ Weilheim, Weilheim, Germany
3. Department of Sports Science, TU Munich, Munich, Germany

Aim

The purpose was to evaluate the sensomotoric capability of the shoulder joint following surgical treatments like rotator cuff repair, stabilization and ac-joint reconstruction in comparison to normal shoulder joints. The hypothesis was that the sensomotoric capacity of surgically treated shoulders will be reduced postoperatively, when compared to the healthy controls.

Background

Postoperative rehabilitation is an important factor to improve the outcome following surgical procedures at the glenohumeral joint. An optimal sensomotoric function of the capsular and muscular structures is important for the utilization of the upper extremity. Little is known about the postoperative sensomotoric impairment.

Methods

We included 40 patients (10 female, 30 male, age: 45.5±15.7years) and 10 healthy controls (3 female, 7 male, age: 47.0±21.0years). Patients were grouped 1) pre-, 2) postoperatively following rotator cuff repair, 3) following AC-joint reconstruction and 4) postoperatively following glenohumeral stabilization. Testing was performed 2.5±1.2 years postoperatively. A force measuring plate (Fa. Bertec) was used with a 100HZ measuring technology. Each participant performed support task with both arms in a supine position on an adaptable bench for 30 sec. Motion amplitude and distance to the center of pressure (CoP XY length) was calculated and compared to the healthy shoulder as control.

Results

The highest amplitude of the CoP was seen in group 1 (1.53±1.02m) followed by group 2 (1.28±0.31m). Patients of group 4 showed an amplitude of (1.13±0.24m) and the lowest amplitude was seen in patients of group 3 (1.05±0.15m).

Conclusions

Sensomotoric function showed deficits compared to the healthy control following all surgical procedures. The most decreased function was seen in the case of a rotator cuff defect preoperative. Postoperative function following rotator cuff repair and stabilization was also decreased. Surgical procedures not addressing the glenohumeral capsule and muscles (AC-repair) showed less impairment. Rehabilitation should focus on sensomotoric training to improve the postoperative function and optimize joint control.



14:28 - 14:35

170 Preoperative Factors Influence The Recovery Of Forward Flexion Following Reverse Shoulder Arthroplasty

Solenn Gain, Philippe Collin

CHP Saint Grégoire, Saint Grégoire, France

Aim

This study sought to determine if subjective preoperative factors influence the rate and timing of AFF recovery after RSA.

Background

Recently the use of reverse shoulder arthroplasty (RSA) has increased because of a clinical perception of durable functional outcome. However, some patients unexpectedly have poor recovery of active forward flexion (AFF) after surgery. Objective factors such as initial diagnosis, pre- and intra-operative range of motion (ROM), deltoid impairment or arm lengthening have previously been associated with AFF.

Methods

Between January 2011 to January 2012, all RSAs performed by a single surgeon were prospectively enrolled in this study. The cohort was divided into 2 groups based on AFF <90 or > 90 after surgery. A multivariate analysis was performed to define independent predictive factors of postoperative AFF. Factors assessed included: age, sex, dominant arm, patient activity, body mass index (BMI), preoperative diagnosis, deltoid status, pain and Constant scores, subjective shoulder value (SSV), simple shoulder test (SST) and radiographic findings. Patients were reviewed at 6 weeks, and 3, 6, 12 and 24 months.

Results

During the study period, 127 RSAs were performed. Twenty-three patients were excluded from the study because of preoperative diagnosis. Two patients declined to participate and 1 patient died leaving a cohort of 101 RSA in 101 patients for the final analysis. Poor postoperative AFF at 6 weeks was significantly related to poor postoperative deltoid strength. Poor postoperative AFF at 1 year follow-up was related to surgery of non-dominant arm, preoperative poor AFF, preoperative activity, poor subjective shoulder value (SSV), and a low contralateral Constant score. The AFF and Constant score improved until 6 months and plateau was then observed with no difference between the 6 months' follow-up and the last control. In contrast, both external and internal rotation continued to improve during the whole follow-up.

Conclusions

A



14:35 - 14:42

563 Development And Use Of A Tool For Quantifying Physiotherapy Treatment Of Subacromial Impingement Syndrome / Rotator Cuff Tendinopathy (SIS/RCT) Patients

Michael J Smith¹, Robert Goldsmith², Anne Wilkes², Timothy Matthews²

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2. Cardiff and Vale University Health Board, Cardiff, United Kingdom

Aim

To record and quantify the nature of physiotherapy treatment for SIS/RCT secondary care patients in a public health service setting

Background

The individualised and multi-faceted nature of physiotherapy treatment makes it a complex intervention. For trials which incorporate physiotherapy to have content validity, it is essential that they reflect routine clinical practice. Capturing the content of physiotherapy treatment is therefore a requisite precursor stage.

Methods

A combination of published literature and clinician opinion informed the design of a bespoke physiotherapy treatment data collection form. This comprised standardised descriptors grouped under the headings of education and advice, manual therapy, exercise therapy, taping, electrotherapy, other interventions (heat, cold, acupuncture, hydrotherapy and injection) and home exercise programme. Treatment data were subsequently collected from 76 SIS/RCT patients. Analysis of the content of physiotherapy treatment and clinicians' experience of using the form was undertaken.

Results

All descriptors were used at least once and no treatments beyond those listed on the form were administered. Clinicians rated the quick and user-friendly nature of the form as noteworthy design points, including the ease of circling the standardised prompts. Education and advice, exercise therapy and a home exercise programme were the most commonly applied treatments (for 95%, 99% and 100% of patients; respectively), whilst hands-on techniques were much less frequently administered.

Conclusions

Development of the tool in partnership with clinicians, combined with its comprehensive nature and lack of redundancy, provide evidence of its face validity. Its subsequent use revealed a predominance of hands-off techniques which may reflect clinical reasoning relating to this secondary care patient sample or financial constraints inherent within in a public health service setting. The tool provides a low impact and comprehensive template for capturing the components of a varied and complex physiotherapy intervention. This has the potential to inform future pragmatic trial design and reporting.



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Saturday 16 September

MISCELLANEOUS - II

14:30 - 15:20

POTSDAM

15:02 - 15:10

158 Glenoid Bone Deficiency In Anatomic Total Shoulder Arthroplasty – Clinical Impact Of A New Treatment-Based Classification System**Birgit S Werner**, Inken Wiese, Robert Hudek, Frank Gohlke

Rhön Klinikum AG, Bad Neustadt, Germany

Aim

The aim of our study was to introduce a treatment-based classification of glenoid bone defects in failed total shoulder arthroplasty (TSA) and evaluate its impact on the functional outcome.

Background

Glenoid loosening is one of the main complications in anatomic TSA. Treatment of advanced glenoid bone loss in failed arthroplasty is challenging and needs proper pre-operative analysis.

Methods

We evaluated 103 revisions in failed anatomic TSA associated with glenoid bone loss based on pre-operative computed tomography. An intact glenoid vault represents type 1-2 defects, whereas type 3-5 defects are characterized depending on the destruction of the anterior and/or posterior glenoid wall and medialization. A remaining native glenoid bone stock of less than 10mm was classified as type 5 defect. Functional outcome was assessed at minimum 2 years postoperatively.

Results

By the time of revision surgery, we found an intact glenoid vault in 34 patients, 32 patients demonstrated a type 3 defect with destruction of one glenoid wall, whereas 37 patients were categorized as type 4 or 5 defect. In defects > type 1, revision to a reverse shoulder arthroplasty with use of a long-pegged glenoid baseplate was performed. 41 patients required substantial autologous iliac crest bone graft or allograft of the glenoid, including 28 two-staged procedures in type 4 or 5 defects. We found a correlation between the functional outcome and the extension of glenoid bone loss as well as the complexity of the surgery. 6 postoperative complications were noted: 3 cases of glenoid loosening, 2 fractures of the scapular spine and 1 fatigue fracture of the glenoid neck in a rheumatoid patient.

Conclusions

Our classification system for glenoid deficiency in failed anatomic TSA may serve as a guideline for decision-making. Functional results depend on pre-operative glenoid bone loss as well as healing of the bone graft and concomitant humeral and soft-tissue conditions.



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14:38 - 14:46

159 Propionibacterium Acnes In Primary Reverse Shoulder Arthroplasty. From Skin To Deep Layers.**Carlos Torrens**, Raquel Mari, Albert Alier, Lluís Puig, Fernando Santana Santana

Hospital del Mar, Barcelona, Spain

Aim

Is Propionibacterium Acnes present in shoulder joint in primary Reverse Shoulder Arthroplasty (RSA)?

Background

Propionibacterium Acnes (PA) is commonly associated with infection in shoulder revision surgery but there is still controversy whether PA is commensal of shoulder joint or not in primary surgery.

Methods

Eighty-six primary RSA with no previous surgery were included corresponding to 71 females and 15 males. Mean age 74,6. There were 56 cuff arthropathies, 18 acute fractures and 12 fracture sequelae. Twelve cultures were obtained from each patient (2 skin, 1 subcutaneous, 2 humeral soft tissue, 2 superior glenoid soft tissue, 2 superior glenoid after RSA in place, 2 humeral side after RSA and 1 subcutaneous after RSA). Oxford protocol was followed. Patients underwent prophylaxis (Cefazolin 2gr) and skin preparation with alcoholic 2% chlorhexidine before surgery. Each sample was individually homogenized and inoculated in PoliVitex agar plate and thioglycolate broth. After 5 days, thioglycolate broth culture was reseeded to a plate of PoliVitex agar and to a Laked blood agar plate. Anaerobic cultures incubated 14 days.

Results

A total of 1032 cultures were obtained in 86 patients. Propionibacterium was isolated in 17 patients (19,7%) (significantly higher in males, p.000). There were 6 patients (6,9%) with positive cultures both in skin and deep layers (4 males/2 females) and 11 patients (19,7%) with positive cultures only in deep layers (4 males/7 females). In 9/11 patients with positive cultures in deep layers, PA was isolated in cultures before RSA was in place. There were no significant differences in PA presence according to etiology (p.644) or approach (deltopectoral vs anterosuperior p.175).

Conclusions

In 19,7% of the patients that undergo primary RSA Propionibacterium Acnes is present in deep layers. There is a trend towards female predominance of PA presence in deep layers and male predominance of PA presence in skin.



14:30 - 14:38

452 No Association Between Propionibacterium Acnes And Frozen Shoulder; Shoulder Injections Increase Likelihood Of Shoulder Capsule Colonisation

Simon John Booker, Matthew Boyd, Sian Gallacher, Jonathan P Evans, Cressida Auckland, Jeffrey Kitson, William Thomas, Chris Smith

Royal Devon and Exeter Hospital, Exeter, United Kingdom

Aim

Is there an association between P.acnes capsular colonisation and surgical pathology, and do the independent variables of patient sex, preoperative glenohumeral injection and fat colonisation influence and/or predict capsular colonisation?

Background

P.acnes is an indolent bacteria commonly colonising skin around the shoulder with poorly understood clinical consequences.

Methods

46 patients undergoing a arthroscopic shoulder stabilisation or capsular release had standardised biopsies taken from the shoulder subcutaneous fat and capsule. These samples were sent for culture and also for Polymerase Chain Reaction. The incidence of P.acnes and other microbes were recorded. Correlation was made with a prior injection into the shoulder. Fisher's exact test was used to calculate association with a significance value set at <0.05. Assessment of influence of independent variables was undertaken using a binary linear regression model.

Results

25 (53%) had P.acnes found in one or more of their tissue samples and 35 (74%) had other species found. 28% of the patients had the same microbe in the subcutaneous fat as the capsule. There was no statistical association between surgical pathology and capsular colonisation with P.acnes or mixed identified bacterial species. Male sex was significantly ($p < 0.05$) associated with increased capsular colonisation of P.acnes (OR 12.38). Pre-operative glenohumeral injection was significantly ($p < 0.05$) associated with capsular P.acnes colonisation (OR 5.63). Positive fat colonisation with P.acnes was significantly associated with capsular P.acnes ($p < 0.01$, OR 363). Regression models found fat colonisation with P.acnes to explain 70% of the model variance. Patients who underwent both glenohumeral preoperative injection and were found intraoperatively to have fat colonisation with p.acnes, had a statistically significant association with P.acnes capsular colonisation ($p < 0.01$, OR 165).

Conclusions

These results demonstrate a statistically significant association between subcutaneous skin P.acnes culture and P.acnes capsular culture, especially when the patient has undergone a previous injection. The results refute the hypothesis that P.acnes causes frozen shoulder.



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14:54 - 15:02

644 Interest Of The Glenoid Hull Method For Analyzing Humeral Subluxation In Primary Glenohumeral Osteoarthritis

Soufyane Bouacida, Cyril Lazerges, Michel Chammas, Bertrand Coulet

CHU Lapeyronie, Montpellier, France

Aim

We aimed to compare humeral head subluxation in various reference planes and to search for a correlation with retroversion, inclination and glenoid wear.

Background

Posterior humeral subluxation is the main cause of failure of total shoulder arthroplasty.

Methods

We included 109 CT-scans of primary glenohumeral osteoarthritis and 97 of shoulder problem unrelated to shoulder osteoarthritis (controls); all CT-scans were reconstructed in the anatomical scapula plane and the glenoid hull plane that we defined. In both planes, we measured retroversion, inclination, glenohumeral offset (Walch index) and scapulohumeral offset.

Results

Retroversion in the scapular plane (Friedman method) was lower than in the glenoid hull plane for controls and for arthritic shoulders. The threshold of scapulohumeral subluxation was 60% and 65% in the scapular and glenoid hull plane. The mean upward inclination was lower in the scapular plane (Churchill's method) than in the glenoid hull plane (Maurer's method). In the glenoid hull plane, 35% of type A2 glenoids showed glenohumeral offset > 75%, with mean retroversion $25.6^\circ \pm 6^\circ$ as compared with $7.5^\circ \pm 7.2^\circ$ for the A2 "centered" glenoids ($p < 0,0001$) and an upward inclination of $-1.4^\circ \pm 8^\circ$ and $6.3^\circ \pm 7^\circ$ ($p = 0.03$), respectively. The correlation between retroversion and scapulohumeral offset was $r = 0.64$ in the glenoid hull and $r = 0.59$ in scapular plane ($p < 0.05$).

Conclusions

Measuring in the glenoid hull plane may be more accurate than in the scapular plane. Thus, the glenoid hull method allows for better understanding the type B3 of the modified Walch classification.



15:10 - 15:18

823 A Novel Shoulder Disability Staging System For Scapulothoracic Arthrodesis In Patients With Facioscapulohumeral Dystrophy

Ilker Eren¹, Olgar Birsel¹, Özgür Öztop Çakmak², Ayça Aslanger³, Mehmet Demirhan¹, Piraye Oflazer⁴, Yasemin Gürsoy Özdemir², Hülya Kayserili³, Serpil Eraslan⁵

1. Koc University, School of Medicine, Department of Orthopaedics and Traumatology, Istanbul, Turkey
2. Koc University, School of Medicine, Department of Neurology, Istanbul, Turkey
3. Koc University, School of Medicine, Department of Medical Genetics, Istanbul, Turkey
4. Memorial Hospital, Department of Neurology, Istanbul, Turkey
5. Koc University, School of Medicine, Department of Molecular Genetics, Istanbul, Turkey

Aim

Aim of this study is to develop and validate a staging system to define the shoulder disability in patients with facioscapulohumeral dystrophy (FSHD) and create objective criteria in surgical decision making.

Background

FSHD is an autosomal dominant disorder, specifically affecting periscapular muscles, causing shoulder disability. Scapulothoracic arthrodesis (STA) is a well-established surgical technique to provide scapular stabilization in these patients. Although many patients benefit from this surgical approach, results vary according to the preoperative state. Currently, there are no staging or scoring systems are developed to guide surgical decision.

Methods

Fifty-seven shoulders of 29 patients (15 male, 14 female) with an average age of 34.5 (13 – 73) were included. Patients with previous STA were excluded. A staging system was developed consisting active shoulder elevation, deltoid function (none, partial, full), scapular winging (none, partial, full). Six stages were defined: (0) Full elevation without winging or deltoid loss (1) Elevation above 120° with winging; (2) Elevation 90° to 120°; (3) Elevation below 90° with full deltoid function; (4) Elevation below 90° with deltoid weakness; (5) No or minimal deltoid function with elevation below 30°. As well as written physical examination records, video records of neurological and orthopaedic examinations of patients were assessed by two independent orthopaedic surgeons. Statistical analysis included average, standard deviation for descriptive variables and Cohen's Kappa for inter-observer agreement.

Results

There was strong agreement between observers regarding the functional stage ($k=0.818$, $p=0.0001$). However, moderate agreement on deltoid function ($k=0.651$, $p=0.001$) and weak agreement on scapular winging ($k=0.424$, $p=0.001$) was observed.

Conclusions

This novel staging system has a high inter-observer agreement on FSHD patients' shoulder disability. This would provide surgeons a beneficial tool to define patient groups that would have negative, partial or positive benefits from STA. It is essential to carefully describe the scapular winging and deltoid function to increase agreement.



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14:46 - 14:54

103 Cefazolin Is Superior To Cefonicid For Antibiotic Prophylaxis In Shoulder Surgery

Kazum Efraim¹, Ofir Chechik¹, Ronen Ben-Ami², Oleg Dolkart¹, Yariv Goldstein¹, Dani Rotman¹, Eran Maman¹

1. Shoulder Unit, Orthopedic Surgery Division, Tel-Aviv Medical Center, Tel Aviv, Israel
2. Infectious Diseases Unit, Tel Aviv Sourasky Medical Center, Tel Aviv, Israel

Aim

This study aimed to determine whether the use of Cefonicid is correlated with higher rates of deep Surgical site infection (SSI) following shoulder surgery.

Background

Antibiotic prophylaxis had been switched from cefazolin, a first-generation cephalosporin, to cefonicid, a second-generation cephalosporin for a 14-month period, between May 2011 and July 2012. A switch back to cefazolin was done after noting an increased incidence of postoperative infections.

Methods

The medical records of all 2,670 patients who underwent shoulder surgery in our institution between July 2006 and June 2015 were screened for SSI.

Results

Twenty-seven patients (1%) had a postoperative deep SSI. Pretreatment with cefonicid carried a 4-fold higher risk of infection compared to pretreatment with cefazolin (2.76% vs. 0.66%, respectively; $p < 0.001$). Older age ($p < 0.05$, OR=2.5) and pretreatment with cefonicid ($p < 0.001$, OR=4) were independent risk factors for SSI.

Conclusions

The rate of deep SSI following shoulder surgery was significantly lower with prophylactic cefazolin compared to cefonicid. We recommend that cefonicid should not be used as a prophylactic antibiotic agent in shoulder surgery.



BERLIN 2017 • GERMANY • SEPTEMBER 13-16

Saturday 16 SeptemberRehabilitation II
15:00 - 16:00
PAVILLON

15:07 - 15:14

786 The Acute Effect Of Kinesiotaping In Surgically Repaired Shoulders With History Of Anterior Instability: A Three-Dimensional Motion AnalysisElif Turgut, Gazi Huri, Taha I Yildiz, Egemen Turhan, Leyla S Eraslan, Serdar Demirci, **Irem Düzgün**, Mahmut N Doral

Hacettepe University, Ankara, Turkey

Aim

This study aimed to investigate the three-dimensional scapular kinematics in participants with arthroscopic anterior capsulolabral repair of the shoulder along with the potential biomechanical corrective effects of kinesiotaping.

Background

Compared to control participants, individuals with shoulder instabilities were reported as having scapular kinematic alterations, such as increased scapular internal rotation and increased or decreased upward rotation. Taping has commonly been recommended in rehabilitation for improving proprioceptive feedback, posture, and function as well as for preventing injuries.

Methods

Twenty participants with a history of unilateral traumatic anterior shoulder instability and arthroscopic anterior capsulolabral repair of the shoulder participated in the study. 3-D scapular kinematics were recorded using an electromagnetic tracking device under two conditions: no-taping and taping. Analysis of variance models were used to make comparisons between conditions.

Results

In general, the scapula was less internally and more downwardly rotated in the taping condition ($p < 0.05$).

Conclusions

Differences in scapular motion in the kinesiotaping condition followed a specific pattern, which would be considered to be a position more likely to produce scapular stability and to be potentially increase stress on the inferior glenohumeral ligament for treatment in early rehabilitation of patients, such as those who underwent arthroscopic anterior capsulolabral repair of the shoulder.



15:35 - 15:42

620 Influence Of Selected Factors On Shoulder Proprioception Among Handball Players

Piotr Krzysztof Kaczmarek¹, Przemyslaw Lubiowski², Pawel Cisowski¹, Witold Dudzinski¹, Leszek Romanowski³

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Aim

To examine any differences in level of shoulder joint position sense (JPS) in relation to sport participation and limb preference and to correlate the JPS to shoulder rotation deficits, shoulder pain and morphological changes in throwing shoulder detected by the ultrasound scan.

Background

There are no studies on shoulder proprioception among handball players. Information on JPS in relation to sport participation, limb preference and shoulder range of motion are very limited.

Methods

90 professional male handball players and 32 healthy non-athlete male volunteers participated in the study. Protocol included measurement of dominant and non-dominant shoulder proprioception, measurement of range of internal and external rotation, identification of pain and shoulder ultrasound scan.

Results

Study revealed significantly better values in JPS among handball players for throwing shoulders compared to non-throwing shoulders and compared to dominant shoulder of control group. Handball players showed significant differences in JPS for throwing shoulder for flexion, internal and external rotation in case of internal rotation deficit (GIRD) and total arch of motion deficit (TAMD), for abduction in the case of an RC damage and for flexion in the case of an internal impingement. No significant differences between the throwing and non-throwing sides were found in the case of shoulder pain.

Conclusions

The handball players present better JPS in throwing shoulder at highest ranges of motion when compared to the contralateral one and dominant shoulder of non-athlete population. Players with a clinically significant GIRD (>25°) and greater TAMD display better JPS in throwing shoulder at higher internal rotation angle positions. Players with RC damage show better JPS in throwing shoulder at higher abduction angles; players with internal impingement show a lower level of JPS in throwing shoulder at higher flexion angles; presence of moderate pain in the shoulder does not affect the level of JPS in throwing shoulder.



15:14 - 15:21

901 New Dynamic Brace And Targeted Fast Rehab Protocol For Soccer Players With In Season Gleno Humeral Anterior Dislocation

Marco Conti¹, Raffaele Garofalo², Enrico Ceccarelli³, Alessandro Castagna⁴

1. MedSport, Varese, Italy
2. Miulli Hospital, Bari, Italy
3. Villa Stuart, Roma, Italy
4. Humanitas, Milano, Italy

Aim

To evaluate the effectiveness of a new dynamic brace and a specific rehabilitation program for a safe and fast return to play for soccer players after an in season Shoulder dislocation

Background

The return to play of soccer players after an in season GH dislocation is not well documented

Methods

During two seasons 20 footballers (age range 20 - 29 yrs), none goal keeper, have been enrolled the day after the first Gleno-humeral traumatic dislocation in the "Footballer In Season Fast Rehab" project (FISFast).

Exclusion criteria: RC tears and anterior bone glenoid defect > 25% of glenoid surface, MRI and a CT scan based.

From the day after the dislocation all have been protected from a recurring GH dislocation, until day 60, using a new dynamic brace claimed to allow a protected and controlled ARoM, ensuring the anatomical humeral head positioning by two elongation controlled elastic stripes.

All patients followed a specific 4 sections, of 10 days each, rehab protocol based on brace protected fast RoM recovery integrated by GH stabilizer strengthening and proprioceptive exercises.

Results

All athletes resumed same levels of sport activity 40 days after the dislocation.

90% went back to play without pain, discomfort or instability feeling.

One (5%) claimed slight discomfort or slight pain at the return to play: symptoms vanished at day 60.

One had a traumatic relapse during training at day 50 after the dislocation. He was enrolled with a bony Bankart of 23% of the glenoid surface (just under the limit set at 25%).

One claimed to have had a subluxation during a training session at day 45.

Conclusions

Results show that the combination of a specific dynamic brace worn immediately after the dislocation and a specific rehab program is able to ensure soccer players a safe return to play 40 days after a GH dislocation.



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15:49 - 15:56

655 Kinematics And Electromyographic Analysis Of Shoulder Girdle In Professional Archery: A Prospective Laboratory Study

Elisa De Santis, Ilaria Parel, Fabio Dellabiancia, Giuseppe Porcellini, Giovanni Merolla

Biomechanics Laboratory, D. Cervesi Hospital, Cattolica, Italy

Aim

The aim of this study was to evaluate shoulder girdle kinematics and muscles activation patterns in professional archery during the three main phases of movement

Background

Archery is a discipline described as a three-phases (the stance, the drawing and the sighting), further divided these phases into six: bow hold, drawing, full draw, aiming, release and follow-through. Each of these phases represented a stable sequence of movements which require motor control and skill acquired during this voluntary kinematics.

Methods

Twenty subjects (M/F: 10/10; mean age 24.7 years; [BMI]: 24.1) were enrolled. The position of the scapula (protraction-retraction [PR-RE]), medio-lateral rotation [ME-LA] and posterior-anterior Tilt [P-A]), and humerus (flexion-extension [FL-EX], abduction-adduction [AB-AD] and internal/external rotation [IR/ER]) during the phases of archery shooting were evaluated with an electromagnetic motion capture system (Vicon, Oxford - UK) and reported as mean values + standard deviation (SD). The "on-off" patterns of activation were recorded using a surface electromyography for the following muscles: upper, medium and lower trapezius (UT, MT, LT), deltoid, pectoralis major (PM), latissimus dorsi (LD), biceps brachii (BB), triceps brachii (TB), serratus anterior (SA).

Results

Gleno-humeral motion did not show significant differences in all planes of movements. Scapular motion (ME-LA, PR-RE, Tilt) during humerus FL-EX e AB-AD was significantly different compared to the contralateral shoulder ($p < 0.0001$). During the bow hold and drawing phases we found increase posterior tilting and ME-LA ($p < 0.0001$) and longer activity of PM, BB, anterior deltoid and UT; in the full draw and aiming phases was found a significant improvement of PR-RE ($p < 0.0001$) and longer activity of UT, MT, LT, LD and shorter activity of posterior deltoid.

Conclusions

Longer activity of selected shoulder muscles during the six phases of archery shooting predisposes to scapular muscles weakness and abnormal scapular kinematics.



15:00 - 15:07

149 Conservative Rehabilitation For Shoulder Instability In An Elite Gymnast

Hilde - Fredriksen

Norwegian Olympic Sports Center, Oslo, Norway

Aim

The aim of this case presentation is to describe the rehabilitation program of an elite male gymnast with shoulder instability.

Background

Male gymnasts show high prevalence of various shoulder pathologies, which often are referred for surgery. Studies regarding gymnasts' return to play after shoulder surgery is lacking. However, recent studies in other overhead sports show lower success rates after shoulder-surgery than previously reported. Therefore, a thorough non-surgical rehabilitation should be considered before surgery is offered.

Methods

Single case study. Outcome measure: Return to sport at preinjury level.

History: A 25 years old male gymnast presented with right sided shoulder pain after a subluxation 2 months previously. He had pain when doing all exercises hanging from his arms and pain in flexion and extension end range of motion. He was not able to do rings or high bar exercises, and his performance in parallel bars was limited. His goal was qualification for the European Championship 5 months later. Surgery was therefore not an option at this time. Physical examination: Positive O'Brien's test, pos. apprehension and relocation test, and slightly reduced internal rotation. Normal ROM in all other directions and good strength. MRI showed Buford complex with partial avulsion of middle glenohumeral ligament from the glenoid, GLAD's lesion, and partial supraspinatus rupture. Treatment: General stability training for the glenohumeral joint and shoulder girdle, followed by sport specific stability training and reaction training close to end range positions of the shoulder. (video)

Results

After 2 months he started doing the high bar exercises, after 3 months he the ring exercises, and after 4 months he was back in competition in all exercises. After the competition he rejected the offered surgery, and continued competing at preinjury level.

Conclusions

Sport-specific functional rehabilitation can be a good alternative to surgery in elite gymnasts with shoulder problems.



15:28 - 15:35

567 The Scapular Dyskinesia Test: Is It Reliable And Valid?Michael J Smith¹, Robert Goldsmith², Kevin Nicholas¹, Samantha Owen²

1. Cardiff University, Cardiff, United Kingdom
2. Cardiff & Vale University Health Board, Cardiff, United Kingdom

Aim

To establish whether the scapular dyskinesia test (SDT) can be reliably applied and has ecological validity with subacromial impingement syndrome / rotator cuff tendinopathy (SIS/RCT) patients in secondary care.

Background

The SDT is a clinical tool for assessing scapular movement and control during humeral elevation (HE) with a hand held weight. Its reliability has been established within upper limb athletes (Kappa = 0.48 to 0.61) but its utility within non-athletic populations has not been established.

Methods

Videos of scapular movement were recorded from 76 SIS/RCT patients performing HE. Where tolerated this was repeated with a hand held weight (loaded trial). A nested sample of 30 SIS/RCT patients was used for an inter-rater reliability study between 2 experienced musculoskeletal physiotherapists. Agreement was calculated via linear weighted Kappa. BMI and active humeral range of movement (ROM) were also recorded.

Results

Agreement between the 2 raters was fair (Kappa of 0.33, $p=0.002$) for the nested sample who had a mean (standard deviation) BMI and ROM of 29.0kg/m² (6.3kg/m²) and 138° (25°). Forty-two percent of patients from the main study were unable to perform a loaded trial.

Conclusions

The lower inter-rater reliability in the current study may be explained by the higher BMI of patients in secondary care making identification of bony landmarks more challenging when compared to the college level overhead athletes in the original publication, whose inclusion criteria included BMI < 30 kg/m². Furthermore the impaired ROM of the SIS/RCT patients could have led to failure to achieve portions of the humeral elevation range where scapular dyskinesia may be present. Combined with the inability for over 2/5ths of the main study cohort to perform humeral elevation with a hand held weight, this provides evidence that the SDT in its published form cannot be applied reliably with – and lacks ecological validity in – secondary care SIS/RCT patients.



15:42 - 15:49

617 Inferior Shoulder Joint Position Sense In Junior Handball Players

Piotr Krzysztof Kaczmarek¹, Przemyslaw Lubiowski², **Pawel Cisowski**¹, Piotr Ogradowicz², Witold Dudzinski¹, Leszek Romanowski³

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2. Rehasport Clinic; Department of Traumatology, Orthopaedics and Hand Surgery, University of Medical Sciences in Poznan, Poznan, Poland
3. Department of Traumatology, Orthopaedics and Hand Surgery, University of Medical Sciences in Poznan, Poznan, Poland

Aim

The aim of the study was to evaluate and compare the joint position sense (JPS) of both shoulders of senior and junior male handball players, and non-athletic healthy male individuals.

Background

Proprioception is a specialized variation of the sensory modality of touch and is an essential part of shoulder stability and neuromuscular control. It is controversial whether throwing sports and sports training affects shoulder proprioception.

Methods

90 senior and 19 junior handball players from national handball teams, and 32 healthy male volunteers had participated in the study. The protocol had included the measurement of dominant and non-dominant shoulder proprioception by active reproduction of the joint position and the comparison of results between groups. Measurement included flexion, abduction, internal and external rotation. JPS had been measured with electronic goniometer.

Results

JPS of the junior throwing shoulder had proven to be significantly worse compared to the throwing shoulder of the senior handball players and to the dominant shoulder of the control group at highest ranges of flexion ($4,7^{\circ} \pm 2,3$ vs $3,0^{\circ} \pm 1,6$ vs $3,6^{\circ} \pm 1,5$) and abduction ($8,9^{\circ} \pm 9,9$ vs $3,6^{\circ} \pm 2,6$ vs $4,5^{\circ} \pm 2,1$). There was no difference in joint position matching between shoulders among junior handball players and control group in contrast to senior handball players.

Conclusions

Junior handball players showed significantly inferior JPS in the throwing shoulder at highest ranges of flexion and abduction when compared to senior athletes and control group. This might be related to a younger age and less experience in handball specific training. It can be hypothesized that handball training improves shoulder proprioception as shown by superior values of JPS in senior athletes when compared to younger players and non-athletic population.



15:21 - 15:28

484 Impact Of Multidisciplinary Rehabilitation On The Socioeconomic Burden Of Shoulder Instability – A Prospective Study.

Tania Louise Douglas, Elaine Cobb, Anthony Gilbert, Anju Jaggi

Royal National Orthopaedic Hospital, Stanmore, United Kingdom

Aim

To investigate the socioeconomic burden of shoulder instability and the impact of multidisciplinary (MDT) rehabilitation.

Background

Shoulder instability results in an inability to function physically, socially and emotionally, impacting on individuals and their environment. This prospective study aims to evaluate the effect of shoulder instability on attendance at work and school, reliance on emergency services and the clinical effectiveness of MDT rehabilitation.

Methods

Prospective data was collected at admission, 6/52, 6/12 and 1 year from patients attending a shoulder rehabilitation program between November 2009-December 2010. Data included patient reported outcome measures (PROMs) e.g. OISS, SF-36 as well as impact on work/school, hobbies and Accident & Emergency (A&E) attendance. The rehabilitation programme involved an inpatient admission including physiotherapy, occupational therapy and psychology individualised to patients' needs.

Outcome Measure Data was entered into IBM SPSS v23 for analysis and assessed for distribution prior to the selection of statistical test. Missing data was excluded list wise.

Results

Data was gathered from 72 patients (55 adults, 17 children); average duration of symptoms was 38 months. All outcome data met parametric assumptions and the paired t-test was used. The differences between baseline and 6 weeks, 6 months and 1 year for the PROMs were statistically significant ($p < 0.003$).

On admission, 50% of patients were dislocating more than twice a week. 37% of patients (31% adults, 53% paediatrics) were attending A&E for their dislocations. At one year follow up only one paediatric patient still required A&E assistance.

Only 30% of adults were in full time work prior to admission, this increased to 54% by six months.

Conclusions

This study demonstrates the burden shoulder instability can have on work and healthcare provision. A focus on self-management strategies and return to function can improve outcomes, return to work and reduced dependency on emergency services. Early referral to specialist care is recommended.

**Saturday 16 September**

NEW TECHNIQUES / TIPS & TRICKS

15:20 - 16:15

POTSDAM

15:36 - 15:44

195 A Shortcut To Arthroscopic Suprascapular Nerve Decompression At The Suprascapular Notch: New Arthroscopic Landmarks And Surgical Technique
Hatem Galal Said¹, **Ayman Farouk Abdelkawi**¹, Tarek Nabil Fetih¹, Ahmed Wahid Kandil²

1. Orthopedic Department, Assiut University Hospital, Assiut, Egypt
2. Orthopedic Department, Alexandria University Hospital, Alexandria, Egypt

Aim

The aim of this work is to describe an easier shortcut to the arthroscopic decompression of the SSN depending on palpation of the Coracoclavicular ligaments (CC ligaments) as anatomic landmarks, this reduces the time and minimizes the resection of the surrounding fat.

Background

Arthroscopic Suprascapular nerve decompression at the suprascapular notch is a technically demanding surgical procedure that requires a steep learning curve. This is because the nerve is located medial to the acromioclavicular joint and requires resecting a lot of fat with the potential risk of bleeding and injury of the suprascapular artery.

Methods

We insert a switching stick medial to the Acromion and direct it anterior to feel the Coracoclavicular ligaments, the scope is triangulated on the switching stick. The switching stick is used to clear the fat away. Once a clear view is achieved, a low profile basket forceps is used to cut the Suprascapular ligament.

Results

We used this technique in 9 patients diagnosed to have suprascapular nerve entrapment. The mean operative time was 10 min. None of the patients had an intraoperative complication and all the patients reported improvement of their symptoms.

Conclusions

This work describes an easier shortcut to the arthroscopic decompression of the SSN depending on palpation of the Coracoclavicular ligaments as an anatomic landmark before starting the arthroscopic visualization, this reduces the operative time and minimizes the resection of the surrounding fat.



15:20 - 15:28

739 The "fishmouth" Long Head Of The Biceps Biological Tenodesis Without Implant.

Juan Bruguera¹, Luis Gerardo Natera¹, Luigi Piscitelli², Paolo Consigliere¹, Caroline Witney-Lagen¹, Ofer Levy¹

1. Reading Shoulder Unit, Reading, Berkshire, United Kingdom
2. Hospital Santa Maria della Misericordia, Perugia, Italy

Aim

To describe the technical aspects and clinical outcomes of the "fishmouth" long head of the biceps biological tenodesis without implant.

Background

Long head of the biceps (LHB) pathology often represent a cause of shoulder pain. Treatments options are tenotomy or tenodesis. Tenotomy doesn't involve the complications that may be related to implants. However, it may produce a cosmetic effect of "popeye deformity" and sometimes cramps in the muscle. Tenodesis may avoid these side effects, but technically represents a more demanding procedure that may involve implant-complications as well as residual pain.

Methods

Prospective study (2014-2015) in patients with LHB pathology, without concomitant cuff-tear. In all patients, a LHB "fishmouth" tenodesis was performed. This technique involves an incomplete section (50%) of the LHB with a 45° angle, and a subsequent complete tenotomy of the LHB at its labral insertion. A mechanism for self-tendon anchoring at the groove is achieved.

Clinical outcomes were assessed at the last follow-up visit by means of these items: bicipital groove pain, muscle cramps, "popeye deformity" and patient satisfaction. Ultrasound control was performed 3 months after surgery.

Results

15 patients: 13 males and 2 females. Mean age 57.9 years (50-64). An acromioplasty was associated in 9 cases, and an ACJ excision in 2. Pain in the groove 0/15, Cramps: 2/15, popeye deformity: 2/15, General satisfaction: 13/15 very satisfied, 2/15 satisfied, 0/15 dissatisfied, 0/15 very dissatisfied. Ultrasound control was performed in all cases, and it showed that in 13/15 of the cases the LHB was in the groove.

Conclusions

The fishmouth technique achieves a biological tenotomy-tenodesis that may significantly reduce the risk of "popeye deformity" and muscle cramps, providing satisfactory clinical results and saving the potential complications related to implants.



15:52 - 16:00

831 Double Nerve Transfer For The Reanimation Of Isolated Deltoid Palsies.

Thibault Lafosse, Thibault Gerosa, Malo Lehanneur, Emmanuel Masmajeau, Jerome Pierrart, Arnaud Walch

European Hospital Georges Pompidou, Paris, France

Aim

To describe our surgical management of isolated deltoid palsies with double nerve transfers on the anterior branch of the axillary nerve and the branche of the teres minor.

Background

Isolated deltoid palsies can occur after a lesion of the axillary nerve, or a partial tear of the brachial plexus. It usually recovers in less than 6 month, but sometimes incompletely.

Methods

We manage deltoid palsies with a double nerve transfer which reinforce the probability of recovery, trough an axillary approach with a transfer of the branche of the long head of triceps on the anterior branch of the axillary nerve, and a fascicle of the ulnar nerve on the branch of the teres minor. We performed an anatomical study to describe the technique and assess the feasibility. We measured the length and diameter of theses branches and performed the transfer with tensionless sutures. We operated on 2 patients according to this technique and evaluated the motor deficits in the territory of harvested nerves, and the recovery of the deltoid.

Results

10 fresh cadavers were dissected. The mean length of the anterior branch of the axillary nerve, the teres minor, the triceps and the ulnar nerve branches were respectively 25, 34, 54 and 28mm. Their diameter were respectively 3, 3, 2 and 2mm. The nerve transfer was always feasible. The patients operated with this technique had no deficits in the harvested nerves territories, and a contraction was palpable in the deltoid at 6 months post op.

Conclusions

Isolated deltoid palsies are a frequent and severe condition, and can cause long-term impairment of the shoulder, compromising for instance the implantation of a reverse shoulder arthroplasty. We describe our technique to manage such palsies in early stages, the double nerve transfer greatens the chances of recovery and should be attempted whenever possible.



15:44 - 15:52

39 Clinical Outcome In Patients With Thoracic Outlet Syndrome Who Had Arthroscopic-Assisted Transaxillary First Rib Resection

Yasuhiro Mitsui¹, Masafumi Gotoh¹, Hirokazu Honda¹, Ryo Amamoto¹, Takahiro Okawa¹, Naoto Shiba²

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2. Kurume University Hospital, Kurume, Japan

Aim

The purpose of this study was to assess the usefulness of the arthroscopic-assisted transaxillary first rib resection for TOS.

Background

First rib resection through the transaxillary approach is conventionally used for thoracic outlet syndrome (TOS). However, there are certain issues during surgery under direct vision; narrow operative field, difficult surgical operability and assistant not being able to secure a sufficient visual field. The transaxillary approach with arthroscopy may allow surgeons and assistants to share a sufficient operative field while safely performing this surgery.

Methods

Of 146 patients with TOS who visited our institution, 21 shoulders in 19 patients (mean age of 30.8 years) underwent surgery because of persistence of conservative treatment. Of these patients, six patients had traumatic history, and seven patients were athletes. Outcome measures included the Japanese Orthopedic Association (JOA) score, the Disabilities of Arm, Shoulder and Hand (DASH) score, operation time, intraoperative bleeding volume, anatomical abnormal findings, and the presence or absence of complications.

Results

JOA/DASH score significantly improved 63.7 and 59.2 points preoperatively to 82.6 and 30.6 points postoperatively ($P < 0.01$ and $P < 0.01$, respectively). The mean operation time was 84.7 minutes and mean intraoperative bleeding volume was 17.9 ml. The scalenus minimus muscle was detected in three cases (14.3%), the abnormal fibrous bands in four cases (19.0%), and the narrow space between anterior and middle scalenus muscles attached to the first rib (average 4mm, range: 0-8mm) in all cases. Complications were detected in one case (0.05%) of pleural injury. There were no cases of vessel or nerve injury.

Conclusions

Arthroscopic-assisted transaxillary first rib resection produces acceptable clinical outcome, allowing surgeons and assistants to share a suitable operative field and safe surgery.



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16:00 - 16:08

719 Osteotomy Of Ulna And Humerus With Preservation Of Triceps Tendon For Revision Of Total Elbow Arthroplasty**Christophe Spormann**

Endoclinic Klinik Hirslanden, Zürich, Switzerland

Aim

To assess the functional outcome after exchange of total elbow arthroplasty by an osteotomy of the proximal ulna and distal humerus.

Background

Revisions of total elbow replacements have a high potential of complications. For easy removal of the ulnar implant an osteotomy may be performed to preserve the triceps tendon.

Methods

Between January 2010 and December 2013 six patients sustained revision with removal and reimplantation of total elbow prosthesis. In 2 cases the exchange of prosthetic components was performed for aseptic loosening and in 4 cases for periprosthetic infections. In all 6 cases a longitudinal osteotomy of the proximal ulna was performed from radial allowing to open the ulna in line with the olecranon and triceps tendon for removal of the implant. It is a retrospective case-control-study. Follow-up controls have been done clinically and radiographically at 3, 6, 12 months and every year after revision surgery. Elbow function was assessed from the operated and non-operated side by the Elbow Mayo Performance Score (MEPS).

Results

The mean follow-up was 36 months (minimum: 28). All cases have been free of infection signs at last follow-up. The mean range of motion in flexion – extension was 126° (SD± 14°) and in pronation - supination 122° (SD± 21°). The MEPS was 95 for 2 patients with aseptic loosening and 75 – 90 for 4 patients with periprosthetic infections. Complete bone healing at the osteotomy – line was observed in all cases without complications.

Conclusions

Osteotomy of the proximal ulna is a careful technique to preserve the triceps tendon from damage and the ulna from bone loss. It may be performed for immediate or staged revision procedures and allows early functional mobilization.



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15:28 - 15:36

914 Acromioplasty Planification: A Randomized Prospective StudyCaecilia Charbonnier¹, Frank C Kolo², Alexandre Lädermann³

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2. Rive Droite Radiology Center, Meyringeneva, Switzerland
3. La Tour Hospital, Meyrin, Switzerland

Aim

We developed a computer-assisted planning solution "ArthroPlanner" for acromioplasty. The solution allows to perform standard morphological bony measurements, as well as 3D simulations of the patient's joint during everyday shoulder activities. The software computes the precise bone resection (location and amount) based on detected subacromial impingements during motion.

Background

Subacromial impingement of the rotator cuff between the anterior or lateral acromion and the superior humeral head is a common disorder.

Methods

We reconstruct the bones of the patient's shoulder joint (scapula and humerus from the humeral head to the mid-shaft) from a CT image. The bones are then imported into ArthroPlanner software and the following steps are performed: 1) generic bone models are produced, 2) biomechanical parameters are computed to permit motion description of the glenohumeral joint, 3) morphological measurements are performed to analyze individual shoulder anatomy (CSA, β angle,...), and 4) the joint is simulated using ROM of everyday activities, impingements detected for each motion and the resulting resection plan is calculated. Post-operative visits for all patients were performed at 6 months, including a clinical examination (evaluation of the ROM, pain scores) and an echography to control the rotator cuff. A post-operative CT 3D reconstruction was performed to determine the actual bone resection executed at surgery compared to the planning recommendations. The data collected were compared between the groups.

Results

Preoperatively, groups were similar regarding scores, ROM, CSA, except for β angle. Postoperatively, ROM (AFF, abd, IR, ER), VAS, ASES, CS, SSV, SST, and tendon healing were similar. Nevertheless, bone resection was less in the planification group.

Conclusions

Acromioplasty planification change the authors practice, allowing to do less acromioplasty and to remove less bone at different places.

POSTERS





BERLIN 2017 • GERMANY • SEPTEMBER 13-16

260 Arthroscopic Latarjet With Double Button Fixation: Learning Curve Analysis And Short Term Complications.Nicolas Bonneville¹, Charles-Edouard Thelu², Jerome Vogel³, Yves Bouju⁴

1. University Hospital- Riquet, Toulouse, France
2. Clinic of North shoulder surgery, Marcq-En-Baroeul, France
3. Hand and Upper limb surgery Institute, Villeurbanne, France
4. Hand Atlantic Institue, Nantes, France

Aim

The aim of this study was to analyse learning curve and short term complications after arthroscopic guided Latarjet procedure with double button fixation.

Background

Arthroscopic Latarjet procedure indicated for anterior shoulder instability with glenoid bone loss is an innovative surgery. The use of double button fixation of the bone graft was recently proposed and only few studies from design-centre reported clinical outcomes.

Methods

Eighty-eight patients were included in a prospective study. Operative time, intraoperative and postoperative complications were recorded. Clinical evaluation was performed at 3,6 and 12 months. Radiographic assessment was based on immediate and 3 months postoperative CT-scan analysis.

Results

The mean operative time was 107 min (62-192;30). There was a significant correlation between operative time and surgical experience ($P < 0.0001$; $r : -0.8426$ IC à 95%[-0.9074 ; -0.7384]). The rate of unexpected events or intra operative complications was 3.3%: 1 conversion to open surgery, 1 coracoid fracture and 1 instrumentation problem. The rate of post-operative complication was 6.8%: 4 early migrations of coracoid transfer and 2 subluxations. No infection, neurologic or vascular issue was reported. The bone block was flush to the glenoid rim in 81% of cases and the rate of healing at 3 months was 62%. Both of these parameters significantly improved after 20 cases. At mean follow-up of 9.6 months (3-24), the mean Walch-Duplay and Rowe score were 80 (50-100 ;12) and 81 (60-100 ;13) points respectively.

Conclusions

After a first experience, the rate of complication of arthroscopic Latarjet with double button fixation remained low and short term clinical outcomes were promising. Operative time, position of the bone block and the rate of healing improved with surgical experience.



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261 Results Of Arthroscopic Bankart Repair With Hill-Sachs Remplissage For Anterior Shoulder Instability.**Nicolas Bonneville**, Vadim Azoulay, Florence Dauzère, Amélie Faraud, Pierre Mansat

university Hospital- Riquet, Toulouse, France

Aim

The aim of this study was to evaluate clinical outcomes after Bankart repair + Hill-Sachs remplissage (BHSR) and to highlight prognostic factors of failure.

Background

Even if BHSR for anterior shoulder instability was reported to failed in less than 10% of cases, no study explored factors of failure.

Methods

Thirty-four patients operated on for anterior shoulder instability with BHSR were enrolled in a prospective non randomized study. Clinical and radiographic evaluation was performed at 1.5, 3, 6 months and yearly thereafter. Outcomes measures included Rowe and Walch-Duplay score.

Results

At mean follow-up of 35 months (24-63), the Rowe and Walch-Duplay scores reached respectively 92.7 and 88.2 points. The mean deficit in external rotation was 6° in ER1 and 1° in ER2 ($p=0.4$, $p=0.9$ respectively). Five patients (14.7%) recurred and 3 others had a persistent anterior apprehension. In the failure group, the Hill-Sachs lesion was deeper (26% vs 19% of the humeral diameter; $p=0.04$) and range of motion at 1.5 months postoperatively was higher. Age at surgery, preoperative ISIS, hyperlaxity, type and level of sport, amount of glenoid bone loss had no correlation with failure rate.

Conclusions

The rate of failure at mid-term follow-up of BHSR was higher than commonly reported. The premature recovery of range of motion seems to be a clinical sign of failure at follow-up. Moreover, in case of deep Hill-Sachs lesion (> 20%) an alternative procedure should be considered.



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543 Does A Hill-Sachs Lesion Occur At The Time Of Dislocation?Jun Kawakami¹, Nobuyuki Yamamoto¹, Hideaki Nagamoto², Daisuke Kurokawa³, Eiji Itoi¹

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2. Kurihara Central Hospital, Kurihara, Japan
3. Tohoku Rosai Hospital, Sendai, Japan

Aim

The aim of this study was to investigate the coincidence rate between the shoulder positions at the time of dislocation and the HSL-created position.

Background

At 25th SECEC meeting, we reported that a Hill-Sachs lesion (HSL) was supposed to be created in an average arm position of 74 degrees of abduction and 34 degrees of external rotation. This position was not the same as the so-called dislocation position. We hypothesized that a HSL was created not at the time of dislocation, but sometime later after the dislocation.

Methods

The HSL-created position were investigated using the CT images of 55 shoulders (38 males and 17 females, mean age: 30 years old) with recurrent anterior dislocation of the shoulder. According to the medical records, the dislocation positions were classified into three groups: adduction position (0 to 20 degrees of abduction), abduction and external rotation position (80 to 100 degrees of abduction and maximum external rotation), and elevation position (160 to 180 degrees of elevation). The coincidence rate between the HSL-created position and the dislocation position was assessed.

Results

The dislocation occurred in abduction and external rotation in 30 of 55 shoulders (55%), in elevation in 27%, and in adduction in 18%. The coincidence rates for three positions were 20%, 0%, and 0%, respectively.

Conclusions

Our data showed that only 55% of shoulder dislocation occurred in abduction and external rotation, and the rest occurred either in full elevation or in adduction. As a result, the dislocation position was consistent with the HSL-created position in only 20% of the shoulders. From these results, most of the HSLs are likely to be created not at the time of dislocation but sometime later at the lower angle of abduction.



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540 The In-Vivo Glenoid Track Width Can Be Better Predicted With Use Of Shoulder Horizontal Extension Angle

Jun Kawakami¹, Nobuyuki Yamamoto¹, Mitsuyoshi Mineta², Ryouhei Isawa², Taku Hatta¹, Eiji Itoi¹

1. Department of Orthopaedic Surgery, Tohoku University School of Medicine, Sendai, Japan
2. Kamisugiyama Orthopaedic Clinic, Sendai, Japan

Aim

To determine the relationship between the glenoid track width and the shoulder range of motion in healthy volunteers.

Background

The glenoid track concept has been widely used to assess the risk of instability caused by a bipolar lesion. The average width of the glenoid track is reported to be 83% of the glenoid width, which seems to be affected by the laxity or the range of motion of the shoulder. By clarifying the relationship between the shoulder range of motion and the glenoid track width, we can more precisely determine the glenoid track width for each individual.

Methods

MRI was taken in 25 shoulders of 13 healthy volunteers (mean age: 32 years) with the arm in maximum horizontal extension, keeping the arm in 90° of abduction and 90° of external rotation (90ABER). 3D models of the glenoid and humerus were created using image analyzing software (Amira). The distance from the anterior rim of the glenoid to the medial margin of the footprint of the rotator cuff tendon was measured, and defined as the glenoid track width. Active and passive ranges of shoulder motion were measured in both supine and sitting positions. The correlations between the glenoid track width and the shoulder motions were investigated with use of Pearson's correlation coefficients.

Results

There were significant moderate correlations between the glenoid track width and the following shoulder motions: active horizontal extension at 90ABER in the sitting and the supine positions ($r = -0.74, -0.66$) and active flexion in the supine position ($r = -0.54$).

Conclusions

Our data showed that the greater the horizontal extension angle at 90ABER, the smaller the glenoid track width. Thus, an individualized glenoid track width can be better estimated by measuring the horizontal extension angle with the arm in 90° of abduction and 90° of external rotation.



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297 The Use Of Assistive Technology In Shoulder Exercise Rehabilitation – A Usability StudyAnthony Gilbert, Iva Hauptmannova, **Anju Jaggi**

Royal National Orthopaedic Hospital, Stanmore, United Kingdom

Aim

The purpose of this research was to determine the acceptability of the MuJo® shoulder devices for the rehabilitation of shoulder dysfunction at a tertiary referral centre.

Background

Shoulder Pain is the third most common reason for musculoskeletal consultations in general practice with an estimated treatment cost of £100million annually. The majority of shoulder pain is associated with weakness of the rotator cuff muscles and there is increasing evidence that rehabilitation to improve the strength of these muscles is as effective as surgical interventions. The use of technology is a growing area to help facilitate active rehabilitation. The MuJo® shoulder machine with associated Application technology has been designed to help target the rehabilitation of the rotator cuff muscles.

Methods

Following completion of rehabilitation patients and clinicians were interviewed to explore the acceptability of the MuJo® devices. Interviews were audio recorded and transcribed. A directed content framework analysis was conducted using Normalisation Process Theory (NPT) as the conceptual tool to frame the enquiry to explore the underlying reasons behind the acceptability of the shoulder devices.

Results

Seven physiotherapists and ten patients were interviewed in the study. The MuJo® was seen as having the potential to rehabilitate the rotator cuff however it posed limitations towards more functional based exercises. Accessibility reduced the demand for physiotherapy as patients completed their rehabilitation independently, however patients and clinicians stressed this was not a replacement for normal care.

Conclusions

The MuJo® system was acceptable to all patients and clinicians. For the MuJo® to be taken up as a routine part of clinical practice patients need to be able to access the devices in the community. The MuJo® device was seen as a useful supplement to clinical practice and has the potential to reduce treatment time with the clinician over the treatment pathway.



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189 Is The Arthroscopic Suture Bridge Technique Suitable For Full-Thickness Rotator Cuff Tears Of Any Size?

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Aim

The purpose of this study was to compare functional outcomes and tendon integrity between the suture bridge and modified tension band techniques for arthroscopic rotator cuff repair.

Background

It is not clear whether the supraspinatus tendon in large-to-massive tears heals better in vivo after repair using the suture bridge technique.

Methods

A consecutive series of 128 patients who underwent the modified tension band (MTB group; 69 patients) and suture bridge (SB group; 59 patients) techniques were enrolled. The pain visual analogue scale (VAS), Constant, and American Shoulder and Elbow Surgeons (ASES) scores were determined preoperatively and at the final follow-up. Rotator cuff hypotrophy was quantified by calculating the occupation ratio (OR). Rotator cuff integrity and the global fatty degeneration index were determined by using magnetic resonance imaging at 6 months postoperatively.

Results

The average VAS, Constant, and ASES scores improved significantly at the final follow-up in both groups ($p < 0.05$ for all scores). The retear rate of small-to-medium tears was similar in the modified tension band and suture bridge groups (7.0% vs. 6.8%, respectively; $p = n.s.$). The retear rate of large-to-massive tears was significantly lower in the suture bridge group than in the modified tension band group (33.3% vs. 70%; $p = 0.035$). Fatty infiltration (postoperative global fatty degeneration index, $p = 0.022$) and muscle hypotrophy (postoperative OR, $p = 0.038$) outcomes were better with the suture bridge technique.

Conclusions

The retear rate was lower with the suture bridge technique in the case of large-to-massive rotator cuff tears. Additionally, significant improvements in hypotrophy and fatty infiltration of the rotator cuff were obtained with the suture bridge technique, possibly resulting in better anatomical outcomes. The suture bridge technique was a more effective method for the repair of rotator cuff tears of all sizes as compared to the modified tension band technique.



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119 Influence Of Screw Type And Length On Fixation Of Anterior Glenoid Bone Grafts

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Aim

This study aims to investigate how type and length of screws influences construct rigidity in a simplified glenoid.

Background

Bone grafting procedures for recurrent shoulder instability produce low recurrence rates, but are associated with complications such as graft non-union. Inadequate screw purchase is believed to play a causative role. However, excessive screw length can endanger neurovascular structures.

Methods

Testing was performed on composite polyurethane foam models with material properties and abstract dimensions of a deficient glenoid and an bone graft. Three screw types (cannulated 3.75 mm and 3.5 mm and solid 4.5 mm) secured the graft in a bicortical-bicortical, bicortical-unicortical and unicortical-unicortical configuration. Biomechanical testing consisted of applying axial loads while measuring graft displacement.

Results

At 200N, graft displacement reached 0.74, 0.27 and 0.24 mm for the unicortical-unicortical and 0.40, 0.25 and 0.24 mm for the unicortical-bicortical configuration of the 3.75 the 3.5 and 4.5 mm screw types. The 3.75 mm screw incurred significant displacements in the unicortical configurations compared to the bicortical-bicortical method ($p < 0.001$).

Conclusions

This study demonstrates that common screw types resist physiologic shear loads in a bicortical configuration. However, the 3.75 mm screws incurred significant displacements at 200N in the unicortical configurations. These findings have implications regarding hardware selection for bone grafting procedures



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767 Latarjet Procedure For Anterior Shoulder Instability In Epileptic Patients

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Aim

The aim is to evaluate the functional and radiographic results of the Modified Latarjet procedure for anterior shoulder dislocation in patients with epilepsy and compare the functional results of these patients with patients without epilepsy.

Background

Powerful contractions during epileptic seizures may cause shoulder dislocation and instability. Half of the epileptic shoulder instabilities are anterior instabilities most of them with osseous Bankart or deep Hill-Sachs lesions.

Methods

12 shoulders of 10 patients with epileptic seizures causing anterior shoulder instability were evaluated retrospectively. All patients had a Modified Latarjet procedure after neurologic treatment arrangement. Epileptic seizures after the operation and redislocation after a seizure were investigated.

The functional results of epileptic patients with Modified Latarjet procedure were compared with non-epileptic patients (63 patients, 64 shoulders) with Latarjet procedure for anterior shoulder instability.

Results

After mean follow-up of 40(6-114) months Four (40%) of the 10 epileptic patients had recurrent seizures after Latarjet procedure, whereas 2 of the 12 shoulders (16%) had dislocation after an epileptic seizure. Both redislocations occurred in the first postoperative week before the graft union can occur.

Functional scores were found to be significantly improved in epileptic ($p < 0.001$) and non-epileptic patients ($p < 0.001$). No significant differences for functional results were found between epileptic and non-epileptic patients after Latarjet procedure ($p > 0.05$). Two shoulders of 12 in the patients with epilepsy group (16 %) and one shoulder of the 64 shoulders non-epileptic patients group (1.5 %) had a redislocation which is significantly higher ($p: 0.013$)

Conclusions

Epileptic patients has a high rate of recurrent seizures even with proper medical treatment. Weeks before the graft union may be critical since seizures before union may cause failure. Functional improvements and stability may be achieved after Modified Latarjet procedure in epileptic patients. These functional results were comparable with those of non-epileptic patients with Latarjet procedure.



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206 Retaining Or Excising Supraspinatus In Complex Proximal Humeral Fractures Treated With Reverse Prosthesis? Biomechanical Analysis In Two Different Designs

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Aim

To biomechanically evaluate the role of supraspinatus tendon in tuberosities displacement when using two different designs of reverse shoulder arthroplasty (RSA) in complex proximal humeral fractures.

Background

RSA has emerged as a viable option in the elderly patient with complex proximal humeral fractures. However, some technical aspects remain unknown, such as the biomechanical effect of supraspinatus tendon in tuberosities construct.

Methods

Four-part fractures were simulated by an oscillating saw in 20 fresh-frozen cadaveric shoulders. Two different designs of RSA were implanted: glenosphere medialized model and a glenosphere lateralized model. Boileau's suture technique was used for tuberosities reconstruction. The interfragmentary displacement of bony fragments was measured in millimeters (mm), by setting three sensors into cadaveric specimens: One in humeral diaphysis (D), one in greater tuberosity (GT) and one in lesser tuberosity (LT). Progressive axial forces were induced through supraspinatus, infraspinatus and subscapularis tendon and measured in Newtons (N). The test was made twice for each specimen: with and without supraspinatus tendon. The regression line (RL) was measured in mm/N with and without supraspinatus for each configuration to measure the effect size.

Results

For the lateralized glenosphere model, GT-D interfragmentary displacement was higher in supraspinatus retaining model (RL: 0,07mm/N), compared to supraspinatus excising model (RL: 0,03mm/N, $p < 0,001$). For GT-LT distance, a small difference in RL was founded between both models (RL: 0,02mm/N and RL: 0,03mm/N, $p < 0,04$). LT-D distance measurement showed no significant displacement with and without supraspinatus ($p > 0,05$). For the medialized glenosphere model, only GT-D interfragmentary displacement reached differences between both models; RL: 0,03mm/N for preserving model vs RL: 0,01mm/N for excising model ($p < 0,001$).

Conclusions

Supraspinatus tendon showed to play a negative biomechanical effect for GT stability in humeral stem of RSA for proximal humeral fractures. This role seems to be of special relevance for glenosphere lateralized RSA models.



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309 Twelve Months Follow-Up Evaluation Of New Cementless Stem Bilboquet For Complex Proximal Humerus Fracture Fixation.Thomas M Gregory¹, Levon Doursounian²

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Aim

The aim of this study was to assess the functional and radiological outcomes of New Cementless stem Bilboquet technique for Complex Proximal Humerus Fracture Fixation at 12 months follow-up

Background

As compared to cemented stem Bilboquet and other fixation systems where the reduction has to be maintained while the fixation is inserted, New Cementless stem Bilboquet enables the reduction of the fracture with the device after its insertion

Methods

We conducted a prospective and multicenter study involving 24 patients (50 to 75 YO) with surgical 3 or 4 part fractures of the proximal humerus treated with cementless Bilboquet. Functional outcome was assessed at 12 months follow-up (Constant score and shoulder motion in forward flexion and external rotation). Radiological outcome was also assessed with the following criteria: fracture fusion, tuberosity reduction and secondary displacement, staple migration through the head and head necrosis.

Results

The operating time was on average 65 minutes (45 to 82). At twelve months follow-up examination, weighted Constant score was on average 78 points, forward flexion of the shoulder 116° (70 to 160°) and external rotation 22° (10° to 50°) . All fractures fused with good reduction of the tuberosities, without secondary displacement, and without head impaction or staple cut out .Radiological signs of head necrosis occurred in 4 patient leading to revision surgery in one case.

Conclusions

Cementless Bilboquet is a straight-forward, easy and durable technique for 3 or 4 part proximal humerus fracture fixation with short term good functional outcomes and reduced radiological complications.



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152 Comparative Analysis Of The Vault And Friedman's Version Measurement Methods According To CT Scan Slice Height And Angulation

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Aim

The aim of this study was to analyse variation of glenoid vault compared to Friedman's angle according to different CT scan slice height and angulation.

Background

Most glenoid version measurement methods have been validated on 3D-corrected axial CT slices at the mid-glenoid. This is not necessarily applicable for reverse arthroplasty where the baseplate is usually aligned with the lower-glenoid, and no study has yet analysed variation of the vault according to slice height and angulation

Methods

60 consecutive right shoulder CT scans were retrieved from a hospital imaging database and were reconstructed in the plane of the scapula. 7 axial slices of different height (mid-, lower-, upper-glenoid), and coronal angulation (-20 to +20°) were then selected, and measures were carried out by 3 observers. Intra- and inter-observer reliability was checked with Bland-Altman.

Results

Mid-glenoid mean version was -7.9° (±5.0, range -9.2 to -6.6) and -2.0° (±4.7, range -3.2 to -0.8) for the Vault and Friedman's methods, respectively. For both methods, decreasing slice height or angulation didn't affect version. The vault was however significantly more anteverted when increasing slice height (+12.1°, range 10.5 to 13.6, $p < 0.001$), or angulation (+10.3°, range 8.98 to 11.7, $p < 0.001$). Both intra- and inter-observer reliability were higher using Friedman's method ($P < 0.008$).

Conclusions

Version at the mid- and lower- glenoid are similar using either method. However, version relative to the vault shows less reliability and more variability to slice height or angulation. Yet, as it significantly differs from Friedman's angle, it should still be used in situations where maximum bone purchase is sought with glenoid implants. For any other situation, Friedman's method remains recommended.



153 Are Pendular Shoulder Exercises Worthwhile ?

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Aim

The aim of this study was thus to quantify GH motion during pendular exercises with the hypothesis was that they involved little if any true glenohumeral (GH) motion.

Background

Codman's pendular exercises have been widely used for decades with the intention of passively mobilizing the GH joint while not compromising recently injured or repaired tissues. However, no studies have yet shown that they actually result in true GH movement.

Methods

10 healthy volunteers were involved in this study. Shoulder kinematics were analyzed based on a validated biomechanical model coupling patient-specific imaging and motion capture, during which participants were instructed to perform medio-lateral, antero-posterior and circular pendular exercises. GH range of motion (ROM), scapulothoracic (ST) ROM, thoracohumeral (TH) ROM and overall exercise amplitude were calculated for each sequence. Linear regression analyses were carried out to determine any association between different components of shoulder motion

Results

Mean overall exercise amplitudes were $36.48^\circ \pm 9.74^\circ$ (range, 25.38 to 56.39°) for medio-lateral exercises, $38.3 \pm 14.97^\circ$ (range, 20.68 to 64.99°) for antero-posterior exercises, and $21.44^\circ \pm 7.72^\circ$ (range, 14.01 to 35.49°) for circular exercises. Mean GH and ST involvement remained minimal, ranging from 4.88 to 10.77° , and 1.4° to 4.19° , respectively. There was no significant correlation between overall exercise amplitudes and GH ($R = 0.38$, $p = 0.01$) or ST amplitudes (adjusted $R^2 = 0.3$, $p = 0.006$).

Conclusions

This study demonstrates that Codman pendular exercises depend mainly on truncal movement, and produce very little movement of the GH and ST joints. The use of these exercises for passive shoulder rehabilitation is thus questionable.



151 The Greater Tuberosity Angle, A New Predictive Radiographic Marker For Rotator Cuff Tear

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Aim

We describe a new radiographic marker, the Greater Tuberosity Angle (GTA), that measures that measures position of the GT relative to the center of rotation of the humeral head. The hypothesis was that a higher angle value was associated with a higher risk of rotator cuff tear.

Background

Association of acromion shape and rotator cuff tears has been extensively studied. However, impingement inherently involves two bony structures, and no study has yet analyzed the role of the greater tuberosity (GT).

Methods

Between August 2015 and July 2016, two population groups were prospectively recruited from a specialized shoulder clinic. Patients consisted of subjects presenting with a degenerative rotator cuff tear shown on MRI scan. Isolated subscapularis and traumatic tears were excluded. Controls consisted of subjects presenting with any other shoulder condition and no rotator cuff pathology. In both groups, subjects with degenerative or post-traumatic deformity of the humerus were excluded. The GTA was measured on a standard anteroposterior shoulder radiograph with the arm in neutral rotation by three different observers at two timepoints.

Results

71 patients were recruited (33 Patients, 38 Controls). GTA was significantly higher in Patients than Controls ($72.5^\circ \pm 2.5$, range 67.6- 79.2, versus $63.8^\circ \pm 4.1$, range 55.8 - 70.5; $P < 0.001$). A value above 70° increased the odds of detecting a tear by 93 fold ($P < 0.001$), with the lowest rate of false-positives (5%) and false-negatives (9%). There was no correlation between GTA and patients characteristics, such as age, dominance, affected side, sex, tear size, and pain duration. Inter- and Intra-observer reliability testing were high (concordance rho ranges = 0.925 - 0.956 and 0.904 - 0.947, respectively).

Conclusions

A high Greater Tuberosity Angle is associated with an increased risk of rotator cuff tear, with above 70° being a reliable predictive cut-off value.



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141 Analyses Of Complications After Fracture Reverse Prosthesis

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Aim

The aim of this study is to present the complications and their treatment options after reversed fracture prosthesis.

Background

Reversed shoulder arthroplasty is established as a treatment for non-reconstructable proximal humeral fractures, for revision after hemiarthroplasty or for fracture sequelae in elderly patients. On the other hand, the risk of intra- and postoperative complications has to be considered and a strategy to avoid those to be worked out.

Methods

In a prospective multicentre study 60 patients (51 female, 9 male) were investigated. Mean age was 78 years. Indications were primary fractures (N=39), prosthesis revisions (N=12), fracture sequelae or posttraumatic osteoarthritis (N=8) and primary fracture by pre-existing osteoarthritis (N=1). The clinical follow-up includes range of motion, Constant Score (CS), ASES and VAS for pain and satisfaction. For 50 cases notching was assessed.

Results

After an average follow-up of 46 months, mean CS was 56 points, adjusted CS 84%, ASES 72 points, VAS satisfaction 8.1 and VAS pain 1.6. Range of motion improved for flexion to 121°, abduction to 116°, internal rotation to 66° and external rotation by 90° abduction to 43°. Notching grade 1 was present in 5 cases (10%). Reoperations were seen in 10%, three late infections, one aseptic stem loosening, one dislocation and one periprosthetic fracture.

Conclusions

Reverse fracture prosthesis is the choice of treatment in elderly patients after primary and secondary fractures and revision arthroplasty. In the mid-term a reoperation rate of 10% has to be expected. Especially the risk of late infections has to be considered, therefore, the pre- and intraoperative procedure has to focus the prevention of such complications. The decision for this type of treatment should be based on patient specific general and local conditions.



527 Glenoid Polyethylene Wear From Articulation With A Ceramic Humeral Head; Comparison Of Conventional And Highly Cross Linked Vitamin E Polyethylene.

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Aim

To compare the wear behaviour, including with edge loading, of a ceramic humeral head on a conventional polyethylene (CPE) glenoid component, and a vitamin E enhanced highly cross linked (VEPE) polyethylene glenoid. Glenoid components with unaged polyethylene and with accelerated polyethylene aging were compared.

Background

Polyethylene wear resulting in glenoid loosening is the main reason for long term failure of total shoulder replacement

Methods

Wear tests were performed using a wear simulator set up for roll glide and edge loading wear. The accelerated aging was carried out utilizing pressurized pure oxygen at 70C (ASTM F2003). The wear behaviour was based on the mass loss of polyethylene components. Characterization was made of the size and morphology of the particles.

Results

The unaged VEPE glenoid showed a 36% reduction in wear compared with the unaged CPE glenoid ($p=0.003$). Aging significantly increased the polyethylene wear rate; however the increased wear rate of the aged VEPE glenoid was halved when compared with the aged CPE glenoid ($p=0.0002$).

Analysis of the size and morphology of the wear particles showed no difference between the 4 groups. Particles in all groups had double the length compared with the width.

Conclusions

This study demonstrates in vitro superior wear properties of the cross linked polyethylene glenoid compared with conventional polyethylene when articulating with a ceramic head. The addition of vitamin E to polyethylene was shown to decrease polyethylene degradation related to oxidation, resulting in less wear in the artificially aged VEPE glenoid.



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229 An Anatomic Total Shoulder Arthroplasty Using A Ceramic Humeral Head Results In Less Glenoid Component Cement-Bone Radiolucent Lines When A Chrome-Cobalt Head Is Used.

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Aim

To compare in an anatomic total shoulder replacement the clinical outcome, and incidence of radiolucent lines around the pegs of a cemented glenoid component, utilizing a humeral component with either a ceramic head or a chrome cobalt head.

Background

Radiolucent lines leading to glenoid loosening in total shoulder replacement may be influenced by changes on the humeral side of the replacement.

Methods

A prospective analysis was made comparing 43 patients having a total shoulder replacement utilizing a long humeral stem with a chrome-cobalt head, and 54 with a short stem humeral component with a ceramic head. The same two pegged polyethylene cemented glenoid prosthesis was used in all cases.

At 2 years post arthroplasty radiological assessment of glenoid component radiolucent lines was made in both groups utilizing the Lazarus classification, and clinical results recorded.

Results

The demographics of the two groups were very similar, including the pre-operative Walch scores, and the utilized head and glenoid size. The function, satisfaction, and ASES scores were also very similar. On analysis of the glenoid radiolucent lines, more lucent lines were present with the metal head than with the ceramic head ($p < 0.001$). No lines were present in 87% with ceramic heads, and 47% with metal heads. There were no grade 3 cases with ceramic, but 7% with metal. No association was seen between the preoperative glenoid Walch classification and the Lazarus scores.

Conclusions

The use of a ceramic head resulted in far less glenoid component radiolucent lines than a metal head. A ceramic head prosthesis may result in less long term loosening of the glenoid component in an anatomic shoulder replacement.



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551 Radiological Assessment Of The Effect Of Dog-Ear Deformities On Re-Tear Rate After Rotator Cuff Repair

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Aim

To evaluate remodeling and re-tear rate associated with deformities after RC repair.

Background

The natural course of Dog-ear and Bird-beak deformities after rotator cuff (RC) repair using the suture-bridge technique is unclear. The remodeling potential of these deformities has not been investigated.

Methods

From November 2011 to February 2012, 99 consecutive shoulders were studied. All patients underwent arthroscopic RC repair using the suture-bridge technique with or without additional sutures. Two groups (no deformity[46] and deformity[53]) were formed. Tendon height was measured from the highest point of the most protruding portion of the deformity to the cortex on semi-coronal magnetic resonance imaging (MRI). Change in tendon height was evaluated using MRI at 1-week and 6-months postoperatively. Assessment included the American Shoulder and Elbow Surgeons (ASES) score, Constant shoulder score, and pain visual analog scale (pVAS) score.

Results

There were no significant differences in age, sex, symptom duration, preoperative ASES score, Constant score, pVAS score, and tear size ($P > .05$) between the two groups. The initial tendon height was 7.5 ± 1.7 mm in the no-deformity group and 9.2 ± 2.0 mm in the deformity group. Follow-up height was 6.5 ± 1.3 mm in the deformity group and 6.6 ± 1.5 mm in the no-deformity group. Mean postoperative tendon heights were $90.1 \pm 23.8\%$ of the initial height in the no-deformity group and $73.2 \pm 15.1\%$ in the deformity group. Clinical scores (ASES, Constant, and pVAS) were not significantly different between the groups at 6 months. Four shoulders in each group experienced re-tearing (grades IV and V according to the Sugaya classification) at 6 months postoperatively. There was no difference in re-tear rate ($P > .999$).

Conclusions

Most deformities after RC repair were remodeled with no effect on re-tears. Clinical outcomes were not affected by deformities. There was no huge deformity in our series; these conclusions are limited to deformities under 14mm-height.



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507 Three-Dimensional Quantitative Analysis Of Humeral Head And Glenoid Bone Defects With Recurrent Glenohumeral Instability

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Aim

The purpose of this study was to quantify bone defects three-dimensionally in cases with glenohumeral instability using computed tomography (CT) surface matching technique.

Background

Hill-Sachs lesions and glenoid defects have recently been recognized as bipolar bone loss, and both lesions are thought to reciprocally affect shoulder instability. Although bone defects of the humeral head and glenoid could affect glenohumeral instability, bone loss has not been sufficiently evaluated.

Methods

Three-dimensional surface models of bilateral proximal humeri and glenoids were reconstructed from CT scans of 90 patients with symptomatic, unilateral, recurrent glenohumeral instability. The left-side models were mirrored, and intact bony areas were matched to those of the right-side models. The volume, length, width, and depth of identified bone defects were assessed. After the values were corrected by patient height, the characteristics of the bone defects were evaluated.

Results

Bone defects were present in 97.8% of the humeral heads and 96.7% of the glenoids, and females had significantly smaller bone defects than males. The volume of humeral head defects had a mild correlation with that of glenoid defects. The number of traumatic episodes was not correlated with humeral head bone defects, but it was positively correlated with glenoid bone defects. Patients with recurrent dislocations had significantly deeper and larger Hill-Sachs lesions than the other cases.

Conclusions

Bone defects of the humeral head and the glenoid in cases with symptomatic traumatic glenohumeral instability were quantified. Almost all cases showed bone defects in the humeral head and glenoid in comparison with the intact shoulder, and the bone defects might exist more frequently than ever reported. The number of traumatic episodes was not correlated with humeral head bone defects, but it was with glenoid bone defects. This study indicated that bipolar bone lesions are not always created by the same mechanism.



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506 Quantitative Assessment Of Fatty Infiltration And Muscle Volume Of The Rotator Cuff Muscles Using 3-Dimensional 2-Point Dixon Magnetic Resonance Imaging

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Aim

The purpose of this study was to quantitatively assess fatty infiltration and muscle volume of the whole muscles constituting the rotator cuff and to clarify the characteristics of fatty infiltration and muscle atrophy of the rotator cuff muscles using a 3-dimensional 2-point Dixon MRI sequence.

Background

In cases with rotator cuff tears, muscular degeneration is known to be a predictor of irreparable tears and poor outcomes after surgical repair. A precise evaluation of muscular condition is needed to predict the prognoses of patients and to determine the appropriate treatment strategy.

Methods

Ten shoulders without a full-thickness tear, 10 shoulders with an isolated supraspinatus tear, and 10 shoulders with a massive tear involving supraspinatus and infraspinatus were compared with 10 control shoulders after matching age and sex. With segmentation of muscle boundaries, the fat fraction value and the volume of the whole rotator cuff muscles were computed. After determining reliabilities, differences in fat fraction, muscle volume, and fat-free muscle volume were evaluated.

Results

Intra- and interrater reliabilities were regarded as excellent for both fat fraction and muscle volume. Tendon rupture adversely increased the fat fraction value of the respective rotator cuff muscle ($P < .002$). The massive tear group showed significantly decreased muscle volume of infraspinatus ($P = .035$) and increased volume of teres minor ($P = .039$). With subtraction of fat volume, a significant decrease of fat-free volume of the supraspinatus muscle became apparent with a massive tear ($P = .003$).

Conclusions

The 3-dimensional measurement could evaluate fatty infiltration and muscular volume with excellent reliabilities. The present study showed that chronic rupture of the tendon adversely increases the fat fraction of the respective muscle and indicates that the residual capacity of the rotator cuff muscles might be overestimated in cases with severe fatty infiltration.



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808 Guidelines For Humeral Subluxation Cut-Off Values As Determined On Different Imaging Modalities

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Aim

To determine whether thresholds of humeral subluxation in relation to the glenoid and scapula are influenced by different imaging modalities in healthy shoulders.

Background

Posterior humeral subluxation is often measured before total shoulder arthroplasty. Anterior and posterior humeral subluxation to the glenoid and scapula has been arbitrarily set at a posterior humeral subluxation index of 45% and 55%, respectively. The influence of different imaging modalities on humeral subluxation thresholds is unknown.

Methods

The humeral subluxation index in relation to the glenoid (GHSI) and scapula (SHSI) were assessed in 120 healthy shoulders on standard CT-scans, CT-scans reoriented to a reference plane (glenoid center-plane, scapular plane), and 3D reconstructed CT-scans. The 95% normal range (mean \pm 2 SD) determined the cut-off values of humeral subluxation.

Results

GHSI thresholds for standard, reoriented and 3D CT-scans were 40.3% - 61.3%, 44.2% - 56.0%, and 45.6% - 54.8%, respectively. The mean GHSI did not differ between each imaging modality (standard: 50.8%, reoriented: 50.1%, 3D: 50.2%; $p = 0.146$). The SHSI thresholds for standard, reoriented and 3D CT-scans were 33.5% - 61.1%, 44.1% - 67.2%, and 47.9% - 61.5%, respectively. A different mean SHSI was found for each imaging modality (standard: 47.3%, reoriented: 55.7%, 3D: 54.7%; $p < 0.015$).

Conclusions

GHSI and SHSI are different measures with different cut-off values, which are influenced by the chosen imaging modality. Currently accepted cut-off values only apply for the 3D GHSI. A standardized analysis resulted in smaller thresholds because of smaller variances. Since the humeral head was not perfectly aligned to the scapula, a reorientation around the scapular axis created a different projection of the scapulohumeral relationship on the slice of measurement, resulting in a different mean SHSI for each imaging modality.



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783 Glenoid Track And Glenoid Bone Loss As Predictors Of Recurrent Instability After Bankart Repair: A 3D CT-Scan Study

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Aim

To evaluate the glenoid track and glenoid bone loss as a predictor for recurrent instability after arthroscopic Bankart repair in patients with Hill-Sachs lesions.

Background

High redislocation rates after Bankart repair are noted in patients with Hill-Sachs lesions, with even higher failure rates in cases of bipolar bone loss. Treatment algorithms use the glenoid track concept and glenoid bone loss as parameters. Yet, consensus on what concept has the highest predictive value is lacking.

Methods

Patients that underwent an arthroscopic Bankart repair between 2008 and 2016 were reviewed. Inclusion criteria were 18 years of age or older; traumatic, recurrent, anterior shoulder instability; a Hill-Sachs lesion visible on the preoperative CT-scan; and a minimum 2-year follow-up with exclusion of earlier recurrence. Patients with concomitant lesions, seizures, hyperlaxity or a CT-scan of poor quality were excluded. The glenoid track and glenoid bone loss were assessed on 3D CT reconstructions. Grouping variables determined by on/off-track and bone loss percentages (20, 13.5% and 10%) were evaluated in relation to instability recurrence using the positive predictive value (PPV), relative risk (RR) and odds ratio (OR).

Results

Of 244 patients, 40 subjects met the eligibility criteria. Instability reoccurred in 28 cases, within an average of 21 months. Twelve shoulders remained stable at a mean follow-up of 37 months. Grouping variables had a similar PPV, with > 13.5% bone loss having the highest (81%) and > 10% bone loss the lowest (74%). Off-track lesions had the highest RR (2) and OR (6.06) compared to > 20% (RR = 1.2; OR = 2), > 13.5% (RR = 1.4; OR = 3.09), and > 10% (RR = 1.2; OR = 1.79) glenoid bone loss.

Conclusions

The glenoid track concept is a better indicator of recurrent instability than glenoid bone loss after Bankart repair in patients with Hill-Sachs lesions.



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275 Comparison Of Preoperative Radiographic Acromial Characteristics And Clinical Outcome Between Articular Versus Bursal Side Partial-Thickness Rotator Cuff Tears

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Aim

To compare preoperative radiographic acromial character and to report clinical results of articular- and bursal-side partial-thickness rotator cuff tear (PTRCT) repair by arthroscopy.

Background

A few studies have compared preoperative radiologic difference partial-thickness articular- and bursal-side rotator cuff tears and postoperative results.

Methods

Sixty consecutive shoulders with partial-thickness rotator cuff tears (25 articular-(group A) and 35 bursal-side(group B)) treated with arthroscopic repair, were evaluated. We measured acromial slope (AS), acromial tilt (AT), lateral acromial angle (LAA), acromion index (AI) and critical shoulder angle (CSA) on standard radiographs, preoperatively. The following outcome measures were used in this study, VAS score, the University of California, Los Angeles (UCLA) Shoulder Rating Scale, the Constant score, and range of motion. Postoperative MRI at least 6 months after surgery was evaluated for repair integrity. The mean duration of follow-up was 18.1 months (range, 12.1 to 36.9 months).

Results

A statistically significant difference between group A and group B was found for AT. LAA of group B lower significantly from that of group A. AI and CSA of the group B was statistically not different from group A, however mean value of an AI and CSA were more higher in the group B.. At last follow-up, both groups showed significant improvement in pain and shoulder function scores, even though there was no significant difference between groups. The retear rate on follow-up MRI was not significantly different between group A (1 case, 4%) and B (2case, 5.7%).

Conclusions

Large tilting of the acromion and low lateral acromial angle are associated with a higher prevalence bursal-side partial-thickness tear. The Critical shoulder angle were not significantly different between groups, but bursal-side partial-thickness tear had higher value. This study has revealed that bursal side tears more associated with extrinsic mechanical impingement in the subacromial space.



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566 Classification Of Humeral Head Pathomorphology In Primary Osteoarthritis: A Radiographic And In Vivo Photographic Analysis

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Aim

The purpose was to characterize the osteoarthritic changes of the humeral head.

Background

The degree of severity of primary-osteroarthritis is only decribed for the glenoid side.

Methods

Fifty-five consecutive patients with primary osteoarthritis who underwent anatomic shoulder arthroplasty were included. The following radiologic parameters (x-ray; MRI) were assessed: Samilson-Prieto classification, the shape of the humeral head in the coronal plane, shifts of the apex of sphericity in the transverse plane, the posterior subluxation of the humeral head and Walch's glenoid morphology. Head-deformity in the transverse plane and humeral cartilage erosion in the coronal plane were chosen for photographic measurements from the resected humeral heads.

Results

Aspherical humeral heads tend to coincide with longer osteophytes. Longer osteophytes significantly coincide with a decentered apex in the transverse plane. A decentered apex in the transverse plane accompanies significantly with asphericity of the humeral head in the coronal plane. The frequency of glenoid type B1 decreases and the frequency of glenoid type B2 increases when humeral heads are aspherical in the coronal plane as well as when they have grade 3 osteophyte. The maximal cartilage erosion of the humeral head was in 75% of cases in the caudal half. However, where the apex was decentered in the transverse plane, primary cartilage wear shifted towards the cranial half of the humeral head. Displaced apex in the transverse plane had also a subluxation index of 55%. Based on our results we differentiate two types of humeral osteoarthritis: The simple form, type-A osteoarthritis (spherical form) and the more complex form, type-B osteoarthritis (aspherical form).

Conclusions

Over the time the humeral head becomes aspherical, the apex is shifted decentered with superior cartilage erosion, there is subluxation, and decentered, posterior glenoid rim erosion. These five factors show a significant increase in frequency and severity when osteophyte length is >13mm compared to spherical humeral heads with shorter osteophytes. We therefore propose an extended Samilson-classification with type A (spherical) and type B (aspherical) and Grade I-IV° osteophytes.



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560 Glenoid Deformity In The Coronal Plane Correlates With Humeral Head Changes In Osteoarthritis: A Radiographic Analysis

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Aim

This study aimed to analyze the correlation between the radiographic humeral-sided Samilson and Prieto classification system and 3 different radiographic classifications describing the changes of the glenoid in the coronal plane.

Background

A variety of measurements can be used to assess radiographic osteoarthritic changes of the shoulder.

Methods

Standardized radiographs of 50 consecutive patients with idiopathic osteoarthritis before anatomic shoulder replacement were included. On the basis of radiographic measurements, the cases were evaluated using the Samilson and Prieto grading system, angle β , inclination type, and critical shoulder angle by 2 independent observers.

Results

Classification measurements showed an excellent agreement between observers. Our results showed that the humeral-sided Samilson and Prieto grading system had a statistically significant good correlation with angle β (observer 1, $r = 0.74$; observer 2, $r = 0.77$; $P < .05$) and a statistically significant excellent correlation with the inclination type of the glenoid (observer 1, $r = 0.86$; observer 2, $r = 0.8$; $P < .05$). A poor correlation to the critical shoulder angle was observed ($r = -0.14$, $r = 0.03$; $P > .05$).

Conclusions

The grade of humeral-sided osteoarthritis according to Samilson and Prieto correlates with the glenoid-sided osteoarthritic changes of the glenoid in the coronal plane described by the angle β and by the inclination type of the glenoid. Higher glenoid-sided inclination is associated with higher grade of osteoarthritis in primary shoulder osteoarthritis.



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142 CHOICE OF ACROMIOCLAVICULAR STABILIZATION TECHNIQUE AFFECTS PRIMARY STABILITY OF THE ACROMIOCLAVICULAR JOINT

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Aim

Assessment of the impact of 4 different constructs on AC joint stability.

Background

Acute acromioclavicular (AC) disjunction disrupts rotational and translational control on the scapula by the acromioclavicular and coracoclavicular ligamentous complexes. Optimal stabilization remains controversial.

Methods

Two synthetic bone models were equipped with coracoclavicular devices. Horizontal tunnels were drilled at the AC joint on one model and vertical tunnels on the second one.

Navigation tracking devices were set on the clavicle and acromion. Rotational and translational stability of the constructs were tested with nondestructive tests in abduction/adduction, flexion/extension, external/internal rotation and inferior translation. Forces were applied using a force transducer.

Measurements were carried with the coracoclavicular device alone (CC). Stabilization was then achieved by 4 different types of constructs; (O) horizontal cerclage alone, (8) horizontal figure of eight alone, (O8) horizontal cerclage reinforced with a figure of eight, and (V) vertical cerclage alone.

Total displacement between clavicular and acromial tracking devices was recorded in a kinesiology laboratory and normalized using values measured with the force transducer during motion. Total displacement was computed as the sum of all normalized rotations and translations.

Results

Total displacement (mean \pm SD mm/N) was 9.67 \pm 12.56 for CC repair alone, it was 1.3 \pm 0.64 for horizontal cerclage, 1.6 \pm 1.58 for figure of eight; 0.95 \pm 0.79 for horizontal cerclage associated with figure of eight and 3.31 \pm 3.04 for vertical cerclage. Total displacement was significantly inferior for O8 constructs than for all other constructs ($p < 0.000 - 0.014$). No statistical differences were found between O and 8 constructs ($p = 0.09$) as well as vertical cerclage and coracoclavicular cerclage alone ($p = 0.06$).

Conclusions

Horizontal cerclage of the AC joint associated with figure of eight allows for significantly increased resistance to rotational and translational displacement forces in comparison with other tested constructs. Further study is required to assess resistance of the constructs to cyclic loading.



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590 Outcome Of Traumatic Rotator Cuff Tear Repairs

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Aim

This study presents the outcome of repaired traumatic rotator cuff injuries regarding the timing of surgery and compares the results to a matched control group with non-traumatic rotator cuff tears.

Background

Little is known about the outcome of delayed repairs after traumatic rotator cuff injuries.

Methods

Patients younger than 50 with traumatic rotator cuff repairs were identified from our register. We defined 5 trauma-until-surgery-interval groups from "less than 6 weeks" to "more than 12 months". Constant Score (CS) was performed at 6 months follow-up. Subjective Shoulder Value (SSV), Oxford Shoulder Score (OSS) and questions on perceived improvement were collected at 24 months. Isolated supraspinatus tears were matched (odds 2:1) to non-trauma patients.

Results

Baseline scores in the earliest group were significantly worse. After surgery, the CS improved for all groups with greater improvement for the earliest interval group. There were no differences in CS after 6 months (72, 70, 73, 80 and 71 points, respectively) and OSS after 2 years (43, 36, 40, 42 and 42 points, respectively). 112 traumatic supraspinatus tears were matched with 56 non-trauma patients. The CS was similar at 6 months. After 2 years, 81% of trauma patients reported a "much better improvement" compared to 50% of non-trauma patients ($p = 0.005$), which was associated with a significantly higher SSV of 89.9 (trauma) versus 77.8 (non-trauma) ($p = 0.003$).

Conclusions

End-results did not differ between early and late repair. This finding does not support the rule of "surgery within 3 weeks", which was introduced by Bassett and Cofield. Patients who are not operated directly after trauma can expect analog end-results, if the tear is repairable. Compared to non-trauma situations the functional outcome is similar, but trauma patients report a greater perceived improvement.



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861 Metaphyseal Reverse Total Shoulder Arthroplasty - Long-Term Results With 5 - 11 Years Follow-Up.

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Aim

To evaluate the 5 -11 years long-term clinical and radiological outcomes using a short metaphyseal reverse total shoulder arthroplasty (rTSA) without a diaphyseal stem.

Background

rTSA are increasingly used in recent years. Metaphyseal humeral components without a stem were developed to minimise bone resection and preserve bone.

Methods

185 consecutive shoulders underwent rTSA between 2005 to December 2011, 159 with stemless implant and 26 with stemmed implant. Mean follow-up 89 months (7 years & 5 months) (range 60 - 138 months). There were 141 females and 44 males; Mean age at surgery 74.8y (range 38-93y). Aetiology: 108 cuff arthropathy, 22 fracture sequelae, 24 rheumatoid arthritis, 14 failed RC repair or massive irreparable cuff tear, 3 osteoarthritis with cuff deficiency or eroded glenoid, 8 failed anatomical prosthesis with cuff deficiency, and 6 for acute trauma. 14 patients underwent bilateral (staged) rTSA at that period. 50 patients were operated as revision arthroplasty.

Results

Patients' satisfaction (SSV) improved from 0.8/10 to 8.2/10. Mean Constant Score (for all diagnoses) improved from 15.6±8.6 preop to 59.0±20.4 (Age/sex adjusted 86.8±30.3) at the last follow-up (p<0.0001). Mean active range of movement improved from 53° to 129.5° elevation, 10° to 50.6° active external rotation and 24° to 67.2° active internal rotation. Radiographic analysis showed no lucencies, subsidence or stress shielding around the humeral or glenoid components. Glenoid notching was found in 38 patients (20.5%) (36 grade 1-2, 6 grade 3).

Conclusions

The short metaphyseal rTSA (without a diaphyseal stem) shows encouraging long-term results with excellent pain relief and shoulder function, restoration of good active range of motion and high patients' satisfaction scores. The design of this implant seems to result in improved rotational movements, low incidence of glenoid notching and no implant loosening, subsidence or stress shielding.



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90 Management Of Posterior Involuntary Shoulder Instability: A Multicentric Study Of 121 Patients.

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Aim

The main goal of this study was to determine efficiency of surgery in management of involuntary posterior shoulder instability.

Background

Posterior shoulder instability was divided by Boileau in 3 groups: involuntary posterior shoulder instability, voluntary posterior shoulder instability and painful posterior instable shoulders. No previous study focused specifically on the first group.

Methods

We perform a prospective and retrospective multicentric study involving patients with involuntary posterior shoulder dislocations. Prospective patients were analyzed to evaluate and pre operative data and early failure (before 2 years). We include 78 patients in the retrospective part of the study, and 43 in the prospective one. Clinical data, hyperlaxity, imaging specificity, Constant score, SST, Walch Duplay and Rowe score were reported for all patients. Result of treatment was analyzed comparing soft tissue procedure vs bone block vs rehabilitation.

Results

Clinical exam identify 79% of positive posterior apprehension test, 30% positive anterior and antero-inferior apprehension in populations. 37% of patients had shoulder hyperlaxity. 31% of patients had reverse Hill Sachs lesion and 25% had no posterior Bankart lesion. 15% patients had specific rehabilitation management, 40% had a bone block procedure and 45% had soft tissue procedure. 87 % of patients were satisfied with statistically significant improvement ($p < 0.001$) in Constant score, VAS pain, Rowe and Walch and Duplay score. 90% of patients who had surgery had a stable shoulder in the retrospective study at minimum 2 years FU. In the prospective study we had 17% of early failure, mostly related to non-surgical treatment. No pre operative clinical or imaging factor influences this result in any population.

Conclusions

This multicentric study emphasizes the specificity of clinical exam even in the classical involuntary posterior shoulder dislocation. 80% of patients are satisfied with surgical treatment, mostly with bone block procedure, independently of anatomical lesions.



78 Are There Predictive Factors Of Early Non-Healing In Rotator Cuff Repair In Young Patients?

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Aim

The purpose of this study was to know the global healing rate and if any preoperative factor affects the healing in young patients

Background

Literature reports 95% of good clinical outcome for young patients cuff repair, no previous study evaluates the healing rate.

Methods

After IRB approval, files of patients younger than 50 yo, who had an arthroscopic rotator cuff repair in a 3 years period were collected. Gender, age, side, traumatic or atraumatic onset, delay between surgery and beginning of symptoms, sport and tobacco were collected. On pre operative imaging, type of tear (partial / total) location (distal, intermediate or proximal), number of torn tendons and fatty infiltration were analyzed. Per operative data were also collected. Variables were compared using ultra-sound healing assessment at 3 month.

Results

From 116 patients aged younger than 50 yo, 84 had a validated evaluation of the healing performed by our radiology department 3 months after repair. Ten percent of patients didn't heal on ultra-sound. Pre operatively, only increasing number of tendon torn was correlated to poorest healing rate (OR= 15.3 (2.1-111.1) for 3 tendons, and 1.5 (0.2-9.4) for 2 tendons p=0.02). Tabaco, delay, importance of the retraction or fatty infiltrations, who are commonly considered as important factors, were not correlated to poor healing. During surgery, impossible footprint restoration was also correlated to poorer healing rate (OR=11.3, (1.3-95.4) p=0.02)

Conclusions

In young patients failure of healing occurs, at least, in 10% of cases after cuff repair. It is more the antero-posterior extension of the lesion than the medial retraction that is correlated to failure. The current study highlights the importance of controlling healing after cuff repair in young patient, whatever is the cuff lesion and the technical repair.



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496 Location Of Hill Sachs Lesion - A CT Surface Matching Analysis -

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Aim

We aimed to evaluate the location of the Bone defect in the humeral head in the patients with recurrent shoulder dislocation by comparing the affected side with the intact side using CT surface matching technique.

Background

Recent studies suggested that the location of the humeral head bone defect is more accurate predictor for redislocation than bone defect size.

Methods

Fifty patients (31 male and 19 female, Age 27.4 ± 12.0 years) with history of recurrent episodes of dislocation or subluxation were enrolled. CT scan of the bilateral shoulder joints was performed. The surface data of the bilateral humeral head were reconstructed. The intact side was matched with the affected side using surface matching program. Distance between the intact and affected surfaces was calculated using Hausdorff distance between two surface mesh models. When the distance was more than 0.5mm, these surface areas on the intact surface were defined as the bone defect area. The location of the bone defect area was described in the humeral head coordinate system. We evaluated the difference of location and size of the bone defect between male and female, and between single dislocation group and multiple dislocation group using Mann Whitney U-test.

Results

Sixty four percent of the patients had bone defect in 7mm superior from the humeral head center, 2mm medially from the anatomical neck. On the joint surface view, the center of the bone defect locates at 2:43 o'clock position on average. Male group had larger bone defect than female (Male $205 \pm 107 \text{mm}^2$, Female $87.9 \pm 45.7 \text{mm}^2$: $P < 0.001$). There was no significant size difference between single and multiple dislocation groups.

Conclusions

Most of the patients had bone defect 2mm superior from the anatomical neck and 7mm from the center of the humerus. Male had larger bone defect. There was no significant difference between single and multiple dislocation groups.



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689 The Limitation Of Arthroscopic Rotator Cuff Repair Combined With Muscle Advancement Procedure For Irreparable Massive Rotator Cuff Tear**Masazumi Hirata**

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Aim

The purpose of this study was to evaluate the relationship between fatty infiltration of the torn cuff and cuff integrity after arthroscopic rotator cuff repair combined with muscle advancement for irreparable massive rotator cuff tear.

Background

There are many young patients with massive rotator cuff tear who need surgery, not reverse shoulder arthroplasty but cuff repair.

Methods

24 shoulders with massive rotator cuff tear went through the procedure. The mean age was 67.6 years old. After short skin incision was made on the scapular spine, medial detachment and advancement of the supraspinatus(SSP) and infraspinatus(ISP) muscle was performed. The torn cuffs were repaired using suture anchors arthroscopically. We evaluated the clinical results by Japan Orthopaedic Association (JOA) score. The cuff repair integrity was assessed by Sugaya's MR classification 6 months after surgery. The fatty infiltration of the cuff was graded on Y-shaped view of the preoperative MRI according to Goutallier's classification. GFDI(global fatty degeneration index) was calculated as the mean value of SSP, ISP and subscapularis(SSC) muscles.

Results

The average GFDI in repaired group was 1.9, whereas the average index in retear group was 2.7. A cut-off value was 1.85. There was no statistical significance at clinical results between the repaired group and the retear group after the operation.

Conclusions

Although there was a limitation of GFDI, the rotator cuff repair combined with muscle advancement for irreparable massive tear provided satisfactory clinical outcomes. This procedure should be considered before considering the reverse shoulder arthroplasty.



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269 The Subchondral Bone Layer And Glenoid Implant Design Is Relevant For Primary Stability In Glenoid Arthroplasty: A Biomechanical Study

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Aim

This study aimed to evaluate under standardized conditions the importance of the subchondral bone layer and the influence of glenoid components that adapt to the individual anatomy.

Background

Aseptic loosening of the glenoid component is still the most important long-term complication in total shoulder arthroplasty (TSA). Based on clinical studies it is discussed that removal of the subchondral bone layer in order to optimize implant-seating is a possible risk factor for glenoid loosening.

Methods

Three treatment options in a A1 Glenoid according to Walch were analyzed:

- (1) Preserving the subchondral bone layer
- (2) Removal of the subchondral bone layer and
- (3) Implantation of a glenoid component with a non-anatomic back-curvature after creating a congruent surface.

Artificial glenoid bones (n=5 per group) were used and a highly standardized preparation and implantation protocol applied. Biomechanical testing was performed applying a simulated physiologic shoulder-motion. Using a high-resolution optical measurement system the micro-motions between glenoid prosthesis and artificial bone were quantified. The testing was performed until 10000 motion cycles.

Results

After 10000 cycles significantly more micromotions were observed in the subchondral removed group than in the subchondral preserved group (p=0.0427). Most micro-motions were observed in the non-anatomic group. They were significantly higher than in the subchondral preserved (p=0,0003) and the subchondral removed group (p=0,0207).

Conclusions

The subchondral bone-layer should be preserved in order to reduce micromotions between implant and bone in glenoid arthroplasty. Glenoid implants that adapt to the individual anatomy can preserve the subchondral-bone layer without impairing proper implant seating.



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89 Radiolucency In Stemless Shoulder Arthroplasty Is Associated With An Imaging Phenomenon

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Aim

We aimed to quantify the radiolucency around the humeral seating of a stemless humeral implant and the radiographical parameters with which it is associated.

Background

Stemless humeral implants show comparable midterm clinical results compared to stemmed components. Recently, radiolucencies around the metaphyseal seating of humeral stemless implants were reported on postoperative radiographs. It is controversial whether they are attributable to bone resorption. We hypothesized these radiolucencies result from imaging artifacts.

Methods

Seven cadaveric specimens (3 male and 4 female) were first radiographed and then scanned with CT. A stemless humeral component of current design was implanted in each specimen. After implantation, all specimens were radiographed with different exposure settings. The implant was removed, and the specimens were scanned with CT again. Pre- and post-implantation radiographs and CT scans were compared. The mean Hounsfield units (HU) at the humeral resection plane from the pre-implantation CT were correlated with the diameter of the radiolucent halo on the post-implantation radiographs.

Results

A symmetric radiolucent halo of variable diameters occurred on all radiographs after implantation when an automatic exposure control was used. The halo disappeared in all specimens when the tube voltage was reduced. Lower CT-values (HU) before the implantation resulted in greater halos on the radiograph after implantation.

Conclusions

Symmetric radiolucent halos can result from imaging artifacts, which is most likely due to radiation scatter. The halos can be minimized by reducing the tube voltage. The halo effect appears to be pronounced in bones with decreased density.



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511 Serum Lipid Abnormalities In Diabetic Frozen Shoulder: A Case-Control Study**Hyung Bin Park**, Ji-Yong Gwark, Jin-Hyung Im, Mincheol Kam

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Aim

This study's purpose was to evaluate any association between serum lipid profiles and diabetic frozen shoulder (FS).

Background

Inflammatory lipoproteinemia has been reported as a risk factor for primary FS. Diabetes is a well-known risk factor for FS. However, it has not been determined whether inflammatory lipoproteinemia is associated with diabetic FS.

Methods

Our case group comprised 30 newly diagnosed diabetic FS patients without rotator cuff tear or other diagnosed systemic diseases. Two control groups each comprised 90 age- and sex-matched clients of a health promotion center, who had no diagnosed systemic diseases prior to their routine health check-ups. The first control group was composed of subjects with no diabetes found during routine health check-ups. The second control group was composed of subjects whose diabetes was newly diagnosed during routine health check-ups. No thyroid dysfunction was found during the routine health check-ups of any of the subjects in either control group. Using conditional logistic regression analysis, we calculated the odds ratios (OR) and the 95% confidence intervals (CI) to identify any differences in serum lipid levels between the diabetic FS group and the paired control groups. We evaluated continuous and categorical data on the serum levels of total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), triglyceride (TG), and non-high-density lipoprotein (non-HDL).

Results

A comparison of the case group with the first control group indicated that all continuous and categorical values were significantly associated with diabetic FS, except HDL and hypo-HDLemia. A comparison of the case group with the second control group indicated that total cholesterol, LDL, and non-HDL were significantly associated with diabetic FS in continuous values, and that hyper-LDLemia and hyper-non-HDLemia were significantly associated with diabetic FS in categorical values.

Conclusions

Inflammatory lipoproteinemias, particularly hyper-LDLemia and hyper-non-HDLemia, have significant association with diabetic FS.



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897 Fracture Patterns In Midshaft Clavicle Fracture

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Aim

The aim of the study was to evaluate the fracture pattern of clavicle fractures using 3D computed tomography reconstructions

Background

Although there is still debate concerning the optimal treatment of displaced midshaft fracture, currently there is a clear increase in operative treatment of these lesions in daily practice. In contrast to most other fractures, no clear fracture patterns of clavicle fractures have been described.

Methods

In total 68 clavicle fractures were 3D reconstructed (39 non-communited and 29 wedged). Fractures were reduced interactively using the contralateral side. Individual fracture lines were calculated using mathematical morphology and mapped to the average clavicle via statistical shape model fitting. A fracture line density map was calculated. Next the areas and locations of highest fracture line intensity were analysed (0% medial side – 100% lateral side).

Results

In 2-part fracture, the highest fracture line intensity is postero-inferior at 50% and antero-superior at 56%. In wedged fractures, the butterfly fragment is located antero-inferiorly and there is no comminution at the postero-superior area. In postero-superior area, the highest fracture line intensity between the medial part and the lateral part of the clavicle is at 57%. The highest fracture line intensities of the butterfly fragment are located infero-medial at 48% and infero-lateral at 63%.

Conclusions

In 2-part fractures the most common fracture line goes oblique from postero-infero-medial to antero-supero-lateral. This fracture pattern allows the lateral part of the clavicle to displace medial and inferiorly as commonly seen on X-ray. In wedged fracture there is no comminution at the postero-superior part and this area can be used to check anatomical reduction (length). The contact area of the butterfly fragment is larger at the medial part of the clavicle than at the lateral part and we propose to fix the butterfly first to the medial fragment.



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282 What Factors Affect Decision Making In The Surgical Treatment Of Antero-Inferior Shoulder Instability?

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Aim

The aim of this study was to identify and analyze both clinical and radiological parameters for their relevance to decision making in the surgical treatment of traumatic shoulder instability.

Background

The decision when to perform a soft-tissue(Bankart) reconstruction or a bone and soft-tissue(Latarjet) reconstruction for shoulder instability is the source of much discussion and research. Whilst some authors combine clinical and radiological parameters in their decision-making protocol, others have recommended glenoid bone loss, or combined bone loss, as the determining factor. It is our hypothesis that both clinical and radiological parameters play an important role in our decision making when treating this condition.

Methods

66 consecutive patients with documented traumatic, antero-inferior shoulder instability who had undergone shoulder reconstruction surgery with either an arthroscopic Bankart or n open Latarjet procedure were included.

Age, involvement in overhead or contact sport, and level of sporting participation were documented, along with surgical factors including the type of procedure, any previous stabilization procedures, and the treating surgeon.

Radiological evaluation of standardized CT scans was undertaken for quantitative measurement of glenoid and humeral bone loss.

Odds Ratios(OR) with 95% confidence intervals were calculated for each parameter to evaluate its association with the performance of a Latarjet procedure as opposed to a Bankart procedure.

Results

Linear glenoid bone loss greater than 19% (OR 15.4 , $p < 0.01$) and ipsilateral previous stabilization surgery (OR 7.2 , $p < 0.001$) were the only 2 parameters associated with an increased likelihood of undertaking a Latarjet procedure.

Conclusions

Contrary to our hypothesis, age and involvement in sports were not demonstrated to influence our decision making regarding the treatment of shoulder instability. Quantitative evaluation of humeral bone loss proved unreliable, and hence we conclude that linear glenoid bone loss and previous ipsilateral surgery are the most influential parameters to consider.



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75 Postoperative Analgesia In The Outpatient Arthroscopic Shoulder Surgery : Prospective Comparative Study Between Prolonged Continuous Interscalene Block Versus Single-Shot Block.

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Aim

The purpose of this study was to evaluate the efficacy and the complication rate, of a Single-Shot interscalene block compared with a continuous infusion of a local anesthetic for the management of postoperative pain in patients after arthroscopic shoulder surgery

Background

The management of post-operative pain after arthroscopic shoulder surgery can be difficult especially in the setting of outpatient surgery. Numerous strategies has been described to manage patient acute pain.

Methods

A prospective non-randomized comparative study was performed. Thirty-nine consecutive patients scheduled for an outpatient shoulder arthroscopic procedure under general anesthesia (rotator cuff repair or sub-acromial decompression) by a single surgeon were assigned to 1 of 2 groups. All patients received the same post-operative oral medication. Patients in Group 1 (n=19) received a pre-operative interscalene block and a catheter was left for a continuous interscalene block (Ropivacaine: 2mg/ml 5ml/h) during the first 48 postoperative hours. Postoperative care was performed by a home health agency. Patients in Group 2 (n=20) received a single pre-operative inter scalene block. Pain was assessed during the first post-operative week using the visual analog scale (VAS). Our secondary criteria were analgesic consumption and potential side effects of the drug. All patients were reviewed in the second postoperative week.

Results

There were no patients lost to follow-up. No statistically significant differences were found between the two groups with regard to VAS pain scores, oral medication consumption or potential complications. One of the patients in Group 1 accidentally removed the continuous interscalene catheter.

Conclusions

A prolonged continuous interscalene block does not seem to improve post-operative pain management compared to a single shot block wich is a simple and cost-effective procedure.



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271 Superior Capsule Reconstruction Versus Partial Repair In Non-Repairable Cuff Tears. A Matched Pair Analysis.Stefan Greiner¹, Matthias Koch², Max Kaeae³

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Aim

A matched pair analysis to compare clinical results of superior capsule reconstruction versus partial infraspinatus repair in non-repairable cuff tears.

Background

Superior capsule reconstruction (SCR) represents a new treatment option in non-repairable cuff tears. The present study analyses the clinical value of this method in comparison to partial rotator cuff repair.

Methods

SCR was performed in 15 patients with a non-repairable cuff tear. Patients were matched to patients who underwent partial repair of the infraspinatus regarding age, sex and cuff tear configuration.

Outcome parameters were the Constant Score, Dash Score and the WORC Index.

AP and axial x-rays were taken postoperatively in each group.

Inclusion criteria were among others a non-repairable supraspinatus/cranial infraspinatus tear, an external rotation lag sign of less than 20° and active anterior elevation and abduction of at least 90° pre-operatively.

Results

There were 13 men and two women in each group. The mean age was 60 years. The mean rupture configuration according to the Bateman classification was 2.8, the mean retraction according to the Patte classification 2.9. There were no significant differences in the Constant Score, DASH Score and the Work Index in between both groups. The SCR group showed better centering of the humeral head in comparison to the control group.

Conclusions

In the short term there were no significant differences in the clinical outcome parameters in between both groups. Radiographic evaluation showed a better centering of the humeral head in the SCR group. Whether this may lead to superior results of the SCR technique in comparison to partial repair has to be evaluated in future studies.



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744 CLINICAL OUTCOMES IN A CONSECUTIVE CASE SERIES OF CHRONIC PERSISTENT COMPLEX ELBOW INSTABILITY

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Aim

To analyze clinical and radiographic results of surgical treatment in a consecutive series of patients affected by chronic persistent complex elbow instability (CPCEI).

Background

CPCEI is a very challenging rare condition and few studies analyzed the results of its treatment.

Methods

21 patients suffering from CPCEI were analyzed. Initial injury patterns were: 1 humeral shear fracture-dislocation, 1 radial head fracture-dislocation, 12 terrible triads and 7 Monteggia-like lesions. Surgery was performed at a mean of 63 weeks from initial trauma. Overall 21 arthrolysis, 13 ulnar nerve transpositions and 5 in situ neurolysis, 7 total elbow arthroplasty, 8 radial head arthroplasty, 2 radial head resections, 1 humero-radial anconeus interpositional arthroplasty, 6 coronoid graft reconstruction, 12 ligaments retensioning and 1 augmentation, 3 ulnar nonunion treatment, 2 osteotomies and 2 dynamic external fixators were performed. MEPS, Q-DASH and M-ASES were used. The Student's T test was used for statistical analysis.

Results

The mean follow-up was 29,4 months (range, 17-42). Post-operative extension-flexion and pronation-supination were 14°-138° and 80°-82°, respectively. Post-operative MEPS, Q-DASH and M-ASES were 88, 15 and 80 with significant differences between pre- and post-operative functional scores ($p < 0.05$). The reintervention rate was 23%. The main complication were: 1 persistent elbow instability, 1 ulnar delayed bone union, 2 proximal radio-ulnar synostosis, 1 mechanical failure of ulnar plate with ulnar nonunion. At final follow-up the degree of arthritis, according to Broberg and Morrey, was grade I in 5, grade II in 8 and grade III in 1 patients, respectively.

Conclusions

CPCEI is a challenging condition with uncertain prognosis in one third of patients. The great variability of patient's pathoanatomical conditions requires a strictly customized surgical treatment aimed to the reconstruction of the main joint stabilizers or to the replacement in case of severe joint degeneration. Treatment should be aimed at removing the causes of pain besides recovering range of motion.



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26 Does The Cement Mantle Thickness Influence Glenoid Loosening In Total Shoulder Arthroplasty?

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Aim

The purpose of this study is to determine if the cement mantle thickness influences the mode and localization of loosening. Our hypotheses are: 1) failure is caused by traction stresses generated within the cement mantle and 2) the rocking horse effect risk is increased by a thicker cement mantle.

Background

Glenoid component loosening is the most frequent failure mode. Few data are available on the effect of thickness of cement on glenoid loosening.

Methods

Using a bone substitute, an experimental protocol was designed to compare loosening of a keeled glenoid prosthesis in an off-centered-load condition, to recreate the rocking-horse effect (1.000.000 cycles). Different standardized mantle of cement between the back of the glenoid and the subchondral plate were tested (0 – 1 – 2 – 3 mm). The displacement of the polyethylene inferior rim was assessed with an LVDT gauge when the prosthetic humeral head reached the superior rim of the implant.

Results

The loosening took place within the keel of the implant, and at the polyethylene-cement interface in traction if there is cement at the back of the polyethylene.

For cycling loading, we observed a loosening at the cement / back of the polyethylene interface, with associated fracture of the cement, only for 2 and 3 mm of cement thickness.

Conclusions

This experimental study confirms the mode of failure clinically observed and suggest that the cement mantle should be thin between the back of the implant and the sub-chondral bone but should be optimized around the keel of the implant.



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27 Middle To Long-Term Results Of RSA Implanted After Instability Surgery.

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Aim

The primary objective was to analyze the late clinical and radiographic results of reverse shoulder arthroplasties (RSA) for patients who had instability arthropathy.

Background

Osteoarthritis may be observed after surgery for instability and in the natural history of the pathology.

Methods

This is a retrospective cohort of 25 patients with a mean follow-up of 6.6y. Patients had an history of instability surgery (80%) or multiple closed reductions. They were clinically evaluated: Constant Score (CS), and radiologically (true AP view and Y view).

Results

No significant differences in pre- and post-operative function, radiologic status, complication rate between the patients treated with a prior bone block procedure for the anterior instability and those treated by a capsular plication or non-operatively. A 36mm sphere was implanted in 67%. Bone grafting of the glenoid was needed in 71%. No intra-operative complication has been reported. Clinically the active anterior elevation increased from 70° to 140° ($p < 0.01$) and external rotation from 9° to 21° ($p = 0.02$). The adjusted CS increased from 38 to 98 ($p < 0.01$). 2 early post-operative complications were collected: 1 spine fracture and 1 superficial infection. No early or late dislocation or neurologic complication were observed. At the latest follow-up, there were 38.10% of glenoid spurs, and 55% of scapular notch.

Conclusions

The overall complication rate in this specific group is relatively low. Patients' satisfaction rate is high and clearly higher than those reported with anatomic TSA for this indication. Clinical results are comparable to other studies describing results of RSA.



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440 Total Elbow Arthroplasty Under Unfavorable Soft Tissue Conditions

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Aim

To evaluate the clinical and radiographic outcomes of patients with total elbow arthroplasty and soft tissue reconstruction.

Background

There has been no report of patients with soft tissue reconstruction and total elbow arthroplasty under unfavorable soft tissue conditions.

Methods

We investigated 6 patients who underwent total elbow arthroplasty and soft tissue reconstruction (2 elbows with 1-stage surgery and 4 elbows with 2-stage surgery). The mean patient age at the time of the surgical procedure was 43.2 years (range, 38–49 years); the mean follow-up duration was 88.2 months (range, 25–249 months).

Results

The mean Mayo Elbow Performance Score (MEPS) improved from 26.7 ± 4.1 preoperatively to 81.7 ± 8.2 at the last follow-up. The mean pain VAS scores during motion of the 1- and 2-stage surgery groups were 1.5 ± 0.7 and 0.25 ± 0.5 , respectively, at the last follow-up. The mean flexion-extension arcs of the 1- and 2-stage surgery groups increased from $12.5 \pm 17.7^\circ$ and $13.8 \pm 11.1^\circ$ preoperatively to $72.5 \pm 3.5^\circ$ and $100 \pm 13.5^\circ$ at the last follow-up, respectively. The mean MEPS of the 1- and 2-stage surgery groups were 75 ± 7.1 and 85 ± 7.1 , respectively, at the last follow-up. One of the 6 elbows had loosening on the simple radiograph at the last follow-up, and there were no cases with brushing wear. Three elbows needed additional skin debridement owing to wound complications (2 of 2 elbows in the 1-stage surgery group and 1 of 4 elbows in the 2-stage surgery group).

Conclusions

Under unfavorable soft tissue conditions, performing soft tissue reconstruction with total elbow arthroplasty provides satisfactory functional improvement and pain relief. The 2-stage surgery provided a lower rate of wound complication and better elbow function than the 1-stage surgery, which led to high patient satisfaction postoperatively.



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503 Transformation Of Coracoid Grafts After The Latarjet Procedure: Is It A Remodeling Or Resorption?

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Aim

To evaluate the location and magnitude of osteolysis of coracoid grafts after Latarjet procedure and whether this phenomenon is consistent.

Background

Osteolysis of coracoid grafts following the Latarjet procedure is common.

Methods

This is a retrospective study with 54 patients (55 shoulders) who underwent the Latarjet procedure. 3D computed tomography (CT) scans were performed preoperatively, immediately postoperatively and at follow-up. On "en face" views of the glenoid, size of glenoid defect and changes in glenoid surface area after surgery were measured relative to the area of an assumed outer-fitting circle. On the oblique sagittal planes, location and subsequent severity of osteolysis of the graft at follow up was documented. This study used the classification system we proposed to investigate the magnitude of osteolysis of graft.

Results

The mean glenoid surface area increased from $79.7 \pm 4.8\%$ of original circle preoperatively to $111.3 \pm 8.0\%$ in immediate post-operative scan. At 7.7 and 31.7 months follow-up glenoid surface area decreased to $102.2 \pm 6.0\%$ and $100.3 \pm 5.3\%$, respectively. Osteolysis occurred on the outer side of the graft in all cases and did not occurred on the inner side. Maximum osteolysis was observed in the superior third of the graft (Grade 2: 1.8%, 3: 30.9% and 4: 67.3%), followed by the middle third (Grade 1: 58.2%. 2: 38.2% and 3: 3.6%), and the inferior third (Grade 1: 85.5%, 2: 12.7% and 3: 1.8%). No significant difference in magnitude of osteolysis was observed between 7.7 and 31.7 months of follow up.

Conclusions

Osteolysis of the grafted coracoid mainly occurred on the outer side of the superior portion, resulting in reshaping of the rectangular shape of graft coracoids after Latarjet procedure. Based on these results, it was determined that the coracoid graft underwent physiologic remodeling. The remodeling of coracoid graft was almost completed approximately 8 months postoperatively.



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422 Can Preoperative MRI Predict Reparability Of Massive Rotator Cuff Tears?

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Aim

This study assessed the association between factors identified on pre-operative MRI, especially infraspinatus fatty infiltration, and massive RCT reparability.

Background

Numerous studies have shown preoperative fatty infiltration of rotator cuff muscles to be strongly negatively correlated with successful repair of massive rotator cuff tears (RCT).

Methods

We analyzed a total of 105 patients with massive RCT for whom MRI was performed prior to arthroscopic procedures. The mean age of the patients was 62.7 years (range: 46–83 years), and 46 were men. Among them, complete repair was possible in 50 patients (48%), not possible in 55 patients (52%). Tangent sign, fatty infiltration of the rotator cuff, and Patte classification were evaluated as predictors of reparability. Using the receiver operating characteristic curve and the area under the curve (AUC), the prediction accuracy of each variable and combinations of variables were measured.

Results

Reparability was associated with fatty infiltration of the supraspinatus ($p = 0.0045$) and infraspinatus ($p < 0.0001$) muscles, tangent sign ($p = 0.0033$), and Patte classification ($p < 0.001$). Examination of single variables revealed that infraspinatus fatty infiltration showed the highest AUC value (0.812), while tangent signs showed the lowest value (0.626). Among two-variable combinations, the combination of infraspinatus fatty infiltration and Patte classification showed the highest AUC value (0.874). The combination of four variables, that is, infraspinatus and supraspinatus fatty infiltration, tangent sign, and Patte classification, had an AUC of 0.866, a value lower than the largest AUC (0.874), among the two-variable combinations.

Conclusions

Tangent signs or Patte classification alone are not predictive indicators of massive reparability. Among single variables, infraspinatus fatty infiltration was the most effective in predicting reparability, while the combination of Goutallier classifications <3 of the infraspinatus and Patte classifications ≤ 2 of the rotator cuff muscles were the most predictive among combinations of variables.



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882 Role Of The Posterior Bundle Of Medial Collateral Ligament In Posteromedial Rotatory Instability [PMRI] Of The Elbow

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Aim

To test if, in the context of PMRI, the PMCL tear is necessary for elbow subluxation and joint incongruity, and if an elbow with an anteromedial subtype-2 coronoid fracture and a LCL tear shows contact pressures different from both an intact elbow and one with the aforementioned coronoid fracture alone.

Background

An anteromedial subtype-2 coronoid fracture, a lateral collateral ligament tear (LCL), and a posterior bundle of medial collateral ligament (PMCL) tear comprise a posteromedial rotatory instability (PMRI) injury of the elbow. However, the role of the PMCL injury in this condition is not well understood.

Methods

6 human cadaveric elbows were prepared on a custom-designed apparatus that simulates muscle loads and to passively flex the elbow from 0° to 90° under gravity varus and measure joint contact pressures. The intact specimen (INTACT) was tested initially, and then, an anteromedial subtype-2 coronoid fracture (COR), a LCL tear, and a PMCL tear were sequentially made and the three pathologic conditions were tested (COR, COR+LCL, COR+LCL+PMCL). The maximal values of the mean articular contact pressure (MCP) were used for comparison among the 4 groups.

Results

The INTACT, the COR, and the COR+LCL groups did not show any subluxation or joint incongruity. The COR+LCL+PMCL group showed joint incongruity with subluxation. The average MCP of the COR+LCL group was significantly higher than those of the INTACT and the COR groups ($p=.003$ and $p=.026$). And, the average MCP of the COR+LCL+PMCL group was significantly higher than that of INTACT group ($p=.016$). There was no statistical difference between the average MCP of the COR+LCL and the COR+LCL+PMCL groups ($p=.420$).

Conclusions

The PMCL tear is required for the COR+LCL group to subluxate. The COR+LCL group showed a higher average MCP than the INTACT. Also, the LCL tear in the COR group induced a marked elevation in the average MCP without subluxation or incongruity, compared to that of the COR group.



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361 Effect Of Protocatechuric Acid For Improvement Of Fatty Degeneration And Rotator Cuff Healing In Rat Model**Jung-Taek Hwang**

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Aim

The aim of this study was to verify the effect of protocatechuric acid on tendon healing and reversal of fatty degeneration in a chronic rotator cuff model using the rat infraspinatus.

Background

For chronic rotator cuff tear, the rate of healing failure after surgical repair and fatty degeneration is considerably high. Protocatechuric acid (PCA) is a type of antioxidant.

Methods

28 rats were randomly allocated into 2 groups (14 rats per group: 6 for histological and 8 for mechanical testing): Saline+Repair (SR) and PCA+Repair (PR). The right shoulder was used for experimental interventions, and the left served as a control. From the first operation, PCA (30mg/kg) was administered to the rat in PR group intraperitoneally, and the same volume of saline was done to the rat in SR group. Four weeks after the detachment of infraspinatus, the torn tendon was repaired. The histological and biomechanical evaluations were performed at 4 weeks after repair, and at that time, superoxide dismutase (SOD) levels of infraspinatus muscle and supraspinatus tendon were checked.

Results

At 4 weeks after repair, the mean values of histological parameters were higher in PR group than SR group, but there was no statistical difference. On the biomechanical evaluation, the mean load-to-failure of PR group (20.3 ± 9.4 N) was higher than that of SR group (16.4 ± 6.9 N), although this difference did not reach statistical significance ($p=0.395$). The mean SOD of infraspinatus muscle was higher in PR group than SR group, but the difference did not satisfy a statistical significance (172 ± 215 and 94 ± 5 unit/mg protein, $p=0.053$) (Fig. 1).

Conclusions

The use of PCA might have possibility to improve tendon healing and decrease fatty degeneration after cuff repair. In addition, the administration of PCA might increase SOD level in repaired infraspinatus muscle.



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331 Effect Of Dexmedetomidine Combined With Interscalene Brachial Plexus Block In Arthroscopic Rotator Cuff Repair: A Randomized Controlled Trial

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Aim

The aim of this study was to compare the results of dexmedetomidine combined with interscalene brachial plexus block (ISB) with ISB alone on postoperative pain, satisfaction, and pain-related cytokines within the first 48 hours after arthroscopic rotator cuff repair.

Background

ISB is effective for relieving postoperative pain of arthroscopic rotator cuff repair. Dexmedetomidine is known as a type of alpha agonist which can elongate the duration of regional block.

Methods

50 patients with rotator cuff tears who had undergone arthroscopic rotator cuff repair were enrolled in this study. The 25 patients randomly allocated to group 1 received ultrasound-guided ISB using a mixture of 1 ml (100 µg) dexmedetomidine and 8 ml 0.75% ropivacaine, preemptively. The other 25 patients to group 2 underwent ultrasound-guided ISB alone using a mixture of 1 ml normal saline and 8 ml ropivacaine. Functional scores and blood markers were measured within postoperative 48 h.

Results

Group 1 showed a significantly lower mean VAS (Visual analog scale of pain), and a significantly higher mean SAT (Patient's satisfaction) at postoperative 1, 3, 6, 12, and 18 h than group 2. Group 1 showed a significantly lower mean plasma IL-6 at postoperative 1, 6, 12, and 48 h, and a significantly lower mean IL-8 at 1, 6, 12, 24, 48 h than group 2. Group 1 showed a significantly lower mean plasma cortisol at postoperative 6 h, and a significantly lower plasma Substance P at postoperative 1 h than group 2.

Conclusions

Ultrasound-guided ISB with dexmedetomidine showed a lower mean VAS and a higher mean SAT at postoperative 1-18 h than ISB alone. The mean plasma IL-6 and IL-8 showed a similar pattern to VAS. For rebound pain, the mean timing was later in group 1, but the mean size did not show a significant difference between the two groups.



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411 The Influence Of Chronic Medial Epicondylar Apophysitis On Medial Ulnar Collateral Ligament (MUCL) Insufficiency

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Aim

This study was conducted to investigate the influence of bony deformities of MEC on MUCL insufficiency.

Background

Medial epicondylar apophysitis is one of the common throwing injuries in adolescent baseball players and often causes bony deformities of medial epicondyle (MEC) in adulthood.

Methods

A total of 1,690 high school baseball players were enrolled in this study. The bony deformities of MEC was assessed by ultrasonography and classified into four types: normal, irregular (IR), hypertrophy (HT), and fragmentation (FG). The relationship between these MEC lesions and elbow symptoms related to MUCL insufficiency were investigated using multivariable analysis.

Results

The overall prevalence of MEC lesions was 64.6% (IR: 1.7%, FG: 11.8%, HT: 51.1%). The risk of elbow pain during the last season was significantly high for FG and HT, and each odds ratio (OR) was 2.10 and 1.46, respectively ($p < 0.05$). The risk of positive elbow valgus stress test (EVST) was also significantly high for FG (OR: 7.30) and HT (OR: 2.79) ($p < 0.05$). Comparing FG to HT, FG was at higher risk of elbow pain (OR: 1.44) and positive EVST (OR: 2.61) ($p < 0.05$).

Conclusions

Appropriate management in the early phase of medial epicondylar apophysitis may be important to decrease the preventable MUCL insufficiency in adulthood.



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429 Arthroscopic Debridement For Elbow Osteoarthritis Using Trans-Brachial Portal –a New Technique Of Elbow Arthroscopy.Kenichi Ootshi¹, Shinichi Kikuchi², Ryohei Sato², Takahiro Igari², Takahiro Kaga¹

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Aim

The purpose of this study was to introduce the usefulness and safety of trans-brachial portal for arthroscopic debridement of elbow joint.

Background

Arthroscopic debridement for elbow osteoarthritis was widely done as a minimally invasive approaches and safe and effective treatment.

Methods

The patient is positioned supine, and standard proximal medial portal and anterior lateral portal are established. After diagnostic arthroscopy, trans-brachial portal is made on the anterior elbow crease, just on the biceps tendon. After making 1.5cm skin incision, lateral antebrachial cutaneous nerve is identified just lateral of biceps tendon and retracted laterally. Fascia of brachialis muscle was cut and dissected the muscle in fiber direction, and plastic cannula was introduced into the anterior compartment just over the coronoid and coronoid fossa under arthroscopically. Arthroscopic shaver and burr is inserted into the joint via cannula and soft tissue debridement and removal of osteophytes are performed. The debridement of posterolateral and posterior compartment is also done using standard portals and techniques.

Results

A total of 17 patients with elbow osteoarthritis (16 to 63 years; mean 39 years) were enrolled in this study. Debridement of anterior compartment was easily and sufficiently done using trans-brachial portal because the portal was located just above the coronoid process and fossa. Elbow range of motion and clinical score were significantly improved after surgery. None of the patients had major neurovascular complications except for one transient lateral antebrachial cutaneous nerve palsy after surgery.

Conclusions

Trans-brachial portal might be very useful for elbow arthroscopy because of its convenience for accessing to anterior compartment, especially to coronoid process and fossa.



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764 Beach Chair Versus Lateral Decubitus Positions For Arthroscopic Rotator Cuff Repair After Interscalene Block: A Randomized Controlled TrialSuk-Hwan . Jang¹, Han-Eui . Song², In-Keun . Park¹, Yun-Young . Kim¹, Si-Ra . Bang²

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Aim

To compare the results of beach chair (BC) position with lateral decubitus (LD) position during arthroscopic rotator cuff repair mainly on postoperative pain and satisfaction within the first 48 hours after rotator cuff repair.

Background

.Arthroscopic shoulder surgery can be performed with the patient in the beach-chair or lateral decubitus position.

Methods

Prospective randomized controlled study was performed. Forty patients who underwent arthroscopic rotator cuff repair were enrolled in this study. Among them, 20 patients were allocated to beach chair group and the other 20 patients were allocated to lateral decubitus group. Both positions were prepared using SPIDER2® limb positioner device. All patients received preemptive ultrasonographic guided interscalene nerve block with 10mL ropivacaine and general anesthesia was performed during surgery. Setup time and operation time were recorded during surgery. Postoperatively incidence of neuropraxia, visual analog scale (VAS) pain scores, pain sites, additional medication requirements, patient satisfaction, and incidence of night pain were recorded for postoperative 48 hours.

Results

BC group showed a significantly higher setup time compared with LD group ($p < 0.05$). No significant difference was observed regarding postoperative opioid usage, VAS score and patient satisfaction between the two groups. Rebound pain occurred more frequently and earlier in BC group ($p < 0.05$). No conversion to open approach was performed in either group.

Conclusions

When ultrasonographically guided interscalene block was performed preemptively before arthroscopic rotator cuff repair, there were no significant differences in postoperative pain intensity and patterns between beach chair (BC) and lateral decubitus (LC) position groups. However, BC group showed more frequent and earlier rebound pain.



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259 Reliability Of Glenoid Planning. Comparative Study About Two Preoperative 3D-Planning Software For Shoulder Surgery

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Aim

The objective of the study is to compare two different preoperative 3D-planning software, in terms of inclination and version of glenoid

Background

3D Preoperative Software helps to calculate inclination and version in order to plan any shoulder surgery. The hypothesis is that no matter which software we use, measurements should be similar.

Methods

Comparative study of 22 patients consecutively collected. Mean age was 75.722 ± 8.8238 years old. There were 13 cuff arthropathy, 6 massive rotator cuff tear and 3 proximal humeral fracture sequelae. X-ray (True AP view and outlet) and CT-scan were performed in every patient. Type A Walch Glenoid Classification was observed in 20 patients (A1 11 and A2 9). Two patients were classified as Type B (2 B1) Superior-Inferior erosion was classified as follows E0=6, E1=7, E2=5 and E3=4 according to Favard Classification. Two different preoperative 3D-Planning Software (software A and Software B) were used to calculate version and inclination. Moreover, both software were compared with inclination measured on x-ray according to Maurer et al. and version measured on 2D CT-scan according to Friedman axis. Friedman Test and Wilcoxon Signed Rank were used for statistical analysis.

Results

There were statistical significant differences when all three methods of measurement were compared $p=0.009$. Glenoid inclination measurement with software B was 13.89 ± 6.685 compared to 4.178 ± 4.139 measured with software A, which led to statistical significant differences $P < 0.001$. In terms of version, software A measured similar angle 4.911 ± 3.65 compared with software B 6.17 ± 3.618 ($p=0.151$). X-ray inclination and 2D CT version showed statistical significant differences with software B but only in inclination with software A.

Conclusions

New 3D preoperative software planning showed good correlation in terms of version. However, inclination measurement differs according to 3D preoperative planning software used.



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837 Complex Lateral Avulsion Injury With Extension In The SLAP Complex With Anteroinferior Shoulder Instability**Christian Gerhardt**, Natascha Kraus, Diem Anh Herrmann, Philipp Moroder, Markus Scheibel

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Aim

The aim was to evaluate the prevalence of labral lesions with accompanying anteroinferior and superior extensions following anteroinferior shoulder instability. In addition the lesions were graduated according to common classification systems and clinical and radiographic results were evaluated.

Background

The Bankart-Perthes lesion is accepted as the pathognomonic finding for anterior shoulder instability. Extensive injuries of the labral ring with involvement of the SLAP-complex may occur.

Methods

Over a period of 5 yearstotal of 206 patients (40f/166m, $\bar{\text{age}} 31.8 \pm 16.6$ years) underwent primary arthroscopic surgery due to anteroinferior shoulder instability. Out of this cohort patients with anterior labral lesions that extended into the biceps tendon anchor were selected.

For clinical evaluation subjective-shoulder-value (SSV), Constant-Murley-score (CMS), Rowe-score (RS), Walch-Duplay-score (WD), the Western-Ontario-shoulder-instability-index (WOSI), Melbourne-instability-shoulder-score (MISS) and the long-head-of- the-biceps-score (LHB) were documented. Furthermore MRI was performed to evaluate the SLAP complex.

Results

Overall 15 patients (2female, 13 male, $\bar{\text{age}} 29.3 \pm 8.8$ years) were evaluated revealing an additional lesion of the superior labrum with a prevalence of 7.3 %. In seven patients a SLAP V lesion, n=2 a SLAP IV and n=6 a SLAP III lesion with anteroinferior extension were observed. All of the bucket handle type lesions were reconstructed and nine patients could be completely evaluated using clinical and radiographic parameters. After an average follow-up of 59.5 ± 12.1 months a mean SSV of $87 \pm 8\%$, CMS 91.0 ± 8.8 , RS $83.3 \pm 11.2\%$, WD 80.0 ± 8.9 points, WOSI 73.1 ± 23.5 %, MISS 81.5 ± 10.5 points and LHB 94.0 ± 9.7 points were evaluated. Recurrent dislocation was not obvious although one patient revealed a positive apprehension sign. On MRI an insufficiency of the SLAP reconstruction was not seen and the reconstructed bucket handle lesions seemed to be especially stable.

Conclusions

Arthroscopic anterior shoulder stabilization in combination with SLAP-repair revealed good and excellent clinical results. The reconstruction of the biceps tendon anchor seems to be possible even in cases of complex pathologies.



832 Fatty Infiltration Of The Rotator Cuff – A Comparison Of The Goutallier Classification And Signal Intensity Analysis

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Aim

Aim of this study was to compare the subjective Goutallier classification with the semiquantitative signal intensity analysis.

Background

Classifying the fatty infiltration of the RC according to Goutallier is a subjective estimation that reveals a broad variety.

Methods

MR images in the sagittal plane of 612 patients (T1 and T2 sequences) were retrospectively included.

Exclusion criteria were acute trauma, prior surgery, nerve lesions or inflammatory processes. Fatty infiltration was evaluated according to Goutallier. For the semiquantitative signal intensity analysis 5 regions of interest (22-25mm²) were placed into the subcutaneous fat, SSP, ISP, superior and inferior SSC and TM. The means values and the ratio between the muscle values and subcutaneous fat (as reference) were calculated and correlated with the Goutallier classification. Furthermore the occupation ratio of the SSP was measured. Furthermore 3 observers evaluated 100 MRIs to calculate the reliability of the measurements.

Results

The average age was 54.52±15.67 years. A significant difference was found concerning the Goutallier classification (grade 0-2) and age.

For SSP a significant correlation was found ($p < 0.001$), patients with grade 0 according to Goutallier revealed an \varnothing ration of 4.76(Fat/SSP), grade 1 - \varnothing 3.87, grade 2 - \varnothing 2.93, grade 3 - \varnothing 2.22 and grade 4 - \varnothing 1.70.

Am Beispiel des SSP zeigte sich eine hoch signifikante Korrelation zwischen der Goutallier-Klassifikation und der Signalintensitätsanalyse ($p < 0.001$) Patienten im Stadium 0 nach Goutallier zeigten einen durchschnittlichen Quotienten von 4,76 (Fett/SSP), Grad 1 - \varnothing 3,87, Grad 2 - \varnothing 2,93, Grad 3 - \varnothing 2,22 und Grad 4 - \varnothing 1,70.

The interobserver reliability was Kappa 0.588 for the Goutallier classification and 0.912 for signal intensity analysis.

Conclusions

A correlation was found between the Goutallier classification and signal intensity analysis for measuring fatty infiltration. This gives the possibility to semiquantitatively evaluate fatty infiltration using MRI standard images.



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456 How The Dexamethasone Can Improve Postoperative Analgesia After Shoulder Arthroscopy ?

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Aim

To compare the effect of intravenous (i.v.) versus perineural dexamethasone on the prolongation of analgesic duration of interscalene brachial plexus block (ISB) for shoulder arthroscopy.

Background

Shoulder arthroscopy can be associated with severe postoperative pain and ISB provides excellent, but time-limited analgesia. Dexamethasone added perineural, prolongs the duration of ISB and i.v. glucocorticoids also improve postoperative analgesia.

Methods

This is a prospective double-blind randomized placebo-controlled study in patients undergoing elective arthroscopic shoulder surgery under regional anesthesia with a single-shot ISB (ropivacaine 0.5%). Patients were randomized in three groups: ropivacaine 0.5% (G1); ropivacaine 0.5% and dexamethasone 8 mg perineural (G2); and ropivacaine 0.5% with dexamethasone 8 mg i.v. (G3). Patients were assessed during first 24 hours after surgery for the duration of analgesia, defined as the time from the onset of sensory blockade to the first analgesic request, satisfaction score with pain control, total analgesic use and adverse effects.

Results

Between 1/2015-5/2016, 129 patients were randomized. 120 patients (51F/69M) with a mean age of 57.6 years (range, 18-79 years) completed the study (forty patients in each group). The median duration of analgesia was significantly different between the three groups (G1, 12,65 [12.1-13.1] h; G2, 21,09 [19.9-22.2] h; and G3, 22,5 [21.2-23.6] h; $p = 0.0001$). Total analgesic use presented a significantly lower consumption in G2 and G3 groups, comparing with G1 ($p < 0,0001$). In both dexamethasone groups (G2 and G3) patient satisfaction was significantly higher in comparison with G1 group ($p < 0.001$). There were no adverse effects in the three groups.

Conclusions

Dexamethasone significantly prolongs postoperative analgesia for ISB when added perineural and even more when administrated i.v.

There is a significantly lower median consume of analgesics in both dexamethasone groups comparing with ropivacaine group. Dexamethasone added perineural and mostly i.v. for ISB, has significant impact on increased patient satisfaction during first 24 hours.



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821 Comparison Of Midterm Outcomes Using Anatomic And Reverse Total Shoulder Arthroplasty

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Aim

This study quantifies outcomes with 5yr minimum follow-up using 5 different metrics to compare aTSA/rTSA results.

Background

With improvement of outcomes, the increased use of rTSA is gradually changing the indication limit between aTSA and rTSA according to their respective results.

Methods

443 patients were treated by 10 surgeons. 265 patients received aTSA (mean 66.7 yrs, 141F/124M) for OA and 178 patients received rTSA (mean 72.4 yrs; 119F/59M) for treatment of CTA and OA. Outcomes were scored using SST, UCLA, ASES, Constant, and SPADI metrics; abduction, forward flexion, and active/passive external rotation were also measured. Average follow-up was 74.8 months (aTSA 77.1; rTSA 71.4). A two-tailed, unpaired t-test identified differences ($p < 0.05$) in pre-operative, post-operative, and improvements.

Results

rTSA had a significantly lower pre-operative Constant score ($p = 0.0019$), abduction ($p = 0.0033$), and forward flexion ($p = 0.0083$). aTSA had significantly higher post-operative abduction ($p = 0.0014$), forward flexion ($p = 0.0007$), IR score ($p = 0.0011$), and external rotation ($p < 0.0001$) and significantly greater improvements in active internal and external rotation (both $p < 0.0001$). No difference was noted in any post-operative or improvement in any outcome metric score or any pre-to-post-operative improvement in any outcome metric scores. 36% of aTSA patients had radiolucent glenoid lines and 13% of rTSA patients had scapular notching. 34 complications occurred for both cohorts with a similar rate: aTSA had 21 for a rate of 7.9% and rTSA had 13 for a rate of 7.3%.

Conclusions

Patients undergoing rTSA are generally worse off preoperatively, but had significant improvements similar to those seen with aTSA at mid-term follow-up. Both cohorts had a low complication rate at mid-term, which was lower than previously reported but this series only included primary cases, not revision surgery.



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827 Comparison Of Clinical Outcomes With Posteriorly Augmented Glenoid Components With Anatomic And Reverse Total Shoulder Arthroplasty

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Aim

This study quantifies outcomes achieved using posteriorly augmented aTSA and rTSA glenoid implants in patients with severe posterior wear.

Background

Posteriorly augmented aTSA and rTSA glenoid implants are used to better restore the joint line and improve muscle balance in posteriorly worn glenoids.

Methods

117 patients (mean 68.6yrs) with a minimum follow-up of 2 yrs were treated by 8 surgeons using either 8° posteriorly augmented aTSA/rTSA glenoid components in patients with severe posterior wear. 64 aTSA patients received 8° posteriorly augmented glenoids (mean 65.6 yrs; 23F/41M) for OA and 53 rTSA patients received 8° posteriorly augmented glenoids (mean 72.3 yrs; 23F/30M) for treatment of CTA and OA. Outcomes were scored using SST, UCLA, ASES, Constant, and SPADI metrics; abduction, forward flexion, and external rotation were also measured. Average follow-up was 32.9 months (aTSA 34.7; rTSA 30.8). A two-tailed, unpaired t-test identified differences ($p < 0.05$) in pre-operative, post-operative, and improvements.

Results

ASES (atsa: 43-89; rtsa: 42-88), Constant (aTSA: 40-75; rTSA: 39-74), abduction (atsa: 89-136; rtsa: 80-127), forward flexion (aTSA: 96-143; rTSA: 87-144), and active external rotation (atsa: 20-56; rtsa: 18-37) all improved significantly. No significant difference was observed in any pre- or post-operative clinical metric or any improvement in scores between cohorts. However, posteriorly augmented aTSA glenoids had significantly greater post-op active internal and external rotation and significantly more improvement in external rotation than rTSA. 33% of aTSA patients had radiolucent glenoid lines and 7% of rTSA patients had scapular notching. 3 complications were reported (2 aTSA and 1 rTSA), though no glenoid loosening was observed for either posterior augment cohort.

Conclusions

These results demonstrate good outcomes can be achieved at 2yr minimum follow-up in patients with severe posterior wear using posteriorly augmented aTSA/rTSA glenoid implants. Additional and longer-term follow-up is needed to confirm these positive outcomes.



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255 Arthroscopic Vs Open Latissimus Dorsi Transfer For Irreparable Posterior Cuff Tears: A Kinematic And EMG Study**Paolo Paladini**, Antonio Padolino, Giovanni Merolla, Giuseppe Porcellini

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Aim

The aim of the study is to evaluate with kinematic motion analysis and with upper limb electromyography patients treated with open and arthroscopic latissimus dorsi transfer (LDT).

Background

The management of irreparable cuff tears is controversial, going from partial repair to tendon transfer. Gerber first published results and surgical technique of transposition of the latissimus dorsi tendon for irreparable lesions of the posterior-superior cuff. In literature different techniques of surgical transposition of latissimus dorsi transfer have been described and can be summarized in two big groups: open and arthroscopic.

Methods

From September 2007 to March 2016, 171 patients were treated with open LDT (OLDT) and from March 2015 to March 2016, 15 patients were treated with arthroscopic LDT (ALDT). The mean follow-up was 6.61 months for the ALDT group and 10.73 months for OLDT group. The two groups were clinically evaluated with the Constant-Murley score and the Simple Shoulder Test. Each patient underwent motion kinematic analysis and surface EMG.

Results

Forward elevation and External rotation increased in both groups. Even Constant score and SST scores increased in both groups. The EMG surface analysis found the presence of electrical activity of all tested muscles (posterior deltoid, lower trapezius, Latissimus dorsi). In particular, the activation of the upper portion of the latissimus dorsi is present in all cases and shows how it is active in the external rotation movements.

Conclusions

ALDT showed clinical, functional and satisfaction outcomes, similar to OLDT technique. All patients showed satisfactory return to normal daily activities, improvement in pain symptoms and good recovery of range of motion. The kinematic motion analysis showed a good articular recovery, even in patients coming from a pseudo-paralytic-shoulder condition. The EMG data are encouraging but it is still unclear if the activation of the Latissimus Dorsi act as tenodesis effect or as a contractile function.



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867 Can We Safely Decrease CSA During Arthroscopic Rotator Cuff Repair? A Prospective Cohort Study.

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Aim

To investigate whether a lateral acromioplasty can really reduce the CSA without damaging any deltoid muscle's insertion.

Background

Higher values of the critical shoulder angle (CSA) are associated with increased incidence of rotator cuff tears or even the higher risk of re-tears after repair.

Methods

Sixty-eight patients scheduled for arthroscopic rotator cuff repair (RCR) were prospectively included. The CSA was measured and the patients were categorized into two groups: Group I CSA < 35deg (25 patients) and Group II CSA > 35deg (43 patients). The type of the rupture, its size and its etiology; the patients' age; the ASES; SST; SSV and; Constant scores were preoperatively collected. During RCR a lateral acromioplasty was performed mainly in Group II. The amount of the lateral acromion resected was calculated according to the size of the arthroscopic burr used (5.5mm) by giving attention not to detach the lateral deltoid origin. The CSA was measured with x-rays 7 days post-operatively, while the condition of the deltoid was evaluated 3-6 months later clinically.

Results

No significant correlations were found between larger CSA and age, rupture etiology, SSV, SST, ASES and Constant scores. However, the CSA was statistically significant higher in patients with large and massive tears than in small or medium (38 ± 5 deg vs 35 ± 4 deg, $p = 0.03$).

The mean preoperative CSA in Group I was 32 ± 2 deg and in Group II 39 ± 3 deg, while postoperatively the respective values were 31 ± 2 deg and 35 ± 2.5 deg ($p < 0.001$). However, in Group II when the CSA was > 40 o, the postoperative values remained higher (37 ± 2 deg, $p < 0.001$).

Three to six months postoperatively no clinical detachment of the deltoid or any muscle's atrophy was observed.

Conclusions

The CSA can be reduced during RCR without any obvious adverse effects. However, in cases that was > 40 deg we did not always achieve the limit of 35deg.



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720 Bristow-Latarjet Procedure : Does Ligament Laxity Affect Outcomes Six Months After Surgery?

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Aim

The purpose of this study is to evaluate patients who have undergone bone block surgery (Bristow-Latarjet) and analyze whether ligament laxity affects progress six months after surgery. :

Background

Patients with generalized hyperlaxity with frank recurrent anterior shoulder dislocation had high failure rate after conservative and soft tissue stabilization procedures.

Methods

Between March 2014 and March 2015, 21 patients suffering from glenohumeral instability underwent surgery using Bristow-Latarjet procedure. All of the patients were athletes, male, played contact sports and were aged between 18 and 40 years old. They were referred for bone block surgery after meeting clinical and image criteria. All patients were immobilized for 03 weeks after surgery and received the same rehabilitation protocol. Six months after surgery, they were clinically assessed and classified into two groups: group I (with no ligament laxity), patients with scores of 6 or less according to the Beighton criteria and group 2 (with ligament laxity), with scores above 6 according to the Beighton criteria. Both groups underwent functional assessment using the WOSI (The Western Ontario Shoulder Instability Index), Constant and UCLA scales, as well as having range of movement assessed by measuring flexion and external rotation. .

Results

The variation between groups in the WOSI scale was found to be statistically significant ($p=0.010$), with the median for group I, the group with ligament laxity, being 566.5 (62 to 1050) while that of group II, with no ligament laxity, was 66.6 (20 to 78). No statistically significant differences were found between the groups for the UCLA ($p=0.147$) scale, Constant score ($p=0.068$), flexion ($p=0.902$) or external rotation ($p=0.738$).

Conclusions

Patients with glenohumeral instability and no ligament laxity show better outcomes in terms of quality of life, according to the WOSI scale than patients with hiperlaxity.



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328 The Role Of Overuse And Disuse In The Etiology Of Rotator Cuff Degeneration And Tear. A MRI Study On Patients With Unilateral Arm Amputation

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Aim

In order to evaluate if overuse has a significant role in rotator cuff tear (RCT) etiology, we evaluated both shoulders of patients with old unilateral arm amputation expecting a higher rate of RC degeneration in the healthy side.

Background

RCT etiopathogenesis is still motive of discussion. According to the extrinsic theory, anatomical structures are responsible, for degenerative changes on rotator cuff tendons.

Methods

Nineteen males and six females (mean age:57.3±10.1) with an old (>20years) unilateral arm amputation were submitted to an MRI of both shoulders. Tendon status and muscle tropism were evaluated according to Sugaya and Fuchs classifications, respectively; the acromion humeral distance was measured. Statistical analysis was performed to verify the prevalence of Sugaya and Fuchs categories in each sides.

Results

A significant prevalence of Sugaya type II in the amputated side ($p=0.02$) and of type I in the healthy side ($p<0.001$) was found. Rotator cuff was healthy in 28% and 52% of amputated and non-amputated side, respectively. The mean acromio-humeral distances of the amputated and healthy side were 0.8cm (SD:0.1) and 0.9cm(SD:0.1), respectively ($p=0.02$). A significant prevalence of Fuchs type II category in the healthy side ($p<0.001$) was found. Fuchs III/IV were observed in 40% and 12% of amputated and healthy side, respectively.

Conclusions

The role of overuse on the etiology of rotator cuff tear is resized by our study. Cuff tear prevalence in not amputated shoulders, inevitably submitted to functional overload, was not higher than that of coetaneous subjects with two functional upper limbs.



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**812 How To Manage An Unstable Reverse Shoulder Arthroplasty?
Retrospective Review Of 25 Cases.**Philippe Valenti¹, Charbel Maroun¹, Jean Kany², Denis Katz³

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Aim

To outline the causes of instability, the preoperative planning, the therapeutic strategy and the results of 25 cases.

Background

Although instability is the main complication after RSA, etiologies, risk factors and management, remain not well understood. Recently, many authors believe that instability results from inadequate tensioning of the deltoid secondary to a shortening of the length of the humerus. However, the etiologies are frequently multiple and associated.

Methods

25 unstable RSA were operated between 2008 and 2015 in three centers. Preoperative planning included bilateral radiographs to evaluate humeral shortening, 3D-CTscan to check implant positioning, bone loss and fatty infiltration of the deltoid and the remaining cuff and biological exams as blood count, ESR, CRP and procalcitonine. Causes of instability were: 9 inadequate humeral lengths, 4 baseplates superior tilt, 4 polyethylene wear, 6 loosening and 2 infections. In cases of humeral shortening, if <10mm a thicker PE was used, if > 10mm the humeral stem was placed higher and if >5cm allograft was used. In case of medialization or glenoid loosening, lateralization was done by metallic baseplate with bone graft and inferior tilt.

Results

No patient was lost to follow-up. The mean follow-up was 36 months (24–40). The mean VAS was 0.4, SSV 54.2% and absolute Constant Score 48.8. Active flexion, ER1 and ER2 significantly improved to a mean 102°, 20° and 45° respectively. The mean final SST was six "yes". Only 2 patients were not satisfied (persistent instability). In 2 cases the baseplate shifted under the acromion. No periprosthetic lucency, no scapular notching, no fractures were observed.

Conclusions

Bilateral radiographs, CT-Scans and biologic exams must be systematic. Closed reduction is rarely successful. The restoration of an appropriate humeral length and lateralization of the prosthesis to increase the tension of the deltoid and the remaining cuff are crucial.



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385 Management Of Severe Glenoid Bone Loss With A Long Peg Baseplate. Review Of 50 Patients With A Minimum 2-Year Follow-UpPhilippe Patrick Valenti¹, Charbel Georges Maroun¹, Jorge Rengifo¹, Marco Cartaya²

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Aim

To report the advantages of a metallic lateralized baseplate with a long peg to address severe glenoid bone loss in RSA.

Background

Conventional medialized baseplate in RSA is associated with scapular notching, instability, and limited rotation. Severe bone loss is currently managed by medialized metal-back with a long peg combined with autograft or allograft. This procedure is technically difficult with the potential risk of bone resorption.

Methods

This is a monocentric prospective study of 50 patients operated by one surgeon between 2011 and 2014. We included patients operated for a failed arthroplasty or severe glenoid bone loss contraindicating the use of the standard implant.

The design of the lateralized baseplate with anterior winglet, central keel and the long post implanted in the native bone with an inferior tilt allows primary fixation. Cancellous bone graft is added between the native glenoid and baseplate.

Patients underwent clinical, radiographic and CT assessment with mean follow-up 33 months (range: 24-60 months). Results were evaluated on 44 patients (1 deceased and 5 lost during follow-up).

Results

Mean VAS score decreased from 7 to 1. The SSV score increased from 26 to 69%. The Absolute Constant score improved from 24 to 59 points. The gain in anterior elevation, ER1 and ER2 was 63°, 13° and 31° respectively. Neither bone graft resorption nor scapular notching was observed in all cases. 90% of the patients were satisfied.

Complication rate was 14% (1 glenoid loosening, 3 humeral loosening, 1 dislocation, 1 humeral periprosthetic fracture).

Conclusions

A metallic lateralized baseplate with a long post is an effective way to achieve a good fixation in glenoid bone loss, reducing the size of bone graft. Compared to others techniques, this procedure is associated with a low rate of glenoid notching and instability. In addition it improves external rotation.



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787 Prevalence Of Osteochondritis Dissecans Of Humeral Capitellum Among Young Baseball Players

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Aim

The aim of this study was to investigate the prevalence and stage of osteochondritis dissecans of the humeral capitellum (OCD) among young baseball players.

Background

OCD is a condition that occurs in young patients who participate in sports that place a large amount of stress on the humeral capitellum. Baseball is one of the high-risk sports, which induces OCD. Many players start playing baseball during elementary school. The prevalence and clinical characteristics of OCD among adolescent baseball players are unknown.

Methods

The subjects were 4099 young baseball players from 7 to 17 years (mean, 13.2 years). The elbow of each subject's throwing arm was assessed using a questionnaire and ultrasonography. Subjects with abnormal results on ultrasonography were further examined through radiographic study. OCD lesions were classified into stages (stage I; radiolucent stage, stage II; fragmentation stage, stage III; loose body stage, stage IV; residual stage, stage V; postoperative stage) based on radiographic results.

Results

OCD was detected in 119 (2.9%) of 4099 elbows by ultrasonography. One hundred-five of the 119 OCD players underwent further radiographic examination. Twelve (11.4%) were stage S (superficial stage), 21 (20.0%) were stage I, 35 (33.3%) were stage II, and 11 (10.5%) were stage III, 11 (10.5%) were stage IV, and 15 (14.3%) were stage V.

Conclusions

The prevalence of OCD was 2.9% among young baseball players.



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546 Arthroscopic Biceps Augmentation In Massive Rotator Cuff Repair
-Comparison Interposition Tenodesis With Incorporation Tenodesis Into Double Row Repair-

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Aim

The purpose of our study was to evaluate the functional, structural outcome and sequential change of isokinetic strength of arthroscopic massive rotator cuff repair with biceps augmentation. And to compare the result of interposition tenodesis and incorporation tenodesis into double-row rotator cuff repair.

Background

Biceps augmentation may provide localized graft to enhance tendon healing

Methods

This study included 45 patients who underwent rotator cuff repair with biceps tenodesis, which were followed for at least 1 year. The patients comprised 27 men and 18 women with an average age of 62 years. There were 25 patients (Group A, incorporation tenodesis) were augmented biceps long head was covered by repaired cuff more than 1/2 and 20 patients (Group B, interposition tenodesis) of less than 1/2 or non-coverage. Functional outcomes were evaluated with the American Shoulder and Elbow Surgeons (ASES) score, Korean Shoulder Score (KSS) at least 1 years after surgery. The anatomic status of cuff repair was estimated using MRI or ultrasonography. The isokinetic strength of shoulder (FE, AB, ER) were measured before the operation and every 3 months after the operation.

Results

All postoperative functional scores improved significantly compared with the preoperative scores ($P < 0.01$) and were not significantly different between the groups. Structural failure of rotator cuff was founded in 11(24.4%) cases. 2 of 25(8%) in group A and 9 of 20(45%) in group B. But no popeye deformity was founded. Isokinetic strengths were improved significantly 6 to 9 months after operation in structural integrity preserved cases. But there was no significant improvement in structural failure cases.

Conclusions

An arthroscopic biceps tenodesis with double row rotator cuff repair was effective equivalent clinical and functional outcomes in the setting of massive rotator cuff tear. Incorporation biceps tenodesis was more effective in achieving fewer structural failure and significant improvement in isokinetic strength than interposition tenodesis.



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52 Effect Of Neuromuscular Control On The Shoulder Function After Rotator Cuff Repair -Availability Of Time To Peak Torque And Acceleration Time-

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Aim

To evaluate the neuromuscular control status after rotator cuff repair using isokinetic muscle performance test and to investigate the effect of neuromuscular control on the function of rotator cuff repair patients.

Background

Good clinical outcomes have been reported in the patients with healing failure after rotator cuff repair, but lack of data is available about the explanation of this contradictory results. Neuromuscular control is one of important factors related to shoulder function.

Methods

Ninety one cases with arthroscopic rotator cuff repairs who underwent isokinetic muscle performance test preoperatively and 1 year after operation were retrospectively evaluated. Isokinetic test was performed at the angular velocity of 60°/sec with 30° abduction. For evaluation of neuromuscular control status, time to peak torque and acceleration time were measured in internal rotation (IR), external rotation (ER), forward flexion (FF), and extension (EX). The integrity of repaired tendon was evaluated with MRI or ultrasonography and various functional outcomes were evaluated.

Results

At the 1 year after rotator cuff repair, time to peak torque, acceleration time, pain VAS and all functional scores were improved significantly compared with preoperative value ($p < 0.001$). Eleven of 91 cases (12.1%) showed healing failure. There were no significant differences in isokinetic parameters and clinical outcomes based on the presence of healing failure ($p > 0.05$). However, some of functional scores were significantly related to neuromuscular parameters. Especially, UCLA score was significantly related to time to peak torque in IR, ER and acceleration time in ER, IR, FF, EX ($p = 0.002$, $p = 0.048$, $p = 0.034$, $p < 0.001$, $p = 0.007$, $p = 0.009$, respectively).

Conclusions

Neuromuscular control can be improved after rotator cuff repair and seems to be more closely related to functional status than repair integrity. Therefore, the improvement of neuromuscular control might be one possible reason which can explain the functional restoration after rotator cuff repair even in the patients with healing failure.



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29 Preoperative Fatty Degeneration Of Subscapularis Or Infrapinatus Affects Clinical Outcome In Patients With Intact Tendon After Arthroscopic Repair For Large/Massive Cuff Tears

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Aim

The purpose of the present study was to evaluate the factors affecting clinical outcome in patients with intact tendon after arthroscopic repair for large/massive cuff tears.

Background

Fatty degeneration of the rotator cuff muscles is associated not only with postoperative retear but also with muscle weakness that affects shoulder function. These results raised the hypothesis that fatty degeneration of the rotator cuff muscles affects clinical outcome in patients with large/massive tears, even in those with intact tendon after surgery.

Methods

Fifty five patients with large/massive cuff tears who had undergone arthroscopic rotator cuff repair were subject for this study. The mean age at the surgery was 64.4 ± 9.07 years, with a mean follow-up period of 30.1 ± 16.7 months. They were divided into two groups according to the UCLA score at final follow-up: 12 patients with score ≤ 27 points and 43 patients with score > 27 points. Various variables were examined by multivariate analysis to determine the factors affecting clinical outcome between the two groups.

Results

The mean UCLA score significantly improved in both groups after surgery ($p = .0003$ and $p < .0001$, respectively). Multivariate analysis showed that preoperative Goutallier stage of the infrapinatus and subscapularis was significantly associated with clinical outcome ($P = 0.0054$ and $P = 0.0017$, respectively). In ROC curve analysis, cut off value was Goutallier Stage 1 in both muscles. Next, we examined the relationship between fatty degeneration and each component of the UCLA score. Fatty degeneration of the infrapinatus was significantly associated with "Function" ($P = 0.0005$): For the subscapularis, its fatty degeneration was significantly associated with "Active forward flexion", "Strength of forward flexion", and "Satisfaction" ($P < .0001$, $P = 0.0089$, and $P = 0.0005$, respectively). No association between the fatty degeneration and "Pain" was observed in both muscles.

Conclusions

Preoperative fatty degeneration of subscapularis or infrapinatus affects clinical outcome in patients with intact tendon after arthroscopic repair for large/massive cuff tears.



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394 Improved Shoulder Day Surgery Results With Ultrasound-Guided Inter-Scalene Block.**Anestis Iossifidis**, Paramitra Mitra, Edward Ibrahim, Charalambos Petrou

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Aim

Compare the effect of ultrasound versus nerve stimulator guided interscalene block on post-operative pain management in day shoulder surgery.

Background

Our hypothesis is that ultrasound guided block allows a safer and more efficient pain management than a nerve stimulator block.

Methods

This is a prospective study of 59 patients (30 female) mean age of 55 (27-86 years) over a 6-month period. Shoulder surgery was performed under general anaesthesia and ultrasound guided inter-scalene block using 20ml of 0.25% bupivacaine. Our previous prospective study over 12 months of 104 patients (52 female), mean age 49 (18-85 years), used nerve-stimulator guided inter-scalene block with 40ml of 0.5% bupivacaine. We have recorded the period of active sensory block, pain scores, side effects and patient satisfaction before discharge and by telephone interview 36 hours post-operatively. Surgery performed in day surgery unit included arthroscopic cuff repair, subacromial decompression, and shoulder stabilisation.

Results

Ultrasound guided block : a satisfactory sensory block persisted for a mean of 17.6 hours with no block failure or unplanned admissions. 98% were pain free post-operatively, and 40% at 36 hours. 100% were pleased to have had the procedure as a day case. One case of Horner's syndrome lasting 12 hours was the only complication.

Nerve stimulator guided block : a satisfactory sensory block persisted for a mean of 20.8 hours with 2 cases of failed block. 93% of patients were pain free immediately after surgery and 38% at 12 hours. Complications : 6 patients experienced a transient Horner's syndrome.

Conclusions

This study showed that the Ultrasound guided block is safer and more efficient than the nerve stimulator block. Using 50% less of bupivacaine in dose and volume, resulted in improved post-operative pain management with fewer complications, no unplanned admissions and high level of patient satisfaction in day shoulder surgery.



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182 Predicting Rotator Cuff Tears From Plain Radiographs Of The Shoulder: A New Classification Of Greater Tuberosity Changes

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Aim

To determine the accuracy of a new radiographic classification of greater tuberosity changes for the detection of rotator cuff tears.

Background

Plain radiographs are cheaper and more readily available than ultrasound and MRI and have enjoyed a recent resurgence of interest in the diagnosis of rotator cuff tears following description of the critical shoulder angle.

Methods

Two shoulder specialists (experienced group) and 3 residents (inexperienced group) retrospectively assessed the anonymised pre-operative AP shoulder radiographs of 91 consecutive patients (47 male, 44 female; mean age 57 years old) who had previously undergone a shoulder arthroscopy for a diagnosis of atraumatic rotator cuff dysfunction in the absence of arthritis. The appearance of the greater tuberosity was graded 0-3 according to the new classification and subsequently compared to the intraoperative status of the cuff. The experienced group also measured the critical shoulder angle so that a rotator cuff score could be calculated.

Results

Grade 2 (surface irregularity or intracortical cysts) and grade 3 (eburnation) tuberosity changes were associated with rotator cuff tears and had high mean predictive values (sensitivity 91.7, specificity 80.9, accuracy 86.9). The experienced group was significantly more accurate than the inexperienced group (96.9 vs 83.3; $p < 0.001$). However, this discrepancy was not noted if the inexperienced group's assessment was taken in combination with a rotator cuff score > 10 (accuracy 92.6; $p = 0.147$). Grade 3 changes were highly specific (100) for a massive cuff tear but not sensitive (35.0). Inter-rater agreement was good overall ($\kappa = 0.628$) and excellent between the experienced assessors ($\kappa = 0.901$).

Conclusions

The new classification is useful for the diagnosis of degenerative rotator cuff tears in the absence of arthritis. For inexperienced observers the identification of grade 2 features should only be interpreted as a cuff tear when the rotator cuff score is > 10 . The of presence of eburnation indicates a massive tear.



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692 Evaluation Of Apoptotic Activity Between The Torn Bursal Layer And Remaining Articular Layer In Partial Thickness Rotator Cuff Tear**Yang-Soo Kim**, Hyo-Jin Lee, Jong-Ho Kim, Gwang Young Sung, Dong-Jin Kim

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Aim

To elucidate and compare apoptotic activity of torn bursal layer and remaining articular layer of bursal-sided partial thickness rotator cuff tear (PTRCT).

Background

There is a controversy regarding appropriate treatment of bursal-sided PTRCT whether the remaining articular portion of tendon should be reattached followed by sacrifice or only torn bursal layer should be repaired due to the uncertainty of the condition of articular-side tendon.

Methods

Between May 2014 and June 2015, tissues of torn bursal layer and remaining articular layer of supraspinatus were harvested from 4 patients during the arthroscopic tear completion rotator cuff repair. Normal supraspinatus tendon tissue was harvested as a control (during the intramedullary nail insertion). Caspase 3, 8 and 9 activities were measured to determine the intracellular apoptosis pathway. The activity of caspase 3, 8 and 9 were evaluated by Western blot, and the Caspase-GLOTM 3, 8 and 9 Assays.

Results

The expression of Caspase 3, 8 and 9 in torn bursal side tendon and remaining articular side tendon was significantly higher than control according to Western blot. However, there was no statistical significance between bursal and articular side tendon. Enzymatic activity of Caspase 3, 8 and 9 in bursal side tendon was significantly higher than articular side and control according to Caspase-GLOTM analysis.

Conclusions

Active apoptosis is taking place in torn bursal-side tendon of bursal-sided PTRCT. However, according to the Western blot, remaining articular-side tendon also showed apoptotic activity. Regarding the result of this study, we cannot guarantee the normal condition of remaining articular-side tendon in bursal-sided PTRCT and this result can be an evidence why remaining articular portion of the tendon should be attached followed by sacrifice.



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694 Is It Safe To Inject The Corticosteroid Into The Glenohumeral Joint After Arthroscopic Rotator Cuff Repair?Dong-Jin Kim, **Yang-Soo Kim**, Hyo-Jin Lee, Jong-Ho Kim, Gwang Young Sung

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Aim

Evaluate the clinical outcomes and effect on cuff integrity in patients with repaired rotator cuff after the intra-articular corticosteroids injections.

Background

Intra-articular corticosteroid injection is known to be effective on recovery range of motion (ROM) and pain in various conditions of shoulder, but its usage is limited after rotator cuff repair due to the concerns about the possible harmful effect of steroid on the repaired tendon.

Methods

80 patients with rotator cuff tear (RCT) underwent arthroscopic repair. In 40 patients, glenohumeral injection of triamcinolone was performed 8 weeks after surgery (Group I). Other 40 patients, no injection was performed (Group II). ROM, clinical score, visual analog scale (VAS) were evaluated at 3, 6, and 12 months after surgery, the last follow-up. The integrity of the repaired tendon was evaluated at postoperative 8 weeks (before injection) and 12 months by using MRI.

Results

Group I showed significantly higher ROM in forward flexion ($p=0.05$), external rotation at side ($p<0.05$), external rotation at abduction ($p=0.04$). However, internal rotation back ($p=0.65$) showed no significant difference. Group I showed significantly lower VAS score ($p=0.02$) and functional score (ASES, $p=0.02$) at postoperative 3 months. However, both groups showed no differences after 6 months in ROM and functional scores. On MRI at 12 months, re-tear (Sugaya's classification IV and V) was observed in 7 patients (8.8%). 3 patients from Group I and 4 from Group II. 73 patients (91.2%) without re-tear on MRI, 37 patients were in Group I and 36 patients were in Group II. The differences were not significant statistically.

Conclusions

Intra-articular injection of corticosteroid after rotator cuff repair does not increase the risk of re-tear. It is an effective and safe treatment for increasing ROM (FF) and improving clinical score (CSS) in patients who underwent rotator cuff repair during an early period after surgery.



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242 Postoperative Clinical Results Of Arthroscopic Treatment For Habitual Posterior Dislocation Of The Shoulder

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Aim

The purpose of this study was to evaluate the short term clinical results of arthroscopic treatment for habitual posterior dislocation of the shoulder.

Background

Habitual posterior dislocation of the shoulder is recognized as non-traumatic positional shoulder instability and patho-mechanism of this disease is thought to be dysfunction of posterior labor-ligamentous complex in the shoulder. Arthroscopic capsular plication for posterior slack capsule has reported to be a novel surgical treatment for this disease.

Methods

We retrospectively evaluated 24 shoulders (23 patients, 18 male and 6 female) arthroscopically treated by posterior capsular plication. Arthroscopic capsular plication was performed for loose posterior capsule accompanied with labrum repair by using suture anchors in the cases of damaged labrum. An average age at the time of surgery was 27.1 (range, 14-51) years. Clinical results were evaluated by subjective and objective instability; assessments with JSS shoulder instability score at 6 and 12 months postoperatively.

Results

Disappearance of subjective instability with no apparent complication was confirmed in all the cases at 6 months follow up. However we observed recurrent objective instability in 4 of 24 shoulders (17%) and subjective instability was recognized in 3 of 4 shoulders with positive objective instability at 12 months follow up. The averaged JSS shoulder instability score improved from 59.8 points preoperatively to 86.9 and 93.7 points at 6 and 12 months follow up respectively.

Conclusions

Patients treated with arthroscopic capsular plication for habitual posterior dislocation of the shoulder have showed excellent short term clinical outcomes.



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593 A Cadaveric Biomechanical Comparison Of Conventional Remplissage And Posterior Capsulodesis Alone

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Aim

The purpose of this study was to compare the effects of conventional remplissage and posterior capsulodesis alone on shoulder ROM, translational stability, and shoulder kinematics.

Background

Recently, it has been proposed that a posterior capsulodesis alone could effectively treat engaging Hill-Sachs lesions while having less of an effect on shoulder ROM. Still, the ability of the seemingly tenuous posterior capsule to effectively prevent engagement of engaging Hill-Sachs lesions remains unclear.

Methods

Six fresh frozen cadaveric shoulders were tested in a custom shoulder jig. Testing of the intact glenohumeral joint was followed by repeating the procedure on four more conditions: bipolar bone loss lesions consisting of a 15% bony Bankart and 30% Hill-Sachs defect, Bankart repair alone, Bankart repair with concomitant conventional remplissage, and Bankart repair with concomitant posterior capsulodesis alone.

Results

After creation of the bipolar bone loss lesions, there was a significant increase in humeral head translation and associated engagement of the Hill-Sachs lesions. Bankart repair alone was not sufficient to restore translation or prevent engagement of the Hill-Sachs lesions. The addition of conventional remplissage or posterior capsulodesis alone restored translational stability and effectively prevented engagement of the Hill-Sachs lesions. While both the conventional remplissage and posterior capsulodesis alone had significantly less total ROM compared to intact, the posterior capsulodesis alone had significantly larger ROM than the conventional remplissage.

Conclusions

Posterior capsulodesis with Bankart repair effectively restores glenohumeral translational stability and prevents engagement of large Hill-Sachs lesions. While loss of ROM and alterations in humeral head kinematics are unavoidable with either conventional remplissage or posterior capsulodesis alone, the posterior capsulodesis alone had significantly larger ROM and less alteration of humeral head kinematics compared with the conventional remplissage. Consequently, posterior capsulodesis alone may be a suitable supplemental technique to treat engaging Hill-Sachs lesions.



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697 MRI Quantification Of Fatty Infiltration And Muscle Atrophy In Rotator Cuff Tears Using ImageJ

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Aim

The purpose of this study was to quantify rotator cuff fatty infiltration and muscle atrophy using MRI and to verify the grading systems that were widely used for muscle assessment.

Background

It is unclear whether the existing Goutallier classification that were widely used for muscle assessment adequately describes the overall status of rotator cuff muscles.

Methods

A total of 90 cases of rotator cuff tears (30 medium, 30 large, and 30 massive) were randomly selected as study targets. The fatty infiltration and muscle atrophy of supraspinatus muscle in preoperative MRI were quantified using ImageJ. Correlations between the obtained values and the grades determined according to the existing classification for fatty degeneration developed by Goutallier, as well as the grading system for muscle atrophy developed by Warner, were investigated.

Results

With respect to the tear size, the fatty infiltration ratios of the supraspinatus were 0.104 ± 0.018 , 0.094 ± 0.01 , and 0.199 ± 0.025 for medium, large, and massive tears, respectively ($p < 0.001$). Only weak correlations were found between the quantified fatty infiltration ratio of the supraspinatus and the Goutallier classification for fatty degeneration ($R^2 = 0.287$, $p < 0.001$). Furthermore, the occupation ratio of the supraspinatus showed only a negligible correlation ($R^2 = 0.181$, $p < 0.001$) with the Warner grading system for muscle atrophy.

Conclusions

The quantitative values of the fatty infiltration ratio and occupation ratio of the supraspinatus obtained from MRI images using ImageJ showed only weak or negligible correlations with the classification developed by Goutallier and the grading system developed by Warner, the two grading systems that are currently commonly used.



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699 Comparison Of Clinical And Radiologic Results In Arthroscopic Repair For Full Thickness Rotator Cuff Tears Between With And Without Involving The Anterior Attachment Of The Rotator Cable

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Aim

This study compared the clinical and structural outcomes of arthroscopic repair of full-thickness rotator cuff tears with and without anterior disruption of the supraspinatus tendon.

Background

The anterior rotator cuff cable is critical in force transmission of the rotator cuff. However, few clinical studies have examined the correlation between the integrity of the anterior supraspinatus tendon and surgical outcomes in patients with rotator cuff tears.

Methods

One hundred eighty one shoulders available for magnetic resonance imaging (MRI) at least 6 months after arthroscopic rotator cuff repair, with a minimum 1-year follow-up, were enrolled. The anterior attachment of the rotator cable was disrupted in 113 shoulders (group A) and intact in 68 (group B). The mean age at surgery was 59.6 and 59.2 years, and the mean follow-up period was 24.2 and 25.1 months, in groups A and B, respectively.

Results

There were statistically significant differences in preoperative tear size and pattern and muscle fatty degeneration between the 2 groups ($P = 0.004$, 0.008 , and < 0.001 , respectively). At final follow-up, the Constant score was 77.5 ± 11.2 and 78.0 ± 11.9 points in groups A and B, respectively ($P = 0.875$). In assessing the repair integrity with postoperative MRI scans, the retear rate was 23.9% and 14.7% in groups A and B, respectively ($P = 0.029$).

Conclusions

Irrespective of involvement in the anterior attachment of the rotator cable, the mean 24-month follow-up demonstrated excellent pain relief and improvement in the ability to perform activities of daily living after arthroscopic rotator cuff repair. However, the tear with anterior disruption of the rotator cable showed a significantly larger and more complex tear pattern and more advanced fatty degeneration. Additionally, the retear rate was significantly higher in patients with a tear involving the anterior attachment of the rotator cable.



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596 Deltoid Muscle Shape Analysis With Magnetic Resonance Imaging In Patients With Massive Rotator Cuff Tears: Is There Any Significant Difference Between Shoulders With And Without Superior Migration Of Humeral Head?

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Aim

The aim of this study is to quantify anterior and posterior component of the deltoid muscle by use of magnetic resonance imaging (MRI) and to evaluate if there is any significant difference between shoulders with and without superior migration of humeral head.

Background

Recently, some authors reported a pseudoparalysis is not associated with deltoid muscle shape, but another authors reported an imbalance between the components of deltoid muscle can disrupt dynamic stability of humeral head and cause a pseudoparalysis. However, until now, the relationship between superior migration of humeral head and deltoid muscle shape have not yet been fully clarified in patients with massive rotator cuff tears.

Methods

The preoperative MRIs of 35 shoulders who underwent rotator cuff repair or reverse total shoulder arthroplasty due to massive rotator cuff tears were randomly selected and evaluated for this study. Twenty-one shoulders had no superior migration of humeral head (AHI>6mm) and 14 shoulders have superior migration of humeral head (AHI<6mm). The ratio of posterior to anterior component of deltoid muscle in mean area and thickness was compared between shoulders with and without superior migration of humeral head.

Results

In 21 patients who had no superior migration of humeral head preoperatively (AHI>6mm), the ratio of posterior to anterior component of deltoid muscle in mean area (mm²) and mean thickness (mm) was 2.03 ± 0.12 and 1.57 ± 0.07 and, in 14 patients who had superior migration of humeral head (AHI<6mm), 2.34 ± 0.16 and 1.71 ± 0.11 , respectively ($p=0.207$, 0.438).

Conclusions

In the deltoid muscle shape analysis of the deltoid cross sectional area and thickness by use of MRI in patients with massive rotator cuff tears, the area of posterior component of deltoid muscle was significantly larger than that of anterior component. However, there was no significant difference in the deltoid muscle shape between shoulders with and without superior migration of humeral head.



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131 Analysis Of Spur At The Bicipital Groove Using 3D-CTYongdeok Kim, **Hyun Seok Song**, Ji-Seok Jang

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Aim

The purpose of this study was to analyze the anatomical parameters of the bicipital groove and the spurs around the groove using 3D-CT.

Background

Spurs of the bicipital groove can be classified as medial, lateral, groove spur.

Methods

Among the patients taken a shoulder 3D-CT at this hospital, patients of the proximal humeral fracture involving the bicipital groove were excluded. One hundred eleven were enrolled (59 men and 52 women). Mean age was 55.4 years. The cases were grouped into two groups according to the age. The number of group I (below 45) and group II (over 45) was 22 and 89, respectively. The width, depth and medial wall angle of the bicipital groove were measured in the narrowest axial image. Using 3D-CT and axial images, the spur around the bicipital groove was checked and measured.

Results

The average width of the groove of men and women was 11.92mm and 10.6mm, respectively ($p = .000$). The average depth of men and women was 4.92mm and 4.32mm, respectively ($p = .000$). The average medial wall angle of men and women was 60.79° and 60.77° respectively ($p = .99$). The incidence of spur was 18.2% in group I and 48.3% in group II. The spur was more frequently found at the lateral ridge of the groove than medial one. The width and depth of the bicipital groove was larger in men.

Conclusions

The spur at the medial ridge of the groove was more frequent in men. The spur at the lateral ridge was more frequent in general than medial ridge.



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742 Protruded Posterior Edge Of A Precontoured-Locking Plate For Proximal Humerus Fracture Measured In 3D Printed ModelJi-Seok Jang, **Hyun Seok Song**, Chu Hwan Byun, Yongdeok Kim

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Aim

The purpose was to analyze the protrusion of posterior edge of a precontoured-locking plate for proximal humerus fractures.

Background

A precontoured-locking plate is now widely used with satisfactory results for the proximal humerus fracture. Most plate systems available commercially have one design for right or left humerus. This rectangular design does not fit completely in the contour of the lateral side of the proximal humerus.

Methods

Age and sex-matched thirty shoulder (15 males and 15 females) were enrolled which undertaken shoulder 3D CT. Average ages was 56.8 year-old (range; 20-79 year-old). Cases having proximal humerus fracture, previous operation histories were excluded. DICOM files were imported into ITK-SNAP and Meshmixer free software to construct virtual 3D bone models. 3D model was made using the Fused deposition modeling (FDM) type 3D printer (da Vinci 2.0A; XYZ printing, Taiwan) with rendered files. The largest articular width, the height of the head from the inferior margin of the articular surface was measured by digital caliper. At the well-fitted position of the pre-contoured plate commercially available, the gap between the plate and posterior cortex, the distance between the tip of greater tuberosity and upper margin of the plate were measured.

Results

Average articular width of the head was 45 mm. The height of the head from the inferior margin of the articular surface was 32 mm. At the well-fitted position of the pre-contoured plate, average gap between the plate and posterior cortex was 3 mm.

Conclusions

Posterior edge of a pre-contoured locking plate for the proximal humerus fractures was protruded out of the contour of the proximal humerus. This occurred more in the smaller humerus.



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130 Atelocollagen Enhance The Healing Of Rotator Cuff Tendon In Rabbit Model

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Aim

This study is to verify the effect of atelocollagen on tendon-to-bone healing in the rabbit supraspinatus tendon compared to conventional cuff repair.

Background

Failure of cuff healing is a common complication despite the rapid development of surgical repair techniques of torn rotator cuff.

Methods

A tear of the supraspinatus tendon was created and repaired in 46 New Zealand white rabbits. They were then randomly allocated into 2 groups (23 rabbits per group; 15 for histological and 8 for biomechanical test): (1) Experimental group (group I), patch type atelocollagen was implanted between bone and tendon during repair, (2) Control group (group II), torn tendon was repaired without atelocollagen. Each opposite shoulder served as a sham. Histological evaluation was performed at 4, 8, and 12 weeks. Biomechanical tensile strength was checked 12 weeks after surgery.

Results

Histological evaluation scores of group I were significantly superior to group II at 12 weeks ($p = 0.005$). The load to failure was significantly higher in group I than in group II ($p = 0.001$).

Conclusions

Histological and biomechanical studies demonstrated better results in group I using atelocollagen in a rabbit model of the supraspinatus tendon tear.



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134 Probing Using Needle After Ultrasound-Guided Subacromial Injection

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Aim

The purpose was to analyze the changes of the diagnosis of the tear extent after probing.

Background

Accuracy of the ultrasound is good for the diagnosis of full-thickness tear of supraspinatus tendon. However, it is difficult to diagnose the degree of the bursal side partial-thickness tear on the ultrasound images.

Methods

Among cases undertook an ultrasonography at our hospital, total 53 cases were enrolled in which the supraspinatus has been examined using needle after ultrasound-guided subacromial injection. For 46 cases who were followed clinically, the change of symptoms were analyzed. Average age were 60.7 years (range, 38-86 years). Injection into the subacromial space under the ultrasound-guide was followed by probing and elevating the bursal side of supraspinatus tendon using the needle. Initial and probing ultrasound image videos were analyzed. Blind interpretation was carried out using each video and the extent of tear was diagnosed.

Results

There were 11 cases (group I) who had no abnormal finding, 16 cases (group II) who had tendinitis, 16 cases (group III) who had a partial-thickness tear less than 50% thickness, 9 cases (group IV) who had a partial-thickness tear more than 50% thickness, and 1 case who had a full-thickness tear. Probing using the needle changed the diagnosis in 53%. There was no change of diagnosis in 5 cases of group I (45%), 5 cases of group II (31%), 12 cases of group III (75%), 6 cases of group IV (67%), and none of group V.

Conclusions

In 53% cases, diagnosis were changed on the ultrasound studies by probing using needle after ultrasound-guided subacromial injection. Probing using needle was helpful in diagnosis about tear extent for the cases who were suspected as a bursal side, partial-thickness tear of supraspinatus tendon.



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135 Flipped Bursal Tear Edge Of Supraspinatus

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Aim

We found pattern having a flipped bursal edge which could make an excessive debridement. In this study, the incidence and clinical outcomes after arthroscopic repair were analyzed.

Background

Supraspinatus tear is the most common of the rotator cuff tears. These supraspinatus tears showing variable appearances, usually is classified as U type, L type, and reverse L type. Identification of pattern of tears is important for making strategy of repair and choosing the boundary of debridement.

Methods

Among cases undertaken by one surgeon, total 271 cases which had supraspinatus tear confirmed by arthroscopy were included. Medical records and arthroscopic videos were analyzed. Cases were classified into full-thickness or partial-thickness (bursal, articular or intratendinous) tear. Preoperative MRI images and clinical outcomes of cases having a flipped bursal tear edge were analyzed.

Results

There were 168 full-thickness tears and 103 partial-thickness (62 bursal, 26 articular, 8 both side and 7 intratendinous) tears. Ten cases (3.7%) having a flipped tear edge were searched. Among 10 cases, six were full-thickness tears and four were bursal-side partial-thickness tears. Average ages were 61.4 years old (range, 47-77). All were repaired by suture-bridge technique. On ultrasonography at 1 year postoperatively, there were no full-thickness retear, two partial-thickness defects. In all cases, postoperative functional scores were improved compared to preoperative ones.

Conclusions

Supraspinatus tears having a flipped bursal tear edge were repaired arthroscopically preserving the edge. All cases showed improved clinical outcomes.



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405 Thoracic Outlet Syndrome Secondary To Clavicle Fracture

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Aim

The aim of this study was to find out whether, despite the late diagnosis of TOS and delayed surgical treatment a good final outcome could be achieved.

Background

The common treatment of the clavicle fracture in the middle third is conservative. Most of them heal uneventfully. In rare cases malunion or nonunion can lead to thoracic outlet syndrome (TOS), due to narrowing of the costoclavicular space.

Methods

In our retrospective study we report on 4 cases (3 women, 1 man) who developed a TOS secondary to a middle third clavicle fracture. In 3 patients (2 women, 1 man) the diagnosis of neurogenic TOS, with a delay of several months after the onset of symptoms, was made based on the patient's history, physical examination, imaging studies and neurophysiological tests. In one case (woman) a neurovascular TOS was diagnosed secondary to reconstruction of a deficiency pseudarthrosis (nonunion resection, vascularized myo-osteal flap and plating). The three patients with the neurogenic TOS were treated surgically by nonunion resection, scalenotomy, neurolysis and plating of the clavicle. In one of these cases a first rib resection was performed. The fourth patient, neurovascular TOS, was treated surgically by decompression of the neurovascular structures, scalenotomy and first rib resection.

Results

The surgically treated patients obtained solid bony union of the clavicle and relief from their symptoms without complications. In all our cases a good result could be achieved.

Conclusions

TOS secondary to clavicle fracture is rare, and often will not be recognized as such. Our patients developed symptoms of a TOS at varying intervals following trauma to the clavicle. The delayed onset of symptoms may lead to diagnostic confusion and delay in the beginning of appropriate treatment. There is no reliable method for diagnosis of a TOS, it is only the synopsis of the findings that result in diagnosis.



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38 Ten-Year Multi-Center Clinical And MRI Evaluation Of Isolated Supraspinatus Repairs

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Aim

The authors aimed to report 10 year outcomes isolated supraspinatus repairs and to investigate the factors that favor healing and recovery

Background

Early repair of isolated supraspinatus tears could prevent deterioration of adjacent cuff tendons, but there is no consensus on their management, due to lack of long-term outcome studies.

Methods

The authors retrieved the records of all 511 patients that underwent repair of full-thickness isolated supraspinatus tears in 2003 by 15 surgeons at 15 centers. The patients were recalled in 2014 for evaluation at a minimum follow-up of 10 years. 188 patients could not be reached and 35 were excluded because they were re-operated (17 retears, 7 arthroplasty conversions, 11 other causes). A total of 288 patients (50% men) aged 58.4 ± 6.7 years (range, 46-74) were evaluated clinically, of which 210 were also evaluated using MRI.

Results

Complications were noted in 30 (10.4%) shoulders (20 stiffness, 1 infection, and 9 others). The Constant score had improved from 51.8 ± 13.6 (range, 19-87) preoperatively to 77.7 ± 12.1 (range, 37-100) at 10 years. The SSV was 84.9 ± 14.8 (range, 20-100) and the SST was 10.1 ± 2.2 (range, 3-12). Of the 210 shoulders evaluated using MRI, the repair integrity was Sugaya type I in 26 (12.4%), type II in 85 (40.5%), type III in 59 (28.1%), type IV in 27 (12.9%) and type V in 13 (6.2%). Tendon healing was correlated with total Constant score ($p > 0.005$), particularly with strength ($p > 0.001$), and inversely associated with pre-operative fatty infiltration ($p < 0.001$). Neither surgical approach nor pre-operative retraction influenced on outcomes.

Conclusions

Repairs of isolated supraspinatus tears maintained considerable improvements in clinical and radiographic outcomes at ten years, despite a revision rate of 6.8% and complication rate of 10.4%. It is difficult to estimate the precise re-tear rate, however, due to incomplete MRI records. Our data confirms that the ten-year Constant scores are significantly compromised by pre-operative fatty infiltration and post-operative retears.



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839 Validation Of CT Analysis Protocol For Coronoid Fractures Characterization

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Aim

To present a new protocol for CT analysis of cases with isolated coronoid fractures and fracture-dislocations

Background

Isolated Fractures located in the anteromedial facet of the coronoid have been associated to a specific injury pattern named varus posteromedial rotatory instability. Surgery has been recommended for treatment of this specific injury when more than 15% or 2,5 mm of the coronoid is fractured. However, no specific guidelines to perform such measurements, or their reproducibility are available

Methods

36 consecutive patients with isolated coronoid fractures and fracture dislocations were prospectively enrolled. A CT scan was performed acutely in all. Three radiologist created independently triplanar and tridimensional CT reconstructions from raw dicom files according to an specific protocol. Three axis referenced to the proximal ulna were defined: coronoid base axis, proximal ulna long axis, and posterior cortical axis for planar reconstructions. All radiologists performed independently a set of image analysis test in their reconstructions. Inter-individual and intra-individual reproducibility of variables was tested

Results

34 scans were available. Seventeen elbows had an asociated dislocation and 16 did not. A mean of 20 ± 8 per cent of the coronoid was fractured (range 7-38). Mean height of the fracture was 6 ± 2 mm (range 3-16). The anteromedial coronoid was involved in 30 cases. The fracture exited medially at the sublime tubercle margin in 19 cases and inside the tubercle in 7. The fracture bed was concave in 18 cases. Fourteen had posterolateral humeral impaction injuries and 7 posteromedial. Most reproducible variables were the angulation of the fracture plane referenced to the base of the coronoid, the height of the fractured coronoid and the percentage of the coronoid height fractured. (interclass correlation coefficients range 0.8-0.94).

Conclusions

Coronoid fractures can be reliably characterized with the CT based protocol presented in this study.



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889 Comparative Study Of Total Shoulder Arthroplasty Versus Total Shoulder Surface Replacement For Glenohumeral Osteoarthritis With Minimum 2 Year Follow-Up.

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Aim

We hypothesize that, in patients treated for osteoarthritis with a sufficient rotator cuff, TSA and TSSR patients have comparable functional outcome, glenoid component version and lateral glenohumeral offset.

Background

Compared to Total Shoulder Arthroplasty (TSA), Total Shoulder Surface Replacement (TSSR) may offer the advantage of preservation of bone stock and shorter surgical time, possibly at the expense of glenoid component positioning and glenohumeral overstuffing.

Methods

We conducted a retrospective cohort study with a minimum of 2 years of follow-up. Subjects in both TSA and TSSR groups received a cemented, curved, keeled, all-poly glenoid component. A cemented anatomical humeral stem was used in TSA. TSSR involved a humeral surface replacement (all components from Tornier Inc., St Ismier, France). Patients were assessed for functional outcome. Radiographs were assessed for radiolucent lines. Glenoid component position and lateral glenohumeral offset were assessed using CT images.

Results

After 29 and 34 months of mean follow-up, respectively, TSA (n=29) and TSSR (n=20) groups showed not significantly different adjusted Constant Scores (80% vs. 88%), Oxford Shoulder Scores (mean, 41 vs. 43), Disabilities of the Arm, Shoulder and Hand scores (24 vs. 18) and Dutch Simple Shoulder Test scores (9.4 vs. 10.1). Glenoid components showed similar radiolucent line counts (0.6 vs. 0.5), similar anteversion angles (0.1 vs. 1.5 degrees) and similar pre- to postoperative increase in lateral glenohumeral offset (4 vs. 5 millimeters). One intra-operative glenoid fracture occurred in the TSSR group.

Conclusions

Short-term function and outcome scores are comparable for shoulder osteoarthritis patients treated with TSSR and TSA.



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912 Postoperative Evaluation Of Patient-Specific Guides For Augmented Glenoid Components In Total Shoulder Arthroplasty

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Aim

The objective of this study was to estimate the accuracy provided by patient-specific guides to position augmented glenoid implants, and to compare the preoperative and resulting postoperative humeral head subluxation.

Background

For anatomical total shoulder arthroplasty (aTSA) with biconcave glenoids and humeral head subluxation, preoperative planning software and patient-specific guides are available to position augmented glenoid components, but their accuracy is not yet reported.

Methods

A total of 7 patients (4 women) with a mean age of 68 years (50-78) were prospectively included in this study. All patients underwent aTSA with an augmented glenoid implant (PerForm+, Tornier) to compensate for substantial biconcave wear. Blueprint software was used for preoperative planning. Keeled glenoid implants were positioned using patient-specific guides. Patients underwent standardized preoperative and postoperative shoulder CT scans. Reduced-dose postoperative CTs were performed using iterative reconstructions and dual-energy CT with a metal artifact reduction algorithm. Preoperative and postoperative CTs were registered with Amira software, using six bony landmarks. Two metallic cylinders within implant were used to register the glenoid implant on postoperative CTs. Postoperative implant orientation and position were measured and compared to preoperative planning. Preoperative and postoperative subluxations were measured in 3D as the ratio of the humeral head offset from the scapular axis and humeral head radius.

Results

Differences between planned preoperative and measured postoperative version, inclination, and glenoid center of glenoid implants were respectively 1.5 ± 6.1 degrees, 4.5 ± 3.8 degrees, and 2.0 ± 0.6 mm. Humeral head subluxation was reduced from $51\% \pm 8\%$ to $27\% \pm 12\%$ and remained postero-superior oriented.

Conclusions

Results confirms that planned position of augmented glenoid implant was obtained, within estimated measurement errors (5 degrees and 2 mm). We conclude that preoperative software, patient-specific guides and augmented glenoid implants can efficiently correct worn glenoid cavity and reduce humeral head subluxation.



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421 Short Term Clinical Results Of Latissimus Dorsi And Teres Major Anterior Transfer To Reconstruct Irreparable Subscapularis Tendon Tear

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Aim

The purpose of this study was to evaluate short term clinical results of latissimus dorsi and teres major anterior transfer to reconstruct irreparable subscapularis tendon tear.

Background

There is few reports of clinical results of anterior transfer of Latissimus dorsi and teres major to irreparable subscapularis tendon tear.

Methods

We evaluated 11 shoulders in 10 patients. Average age at surgery was 75.0(66-84) and follow-up period was 11 months(6-25). We analyzed active range of motion and Japanese Orthopaedic Association shoulder score(JOAscore). 7 shoulders were treated with small size humeral head replacement and rotator cuff reconstruction and 1 shoulder was treated with reversed shoulder arthroplasty for cuff tear arthropathy, 2 shoulders were treated with small size humeral head replacement, humeral head bone graft to the glenoid and rotator cuff reconstruction for chronic anterior shoulder dislocation. 1 shoulder was treated with small size humeral head replacement and rotator cuff reconstruction for rapidly destructive arthropathy. 1 shoulder was treated with open rotator cuff repair for massive rotator cuff tear. All cases were performed latissimus dorsi and teres major anterior transfer to reconstruct irreparable subscapularis tear.

Results

There was no complication during and after surgery. Active flexion was improved from 50.9(0-160) to 133.6(30-155) and external rotation was improved from 26.8(-20-60) to 44.1(20-60), JOAscore was improved from 48.1points(30-65) to 80.5points(65-89), postoperatively. Improvement of flexion and JOAscore was statistically significant ($p=0.009$, $p=0.0005$).

Conclusions

Pectoralis major transfer has been performed for irreparable antero-superior rotator cuff tears. We expect that latissimus dorsi and teres major anterior transfer is more effective to stabilize the humeral head than pectoralis major transfer. Improvement of motion was observed for short term period. Longer follow-up will be necessary to evaluate this procedure.



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736 Concomitant Intraarticular Pathologies Are Highly Correlated With Sports Activities In Patients With Recurrent Anterior Glenohumeral Instability

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Aim

To assess the characteristics of sports related pathology in patients with recurrent anterior glenohumeral instability.

Background

Participants in collision, contact and overhead sports are considered to be at risk of traumatic shoulder instability. We hypothesized that the high demand patients were more likely to have the concomitant pathologies with Bankart lesion.

Methods

1581 patients who underwent arthroscopic stabilization for traumatic anterior shoulder instability were retrospectively reviewed. They were divided into five groups by the sports including 213 collision sports, 481 contact sports, 296 overhead sports, 171 winter sports and 334 non or light sports patients. Intra-articular pathologies were investigated in each group. Incidence of bony Bankart lesion was assessed by the preoperative 3DCT. Incidence of SLAP lesion and capsular lesions were investigated by the arthroscopic findings. The data in each sports group were compared with the value of non or light sport patients. Chi-square for independence test were utilized for statistical analysis.

Results

The significantly higher incidence of bony Bankart lesion was observed in collision sports (66.2%, $p < 0.0001$), contact sports (47.2%, $p < 0.0001$) and winter sports (40.4%, $p = 0.012$) when compared to the non or light sport group (29.3%). Arthroscopic surgery revealed significantly higher incidence of the SLAP lesion in collision sports (40%, $p = 0.0078$), contact sports (37.8%, $p < 0.0001$), overhead sports (34.5%, $p = 0.0015$), winter sports (38.6%, $p = 0.00024$) when compared to the non or light sports (23.1%). Capsular lesions were significantly higher in collision (15.5%, $p = 0.0019$) and winter sports (16.4%, $p = 0.0013$) when compared to the non or light sports (7.2%).

Conclusions

Concomitant pathologies were highly correlated with the sports activities in patients with recurrent glenohumeral instability. Highest incidence of bony Bankart lesion and higher soft tissue lesions were observed in collision athletes. High incidence of the intraarticular lesions would have a potential risk of re-injury after returning to the high demand sports.



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**661 ELBOW BRACES: WHICH TYPE FOR WHICH DISORDER?
PROPOSAL OF A CLASSIFICATION SYSTEM.****Alessandro Marinelli**, Enrico Guerra, Marco Cavallo, Alice Ritali, Roberto Rotini

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Aim

Defining a classification of elbow braces, to avoid misunderstanding and to simplify the communication between the different professional figures involved in the rehabilitation phase.

Background

Elbow braces can be effective devices in different phase of elbow rehabilitation and their use, especially if integrated with other modes of physical therapies, can improve the recovery in many elbow disorders. Uncertainty still exists about the definition of different braces with consequent possible misunderstanding about models and their protocols.

Methods

We examined all the literature and we reviewed the cases treated with an elbow brace in our Department over the last 10 years, trying to define a classification system.

Results

On the basis of the function we identified 2 types of braces:

- the protection braces that are devices preventing excessive stress on the elbow. They can be divided in 3 categories: non articulated, sleeve or forearm strap, articulated braces.

- the mobilization braces that are mechanical devices exerting forces to stretch the retracted tissue, stimulating the recovery of the elbow movement. They can be divided in 2 categories: dynamic or static progressive braces.

Indications and their specific protocols in different elbow disorders are also analyzed and discussed.

Conclusions

Elbow braces are effective devices in the rehabilitation of many elbow disorders. The brace should not be thought as an alternative to the physical therapist. It should be included in a global rehabilitation program shared between the patients and the caregivers involved. For these reasons, a shared brace nomenclature and shared protocols are fundamental.



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854 Impact On Severity Of Instability And Patient's Activities Of "Off-Track" Osseous Lesions

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Aim

To analyse the impact on patient's preoperative activities and athletic performance of off-track osseous lesions

Background

We hypothesized that patients with "off-track" osseous lesions have a more severe preoperative grade of instability and impact on patient's athletic activities than patients with "on-track" abnormalities

Methods

Glenoid track measuring Hill-Sachs and/or bony Bankart lesions was calculated preoperatively on MRI or CT scan (diGiacomo 2014), using dedicated software, in 159 patients (mean age, 29,6 years) diagnosed with anteroinferior shoulder instability and scheduled for arthroscopic stabilization. Osseous lesions were categorized in "on-track" or "off-track", and the impact on daily and athletic activities (number of dislocations and subluxations, degree of instability, athletic performance, level of competition) in both groups was compared.

Results

Measurements disclosed 96 "on-track" and 63 "off-track" patients. Both groups were homogeneous regarding age and athletic activity. Glenoid track correlated directly with the degree of instability. Off-track patients reported a higher number of preoperative dislocations (12 ± 26 vs 4 ± 6 in on-track $p=0.089$), and a lower level of athletic activity (93% of patients with On-Track were enrolled in moderate or high demand sport activities, vs 70% in the Off-track group, $p=0,001$). The more severe the genoid track abnormality, the greater the instability and the number of dislocations ($p=0.05$). The larger the Hill Sach index the higher the number of previous dislocations ($P=0.012$), and the lower the functional status $p=0.01$. The Hill Sach Depth did not correlate with the functional status or the level of instability.

Conclusions

Patients with Off-Track lesions had more severe instability and less capacity for higher demand sport activity.



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757 Total Elbow Arthroplasty Latitude*: A Prospective Series Of 36 Cases With A Mean Follow-Up Of 27monthsMarie-Caroline Merlet, **Fabrice Duparc**, Antoine Vallée

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Aim

After having used total elbow arthroplasty (TEA) with distal contact if humeral pillars were present or with anterior hook when pillars were absent or not reconstructible, we implanted the Latitude* (Tornier-Wright) TEA that allowed distal and anterior stabilization.

Background

Background: We report the results of a prospective monocentric series.

Methods

33 patients have been operated on in our department between 2007 and 2016, 10 men (71.2years, (43-82), 23 women (64.9years, (20-81)). The etiologies were fractures (11), post trauma sequelae (8), rheumatoid arthritis (6), osteo-arthritis (6), secondary osteo arthritis (5) (hemophilia, juvenile idiopathic arthritis, psoriatic arthritis). All the prosthesis were linked. The radial head resurfacing was performed in patients. The patients underwent X-Rays and clinical control at 6 weeks, 1 year, 3years, 5years and the follow-up was 27 months (1.5-60)

Results

Good functional results were seen in 33 patients. Range of motion: Extension (-19.2°), Flexion (121.1°), arc of pronosupination (162.6°). 3 cases of stiffness were seen. Radiologic lucent lines were seen along the humeral implant in 1, along the ulnar component in 1, and along the radial component in 2cases. A loosening aspect was seen in 2 cases, but not symptomatic. Per-operative complications were rupture on the pillars (9), post-operative complications were 1 hematoma , 3 displacements , 2hygroma, 3ulnar paresthesia, 1osteoma. No implant has been revised at the maximal follow-up.

Conclusions

The results of this experience with a new TEA are encouraging. The rate of complications of this demanding technique was not superior to the reported data of the literature. The association of the distal contact on remaining pillars even of poor density with the anterior stabilisation seems to lead to a good stabilization of the humeral component



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807 Calcific Tendonitis: Long Term Comparative Clinical Outcome Of Conservative Vs Surgical Treatment.

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Aim

The aim of this work is to compare the subjective results of extracorporeal shockwaves therapy (ESWT) to arthroscopic calcium removal with needling (AN).

Background

Optimal treatment of shoulder calcific tendonitis (CT) is controversial.

Many conservative treatments have been reported in the literature, showing varying levels of evidence of efficacy whereas arthroscopic surgery is considered as the last option.

Methods

We reviewed our database and we found 194 patients treated for CT between 2007 and 2011.

We performed a telephonic interview (VAS, SANE, Patient Based Constant Score(PBCS)) to 75 consecutive patients treated with 3 ESW and to 59 patients treated with AN; all the patients with a 5 years minimum follow up (mean 8.6 years; range 12y -5y). Patients who reported clinical impairment were recruited for office clinical evaluation.

Results

Pain at last F.U. mean 8.6 years (range 12y-5y):

In ESWT group (75 patients), 57 (75%) were pain free, 6 (8%) patients were operated, 12 (16%) patients needed injections and other treatments.

In AN group (59 patients) : 55 (93.3%) pain free, 4 (6.7%) recurrence of symptoms.

ROM (detected from PBCS): In ESWT group: 57 patients (75%) of patients referred full ROM.

In AN group: 55 patients (93.3%) of patients referred full ROM.

PBCS: no statistic difference between the two groups (p<0.01)

Conclusions

This is the first study, in our knowledge, reporting long term F.U. analyzing clinical outcome (PBCS, ROM and pain) and subjective satisfaction after AN vs ESWT treatment of calcific tendinitis. The results are better in the operated group.



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254 SUBACROMIAL PRESSURE REDUCTION AFTER ROTATOR CUFF REPAIR WITH A BIODEGRADABLE SUBACROMIAL SPACER (InSpace)**Matthias Frank Pietschmann**¹, Yan Chevalier¹, Christoph Thorwächter¹, Assaf Dekel², Peter Ernst Müller¹

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Aim

This biomechanical study investigated the effects of a biodegradable spacer inserted in the subacromial space on pressures over the repaired rotator cuff tendon in passive motion cycles, to evaluate the protective mechanisms of the spacer, in particular how it induces pressure change over the repaired tendon in passive motion typical for post-operative rehabilitation routines.

Background

Despite the improvements in arthroscopic rotator cuff repair, mechanical failure after repair of large and massive tears remains a major clinical problem. For large tears (>4 cm), failure occurs with as many as 78% within the first 3 months after repair. Therefore protection of the repair from excessive loading, at the early stages of the rehabilitation process, is crucial.

Methods

The spacer was inserted subacromially over a single-row rotator cuff repair in six fresh-frozen cadaveric shoulders. Specimens were tested using a passive shoulder simulator for abduction-adduction, flexion-extension and internal-external rotation while simulated constant glenohumeral and acromiohumeral loads as well as supraspinatus tension were applied. A sensor positioned below the acromion was used to measure pressure changes before and after placement of a balloon-shaped subacromial spacer.

Results

Peak pressures were measured near 90 degrees abduction. Mean pressures in abduction-adduction were significantly reduced from 122 to 52 MPa. Peak pressures after repair were 1171 MPa and 1750 MPa in flexion-extension and abduction-adduction motion, respectively, and significantly decreased to 469 MPa and 535 MPa after spacer insertion ($p < 0.0001$). No statistical differences were observed for internal-external rotation.

Conclusions

The use of the spacer above the repaired tendon reduced peak pressures and distributed them more widely during both abduction-adduction and flexion-extension motions. The balloon may reduce the pressure on the repaired tendon, thus potentially protecting the repair. Further studies to investigate this phenomenon are warranted, in particular relating these changes to shoulder kinematics following tear repair and spacer insertion.



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481 A Comparison Of The Minimum Data Sets For Primary Shoulder Arthroplasty Between National Shoulder Arthroplasty Registries. Is International Harmonisation Feasible?

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Aim

The aims of this study were to identify the common components of the Minimum Data Set (MDS) of current national shoulder arthroplasty registries that could be pooled for analysis; and to determine whether further harmonisation of data collection across these registries would be feasible.

Background

Despite the increasing use of shoulder replacements, their numbers remain relatively small compared to hip and knee arthroplasty. The ability to pool data from international shoulder registries is desirable to enhance the volume of data available for analysis.

Methods

Copies of primary shoulder arthroplasty MDS forms, annual reports, and other publications from national shoulder arthroplasty registries were identified using internet search engines of Google® and Bing® up to November 2016. A literature review was performed using the electronic databases PubMed, CINAHL and EMBASE. Data relating to local or regional registries was excluded.

Results

There were nine national shoulder arthroplasty registries reporting a total of 97,388 primary shoulder replacements. There was significant variation identified in data collected between the different registries, however all minimum data sets included patient identifiers; date of surgery; implant identification; laterality of surgery; indication; and mode of implant fixation. At least 6 registries had common options within the categories of indication for surgery, implant fixation and previous operations. Most discrepancies were seen between the different registries in categories for additional interventions; outcome measures; and intra-operative complications.

Conclusions

As numbers within individual registries are relatively small, international collaboration would harness the global strength of knowledge and experience in shoulder replacement. Several common components were identified between the current national registries, as well as similarities in some categories that could become unified with only minor changes by a few registries, highlighting the potential feasibility of MDS harmonisation.



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815 Primary Stability Of Knotless Suture Anchors In Primary And Revision Bankart Repair

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Aim

The primary stability of knotless suture anchors in-vivo in primary and revision Bankart repair was tested using the PushLock® PEEK 3.5 mm anchor (Arthrex Inc., Naples, FL, USA) in human glenoids.

Background

Knotless suture anchors are frequently used in Bankart repair. Little data exists regarding the primary stability of knotless suture anchors in revision Bankart repair.

Methods

The quantitative computer tomography bone mineral density (BMD) of the glenoids was determined. The PushLock® was implanted 11 times in the glenoids simulating primary Bankart repair and 15 simulating the revision surgery after times following 11 primary implantations. The biomechanical stability was tested using a cyclic testing protocol with a universal testing machine. The maximum failure load (Fmax), the system displacement and the modes of failure were recorded.

Results

The BMD in the primary and revision groups showed no significant differences. Four suture anchors (26,67 %) in the revision repair group dislocated prematurely directly while initiating the preload tension of 25 N. Premature dislocation of the revision repair sutures occurred mainly after the primary anchor was twisted out while being drilled over; therefore 11 of 15 knotless sutures values were included in the evaluation. There were no significant differences regarding the maximum failure loads of the primary (135.5 N) and revision groups (149.6 N). The system displacement of the suture anchor systems during the first cycle yielded 0.74 mm for the primary repair group and 0.64 mm for the revision repair group and were not significant.

Conclusions

A high primary stability of the revision suture anchors was found, without significant differences when compared to the primary repair group. Once knotless suture anchors are implanted in a stable manner for revision surgery, they provide a primary stability similar as do anchors for primary repair. During revision surgery a complete over-drilling of the primary anchors should be avoided.



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534 Rotational And Varus Laxity In A Cadaveric Model Of Posterolateral Rotatory Instability

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Aim

Investigate the influence of serial sectioning of the lateral ligamentous complex on elbow stability in a cadaveric model of posterolateral rotatory instability (PLRI).

Background

PLRI is caused by an insufficiency of the lateral ligamentous complex, which consists mainly of the radial collateral ligament (RCL) and the lateral ulnar collateral ligament (LUCL).

Methods

Kinematics of six fresh frozen cadaveric elbow specimens were measured by digitizing anatomical marks with a Microscribe 3DLX digitizing system (Revware Inc, Raleigh, NC). Each specimen was tested under four conditions: Intact, LUCL tear, LUCL and RCL tear, and complete Tear (LUCL, RCL and capsule tear). Each specimen was tested in 30°, 60° and 90° elbow flexion angles. Varus- laxity was measured in supination, pronation, and neutral forearm rotation positions and total forearm rotation was measured with 0.3 Nm of torque.

Results

The radial head dislocated in all specimens in LUCL and RCL tear and Complete tear but not in LUCL tear. Total forearm ROM did not increase from intact to LUCL tear ($p > 0.05$) but significantly increased in LUCL and RCL tear ($p = 0.0002$) and complete tear ($p < 0.0001$) in all flexion angles. While there was a significant difference from intact to LUCL and RCL tear and complete tear conditions ($p < 0.0001$ and $p < 0.0001$), there was no difference between the intact and LUCL tear.

Conclusions

LUCL tear alone is not sufficient to cause PLRI; additional RCL tear is needed to cause subluxation of the radial head and increase varus laxity. Capsular tear had no additional effect. We found that PLRI not only increases radial head dislocation and varus laxity but also leads to an increase in forearm ROM. The increase of forearm ROM is a so far unknown symptom in PLRI and might be used as an additional diagnostic feature in the clinical evaluation of the complex syndrome.



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97 Supraspinatus Detachment Causes Musculotendinous Degeneration And A Reduction In Bone Mineral Density At The Enthesis In A Rat Model.

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Aim

The aim of this study was to investigate rotator cuff degeneration in a rat, and assess the development of osteopenia at the enthesis following tendon detachment.

Background

In order to evaluate biological strategies that enhance tendon-bone healing in humans, it is imperative that suitable animal models accurately reproduce the pathological changes observed in the clinical setting following a tear.

Methods

Eighteen female Wistar rats underwent unilateral detachment of the supraspinatus tendon. Specimens were retrieved at three (n = 6), six (n = 6), and nine weeks (n = 6) postoperatively for histological analysis and peripheral quantitative computer tomography.

Results

Three weeks following tendon detachment there was a significant increase in the modified Movin score (indicating degeneration), fatty infiltration, an increase in musculotendinous cellularity, loss of normal collagen fiber structure/arrangement, rounded tenocyte nuclei, and an increase in the number of vascular bundles. This was accompanied by a reduction in bone mineral density at the tendon insertion site. After six weeks though, these changes were less prominent.

Conclusions

This study has shown that three weeks after surgical detachment, the supraspinatus musculotendinous unit in a rat undergoes degeneration, and the greater tuberosity exhibits a reduction in bone mineral density. These changes are similar to those that occur in the clinical setting following a chronic rotator cuff tear, with the difference that scar tissue bridges the defect in a rat whereas in a human the tendon-bone gap is largely maintained. These findings suggest that the detached rat supraspinatus tendon, after three weeks, could represent a suitable model for investigating biological strategies targeted towards improving tendon-bone healing in chronic rotator cuff tears.



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98 Application Of Demineralised Cortical Bone Matrix And Bone-Marrow Derived Mesenchymal Stem Cells In A Chronic Rotator Cuff Tear Model.

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Aim

The aim of this study was to determine if DBM enhanced with mesenchymal stem cells (MSCs) could improve healing when applied to a degenerative rotator cuff tear model.

Background

The success of rotator cuff repair is primarily dependent upon tendon-bone healing. Demineralised bone matrix (DBM) consists of a network of collagen fibers that provide a sustained release of growth factors such as bone morphogenetic proteins (BMPs). Previous studies have demonstrated that it can regenerate a fibrocartilaginous enthesis.

Methods

Eighteen female Wistar rats underwent unilateral detachment of the supraspinatus tendon. Three weeks later, tendon repair was carried out in animals randomized into three groups: Group 1 received augmentation of the repair with cortical allogenic DBM (n = 6); Group 2 received augmentation with a commercially-available non-meshed, ultra-thick acellular human dermal matrix (n = 6); and Group 3 underwent tendon-bone repair without a scaffold (n = 6). All animals received one million MSCs. Specimens were retrieved at six weeks postoperatively for histological analysis and evaluation of bone mineral density.

Results

All groups demonstrated closure of the tendon-bone gap with a fibrocartilaginous enthesis, but the degenerative process could not be reversed. Although there were no significant differences in the enthesis maturation and Modified Movin scores, repairs augmented with dermal matrix + MSCs exhibited a disorganised enthesis, abnormal collagen fiber arrangement, and greater cellularity compared to other MSC groups. Only repairs augmented with DBM + MSCs reached a bone mineral density not significantly lower than non-operated controls.

Conclusions

This study demonstrated that when DBM and MSCs were applied to the healing enthesis in a chronic rotator cuff tear model, a fibrocartilaginous-based structure was produced with significantly increased bone compared to other groups.



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34 Subacromial Corticosteroid Injections Transiently Decrease Suture Anchor Pullout Strength: Biomechanical Studies In Rats

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Aim

To evaluate the effect of single and multiple corticosteroid injections on the pullout strength of suture anchors in rats.

Background

Arthroscopic rotator cuff (RC) repair incorporates suture anchors in order to secure the torn RC tendons to the greater tuberosity bone. The strength of the RC repair may be dependent on the interface between the anchor and the bone, and on the quality of the greater tuberosity.

Methods

50 rats were divided into 3 groups: normal saline injection (control), a single methylprednisolone acetate (MTA) injection (MTA1), and 3 1-weekly MTA injections (MTA3). The rats were sacrificed at either 1 or 4 weeks following the last injection. A mini suture anchor was inserted into the humeral head through the greater tuberosity. All specimens were tested biomechanically.

Results

1 week after the last injection: The mean maximal pullout strength was significantly reduced in both the MTA1 group (63.5%) and the MTA3 group (56%) compared to the control group ($P < .05$ for both). Mean stiffness decreased significantly in both treatment groups compared to controls ($P < .05$). 4 weeks after the last injection: There was a significant increase in the mean maximal pullout strength after the single and triple MTA injections compared to the values recorded at the 1-week time point ($P < .05$). At 4 weeks, the mean maximal pullout strength after a single MTA injection was 26.18 ± 10 N, which was 92.8% of the pullout strength measured in the control group.

Conclusions

Our results clearly showed a significant detrimental effect of corticosteroid exposure on the pullout strength of a suture anchor at 1 week. However, this effect was transient and resolved within a relatively short period. These findings may indicate that there should be a waiting period between the subacromial corticosteroid injection and RC repair that involves the use of suture anchors.



584 Recurrent Instability Following Arthroscopic Labral Repair In Adolescent Athletes

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Aim

The aim of this study was to investigate the recurrence rate of shoulder instability following arthroscopic capsulo-labral repair in an adolescent sporting population.

Background

Traumatic glenohumeral dislocation of the shoulder is one of the most common shoulder injuries but especially among adolescent athletes. The management of instability in the young sporting cohort has been continually controversial due to high recurrence rates.

Methods

A total of 92 patients, under the care of three senior shoulder surgeons were identified over a five-year period. The mean age of the cohort was 16.3 ± 0.9 (range 13-17) and consisted 8 females and 84 males. Demographic, clinical and intra-operative data for all patients with shoulder instability were recorded on our database. Recurrence rates were recorded and relative risks calculated.

Results

At a follow-up of 33 months (± 20 months), thirty-three patients presented with one episode of recurrent instability. Therefore, we highlight a recurrence rate of 36% in adolescent athletes following arthroscopic labral repair surgery. The mean time to recur was 62.4 weeks (± 45.3 weeks). All recurrences were following a sporting injury. Of the thirty-three patients with a recurrence of instability, 25 had a further surgical procedure and the remaining eight patients underwent conservative rehabilitation. A subsequent Latarjet was performed in 22/25 cases of recurrence, with three patients undergoing a revision arthroscopic soft tissue procedure. Relative risk analysis detailed that athletes who undergo primary arthroscopic shoulder stabilisation under 16 have 2.5 times the risk of developing a further instability episode, compared with athletes over the age of 16 at the time of index surgery ($p=0.0002$).

Conclusions

A recurrence rate of 36% was described in adolescent athletes undergoing arthroscopic labral repair surgery. Athletes who undergo primary arthroscopic shoulder stabilisation under 16 have 2.5 times the risk of developing a further instability episode, compared with athletes over the age of 16 at the time of index surgery.



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937 Knotless Double-Layer Reconstruction Of Delaminated Rotator Cuff Tears: A Biomechanical Study In Cadaveric Shoulders

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Aim

The aim of this study was biomechanically compare three different repair techniques for delaminated rotator cuff tears.

Background

Despite continuous improvements in surgical techniques, re-tear rates following rotator cuff repairs are still high, especially in chronic and/or massive tears. A morphological factor that has to be considered in this regard is the presence of a delaminated rotator cuff tear. The prevalence of delamination has been reported between 38% and 92%.

Methods

Eighteen fresh frozen cadaveric shoulders were used to evaluate native tendon extension, footprint reconstruction, gap formation under cyclical loading, and load-to-failure of three different repair configurations (knotless double-layer repair, double-row repair with knotted medial row, knotless double-row repair with FiberTapes). Optical markers were used to document tendon displacement during cyclical loading. Dynamic pressure sensors (TekScan) were used to assess footprint pressure characteristics in three different degrees of abduction and five rotational positions.

Results

Pressurized footprint area was reconstructed most adequately with knotless-double layer repair through the whole range of tested motion, especially in 90° abduction. The double-layer reconstruction technique restored displacement under cyclical loading back to levels of the native supraspinatus tendon. While load-to-failure was highest in the double-layer repair group, the results were not significantly different across groups.

Conclusions

Knotless double-layer reconstruction of delaminated rotator cuff tears demonstrated excellent footprint restoration through the whole range of motion, while restoring displacement under cyclical loading closest to the native tendon.



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473 Arthroscopic Rotator Cuff Repair With A Transosseous Suture Technique: A 40-Months Follow-Up. A Prospective Randomized Controlled Trial.

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Aim

Evaluate clinical and radiological results of arthroscopic rotator cuff repair using two different techniques: single-row anchor fixation versus transosseous hardware-free suture repair.

Background

Rotator cuff tear is a common finding in patients with painful, poorly functional shoulder. The surgical management of this disorder has improved greatly and can now be fully arthroscopic.

Methods

Sixty-nine patients with rotator cuff tears were enrolled: 35 patients were operated with metal anchors and 34 with standardised transosseous repair. The patients were clinically evaluated before surgery, during the 28 days following surgery and at least 1 year after the operation using validated rating scores (Constant score, QuickDASH and NRS). Final follow-up was obtained at more than 3 years by a QuickDASH evaluation in order to detect any difference from previous follow-up. During the follow-up, rotator cuff integrity was determined through magnetic resonance imaging and classified into the five Sugaya's categories.

Results

Patients operated with the transosseous technique had significantly less pain, especially from the 15th postoperative day: in the third week the mean value of NRS for anchor group was 3.00 while for tunnel group was 2.46 (p-value = 0.02), in the fourth week the same values were 2.44 and 1.76, respectively (p-value < 0.01). There were no differences in functional outcome between the two groups at the final evaluation. In the evaluation of rotator cuff repair integrity, based on Sugaya's magnetic resonance imaging classification, no significant difference between the two techniques in terms of re-tear rate were found (p-value = 0.81).

Conclusions

There were no significant differences between the two arthroscopic repair techniques in terms of functional and radiological results. However, postoperative pain decreased more quickly after the transosseous procedure, which, therefore, emerges as a possible improvement in the surgical repair of the rotator cuff.



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310 Intra-Articular Local Infiltration Analgesia Compared To Interscalene Block In Postoperative Pain Control After Shoulder Arthroplasty. A Comparative Randomized Non-Inferiority Trial.

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Aim

To compare the efficacy of intra-articular local infiltration analgesia (LIA) and interscalene block (ISB) as postoperative analgesia within the first 48 hours after total shoulder arthroplasty (TSA).

Background

The ISB is the gold standard in pain control after shoulder surgery. The LIA is an effective alternative to loco-regional anesthesia (LRA) in both hip and knee arthroplasty but no data exist for TSA.

Methods

A prospective randomized controlled multi-center study was conducted in 2014-2016. All patients who were elective for TSA for omarthrosis were included. In ISB group, patients received ISB with perineural catheter and continue infusion of ropivacaine 0.2% during 48h. In LIA group, the surgeon injected 110 ml of ropivacaine 0.2%, ketoprofen 30 mg and epinephrine 0.5 mg before he put the implant and inserted a catheter into the glenohumeral joint. The next morning, he reinjected through this catheter 10 ml of ropivacaine 0.2%, ketoprofen 30 mg and epinephrine and removed it. The primary outcome was the mean pain using a numeric pain rating scale (NRS, 0-10) during the 48h after surgery. Secondary outcomes were mean postoperative opioid requirements, postoperative complications, functional scores at 1-month and at last follow-up. The sample size was calculated as non-inferiority study.

Results

99 (50 LIA/49 ISB) patients were included, mean age 72±9.6 years, 36 anatomic and 63 reversed TSA. No significant difference was found between LIA and ISB groups for mean 48-hour postoperative pain (1.4±0.9 vs 1.7±1, p=0.19) but LIA group had significantly less pain in the recovery room (0.6±1 vs 1.5±1.7, p=0.003). Total consumption of opioids was similar (p=0.27). No complications occurred in both groups. No significant correlation was found between postoperative pain and functional scores at 1-month and last follow-up.

Conclusions

The local infiltration analgesia is not less effective than the interscalene block in the early postoperative pain control after TSA.



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810 Indication, Technique And Long-Term Results After Shoulder Arthrodesis Performed With Plate Fixation

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Aim

Describing the experiences with the used operating technique seems to be helpful for reproducible results. Additional knowledge of long-term results and evaluation of advantages and disadvantages of the procedure seems to be helpful in finding the indication.

Background

Arthrodesis of the shoulder joint is a radical event, so it is difficult to impart patients. However, until now it is an ultima ratio procedure in hopeless cases.

Methods

11 patients operated between 2000 and 2013 could be included in the investigation (mean age 45 years; FU mean 8,5 years; 8 male and 7 female; right 9, left 2). Indications: persistent instability 5 (2 with epilepsy), rotator cuff rupture 3 (2x after latissimus dorsi transfer and 2x with additional instability), brachial plexus injury 2, posttraumatic arthropathy 1. Fixation with DC-plate (pre-bent to 110°) was used in all cases; with special focus placing one screw in scapular neck at least. Targeted arthrodesis position was abduction 30°, forward flexion 30°, internal rotation 30°.

Results

Active abduction improved from 26,1° to 63 °, forward flexion from 20,5° to 79°. In resting position with hanging arm aside, mean abduction was 2,8° and forward flexion 7,8°.

All patients had considerable painrelief from 8,2 to 2,0 points. 5 patients rated the outcome as excellent, 3 as good and 1 as satisfactory. 9 patients would repeat the procedure. In Oxford Shoulder Score an improvement from 3,9 to 2,4 points was found.

Bony fusion was achieved in all cases, 3-4 months p.o. in mean. Considerable neurologic or angiologic complications were not observed.

Conclusions

Described operating technique achieves high fusion and low complication rate. Relief of pain and functional improvement are astonishing. Analyzing our results correction of above mentioned positions is necessary: arthrodesis position for abduction 25° (by means of pre-bending plate of 105°), forward flexion 25° and internal rotation 30° is to suggest.



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674 The Subjective Outcome Determinant (SOD): A Retrospective Study On Physician-Patient Score Correlation

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Aim

This study sought to determine whether the Summary Outcome Determinant (SOD) score had the ability to demonstrate a high level of physician-patient agreement, was easy to administer and understand, and could be used in the context of a variety of procedures (i.e. was versatile).

Background

Recent emphasis on value-based healthcare has led to a greater reliance on patient-reported subjective outcome measures. The perceived success of an intervention may differ between physician and patient which results in poor physician-patient reliability with many outcome measures.

Methods

A sample of patient cases were reviewed, of which 340 cases contained an SOD score. Of the 340 cases, 182 were included as they had both physician-assigned and patient-assigned SOD scores recorded. The SOD is based on the physician and patient assigning a categorical rating in addition to a numerical score based on the perceived outcome after a procedure.

Results

The ICC of physician-patient numerical ratings was 'excellent' (0.94), with substantial agreement of the categorical scores (Cohen's Kappa = 0.69). The physician and patient's numerical ranking matched exactly (71%) or differed by a factor of no more than one (27%) in 98% of cases. The categorical score disagreed by 1 level in 33/182 (17%) cases. In 14 of those 33, the numerical score was identical, and in 17/33, the numerical score differed by only 1 point. In regards to both the categorical and numerical scores, 162/182 (89%) rated the outcomes of surgery at the same categorical level or numerical level, or both.

Conclusions

The SOD score can be used as both a surgeon and patient-based outcome score given the high level of agreement. Given its brevity, ease of understanding and high inter-rater reliability, it has the potential to be used across multiple specialties to rate outcomes.



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591 Radial Neck Diameter As A Guide For Prosthetic Stem SizingDave R. Shukla, Eduard Alentorn-Geli, Andrew T. Assenmacher, James S. Fitzsimmons,
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Aim

Our aim was to determine whether the optimal diameter of a prosthetic radial head stem could be determined based on the radial neck's canal diameter as measured on radiographs, and to assess whether the outer diameter of the radial neck was related to the diameter of the intramedullary canal.

Background

To maximize the chance of implant longevity, a porous-coated cementless prosthetic radial head stem should obtain a secure press-fit, which is dependent on proper stem sizing. Though methods have been described for determining the appropriate stem diameter intra-operatively, there is little published about pre-operative templating of a prosthetic radial head based on radiographs, though these guidelines exist for other types of arthroplasty (i.e. hip and knee).

Methods

AP and lateral radiographs from 22 patients who underwent radial head replacement with one implant design by the senior author were reviewed. The medial and lateral cortices were measured on the AP view, and the anterior and posterior cortices were measured on the lateral view. The pre-operative intramedullary canal diameter was compared to the final stem size implanted.

Results

The mean differences between the canal diameter and final stem diameter were significantly less than 1 mm, based on AP ($0.6 \pm .1$ mm) ($p = .003$) and lateral x-rays ($0.6 \pm .1$ mm) ($p = 0.0005$).

Conclusions

Published data are lacking on the correlation between proximal radial canal diameter and the appropriate size of prosthetic stems as determined from in vivo implants. These data permit the development of templates to augment the currently-used method of intra-operative size estimation based on tactile feedback during implantation. Size selection of press-fit radial head implant stems based on radiographic measurement of canal diameter agrees with intra-operative surgical sizing within 1 mm.



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856 Cartilage Graft From Rib At Elbow Level**LAURENT Obert**, Hugo Kielwasser, Francois Loisel, Antoine Adam, Daniel Lepage

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Aim

to evaluate cartilage and perichondrium graft from rib to fill osteochondral defect at elbow level

Background

Articular defect in high demanding patient can be treated by osteochondral graft. We report 5 cases of rib cartilage autograft to solve the difficult problem of limited destroyed articular zone at elbow level but in high demanding patient.

Methods

2 cases of advanced osteochondritis dissecans and 1 case of necrosis of lateral condyle (post chemotherapy) have been treated by a block-shaped graft harvested from the transitional area between the rib and its associated cartilage was implanted to the osteochondral defect. 2 defect on articular zone of olecranon bone have been resurfaced by perichondrium (periosteum of the rib).

All patients followed prospectively have been reviewed with a mean follow up of 2,4 years (1-4,8). Revascularization of the graft depicted on T1-weighted magnetic resonance imaging and congruity of the reconstructed articular surface depicted on T2-weighted imaging were assessed at 6 and 12 months postoperatively.

Results

Functional recovery was good, and all patients were satisfied with the final outcomes (EVA =0 to 1, Mayo elbow score > 80, QDash < 15 : in all cases). No patient showed obvious radiographic changes of osteoarthritis. All patients were satisfied with the final outcomes and had good functional recovery.

Conclusions

This method allows the osteochondral defect to be repaired with uniform hyaline cartilaginous articular surface without any effect to other joints. Donor site no longer causes pain at 3 weeks days after surgery. As reported by Nishinaka N & al (jses 14), Shimada K & al (jbjs a 12) Sato K & al (Thues 08) this technique is reliable.



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818 Serratus Anterior And Bipolar Teres Major Tendon Transfer In Irreparable Subscapularis Tears: Anatomical StudyThibault Lafosse¹, Malo Lehanneur¹, Philippe Hardy², Bassem El Hassan³

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Aim

To study the anatomical feasibility of new tendon transfers for irreparable subscapularis tears in young patients.

Background

Irreparable subscapularis tears can be a very challenging problem in young patient, for whom reverse shoulder arthroplasty is not an option.

Tendon transfers are described, but do not reproduce the anatomy or the line of action of the subscapularis.

Methods

We propose two new transfers, the Serratus anterior, and the bipolar teres major transfers. We studied 25 fresh frozen cadavers. The first five subjects were used for advanced anatomical dissection and to study the vascular and nervous surroundings of the transfers. We studied the length and width of the muscles, and evaluated the distance between the tip of the scapula and the lesser tuberosity, and the distance between the medial border of the scapula and the lesser tuberosity. We assessed the absence of impingement on the nerves and vessels of the transfers, and the surrounding anatomical structures.

Results

The transfers appeared feasible on all the cadavers without any impingement neither on the brachial plexus nor on the transferred muscles pedicles no matter the position of the arm. We performed 10 Serratus and 15 bipolar teres major transfers. The mean length of the Serratus anterior was 181mm, the mean distance between the tip of the scapular and the lesser tuberosity was 167mm, the length of the teres major was 185mm, and the mean distance between the medial border of the scapula and the lesser tuberosity was 157mm.

Conclusions

Irreparable subscapularis tears are difficult to address in young patients. Existing tendon transfers are not completely satisfactory, and we propose new transfers to better reproduce the line of action of the subscapularis. Clinical evaluation is now necessary



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793 Outcome Of Short Stemmed Hemiarthroplasty Versus Anatomic Total Shoulder Arthroplasty: Preliminary Results

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Aim

This multicentre study aims to compare the outcomes of anatomic total shoulder arthroplasty with hemiarthroplasty, using a short stemmed uncemented humeral prosthesis.

Background

In the last decade, the number of total shoulder arthroplasties has been on the rise as popularity of hemiarthroplasty has been declining. With the advent of modern bearing materials such as ceramic, it may be that the outcomes of these two procedures for degenerate joint disease may not be as disparate as they once were.

Methods

The Affinis Short Stemmed Prosthesis (Mathys European Orthopaedics, Bettlach, Switzerland) was used in all cases and the choice of hemiarthroplasty or total was determined by the surgeon. The data was collated prospectively with clinical evaluation performed pre-operatively and at 3, 6, 12, 24 and 48 months postoperatively. The Constant score was measured and adverse events or complications noted.

Results

Of 267 potential cases, 249 fulfilled the inclusion criteria. Of these, 177 patients underwent a total prosthesis and 72 hemiarthroplasty. The mean age was 65.7 (range 30.4 – 87.1), with no significant age difference between the groups. The immediate post-operative scores for both groups were similar but at one year, the total prostheses fared better with a mean Constant score of 67.6 (18 – 96) compared to 55.2 (9 – 88) in for the hemiarthroplasties. However, by two years postoperatively, the hemiarthroplasty scores were comparable to the totals with a mean constant score of 73.0 (7.0 – 100) and 74.9 (25 – 98) respectively. Overall, there was no statistically significant difference ($p=0.093$) in outcome scores between the two groups at 48 months.

Conclusions

At four years, the functional outcomes of hemiarthroplasty and total shoulder arthroplasty were comparable using this prosthesis. Although this study is limited by the short follow up period these preliminary results are encouraging; both implants may be viable options for shoulder osteoarthritis.



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102 Fluoroscopy Guided Biodegradable Spacer Implantation Using Local Anesthesia: Safety And Efficacy Study In Patients With Massive Rotator Cuff Tears

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Aim

This study was designed to assess the safety and efficacy of fluoroscopy guided biodegradable spacer implantation under local anesthesia, in patients with MRCT and comorbidities completely or partially contraindicating surgeries under general anesthesia.

Background

The management of massive rotator cuff tears (MRCT) is challenging and associated with a high failure rates. Studies have shown that advanced age, lower American Society of Anesthesiologists (ASA) physical status score and concomitant co-morbidities are associated with higher risks of death and postoperative complications.

Methods

In this open-label, single arm, prospective study, subjects with MRCTs underwent sub-acromial fluoroscopy guided implantation with a biodegradable spacer (InSpace™ system) under local anesthesia. Fifteen patients were treated and assessed. Follow-up visits were scheduled according to routine clinical practice. Shoulder function was evaluated using Constant (CS) and American Shoulder and Elbow Society (ASES) scores.

Results

All patients demonstrated an overall improvement in the total CS and ASES beginning at 6 weeks and sustained by at least 12 months postoperatively. Of the 15 patients who reached the 1-year follow-up, 85 % showed a clinically significant improvement of at least 15 points in their Constant score starting at 6 weeks post operation and maintained throughout the entire follow up period.

Conclusions

We conclude that in this initial patient's cohort, fluoroscopy guided implantation of InSpace™ system under local anesthesia, represented an effective alternative to the existing procedures. This procedure may be considered as a treatment option for elderly patients or for patients with multiple comorbidities complicating or contraindicating surgery under general anesthesia. Technically easy, this technique can be an effective tool in the armamentarium of most orthopedic surgeons.



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915 Articular Contact Area And Contact Pressure In Posteromedial Rotatory Instability Of The Elbow

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Aim

Our hypothesis is that the articular contact area (CA) and contact pressure (CP) are significantly different between an intact elbow and an elbow affected by posteromedial rotatory instability PMRI.

Background

PMRI is characterized by subluxation causing joint incongruity, which has been theorized to determine early articular degenerative changes.

Methods

Seven cadaveric elbows were tested under gravity varus stress using a custom-made machine designed to simulate muscle loads and allow passive elbow flexion (0°-90°). The CA and CP data were collected and processed using the Tekscan sensor and software. After testing the intact specimen (INTACT-elbow), a PMRI injury was simulated (Anteromedial coronoid subtype-2 fracture + lateral collateral ligament tear + posterior bundle of the medial collateral ligament tear) and the specimen (PMRI-elbow) was tested.

Results

The PMRI-elbow was characterized by subluxation that spontaneously reduced at 60°±5° of flexion with subsequent shift of the CA towards the lower portion of the coronoid. The CP progressively increased until the elbow reduced, and the mean CP dropped from 870±50 KPa to 440±40 KPa (p<.001). The CA progressively reduced to a minimum value right before elbow reduction, with a subsequent shift from 80±8 mm² to 150±58 mm² (p<.001). Both the INTACT-elbow CA and CP at the same flexion angle where the PMRI-elbow reduced was significantly different than the PMRI-elbow CA and CP, both before and after the elbow reduction (p<.001).

Conclusions

The elbow affected by PMRI is characterized by a significant and sudden decrease in CA and increase in CP values subsequent to the shift from joint subluxation to reduction. This could explain the high risk of joint degeneration in the elbow affected by this injury.



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909 Coronoid Reconstruction Using Osteochondral Grafts: A Biomechanical Study

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Aim

The purpose of this study was to test the hypothesis that coronoid deficiency, in the setting of posteromedial rotatory instability (PMRI), must be reconstructed to restore articular contact pressures to normal and to compare three different osteochondral grafts for this purpose.

Background

Several surgical options have been described to treat coronoid deficiency, such as techniques using bone grafts, with no consensus on what is the best.

Methods

Six cadaveric elbows were tested under gravity varus stress using a custom-made machine designed to simulate muscle loads and to passively flex the elbow. Mean articular surface contact pressure data were collected and processed using Tekscan sensors and software. After testing the INTACT specimen, a PMRI injury was created (PMRI). Testing was repeated after reconstruction of the lateral collateral ligament (LCL-ONLY) followed by reconstruction of the coronoid (RECONSTRUCTED) with three different osteochondral graft techniques.

Results

Contact pressure was consistently significantly higher in the PMRI-elbow compared to the INTACT, LCL-ONLY, and RECONSTRUCTED conditions ($p < .006$). The LCL-ONLY elbow contact pressure was significantly higher than the INTACT and RECONSTRUCTED conditions from 5° to 55° of flexion ($p = .018$). The INTACT contact pressure was never significantly different from that of the RECONSTRUCTED, except at 5° of flexion ($p \leq .008$). No significant difference was detected between each of the RECONSTRUCTED techniques ($p \geq .15$). However, the annular surface of the radial head was the only graft that yielded contact pressures not significantly different from normal at any flexion angle.

Conclusions

Isolated reconstruction of the LCL did not restore native articular surface contact pressure and the reconstruction of the coronoid using osteochondral graft was necessary. There was no difference in contact pressure among the three coronoid reconstruction techniques.



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794 Arthroscopic Microfracture For Glenohumeral Chondral Defects

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Aim

To ascertain whether microfracture is effective and safe for treating symptomatic chondral defects of the glenohumeral joint.

Background

Management of chondral defects in the shoulder remains controversial. Microfracture is known to be effective in the knee. However, there is little information about effectiveness and safety of microfracture in the shoulder.

Methods

The study comprised 27 consecutive patients undergoing microfracture for glenohumeral Outerbridge stage 3 or 4 chondral defects. Arthroscopic microfracture was performed from 2005 onwards. Outcomes collected prospectively were Constant scores (CS), pain, satisfaction, range of movement and strength. Data for operative complications and demographics was collected retrospectively. Mean follow-up was 29 months (range 9 months to 11 years).

Results

There were 14 females and 13 males, with a mean age of 56 years. Complete outcome data was available for 25 of 27 patients (93%). 2 patients were lost to follow-up. Mean CS improved from 47 preoperatively to 71 (adjusted 88) postoperatively ($p < 0.0001$). Clinically and statistically significant improvements also occurred for pain ($p < 0.0001$), satisfaction ($p < 0.0001$), abduction ($p = 0.0001$), forwards flexion ($p = 0.001$), internal rotation ($p = 0.035$) and strength ($p = 0.010$). Postoperative adjusted CS were not significantly different for males and females ($p = 0.211$). However, males reported reduced pain ($p = 0.011$) and improved satisfaction ($p = 0.047$). CS, pain and satisfaction did not differ between patients aged under 55 years versus older patients, or for patients receiving microfracture for both the humerus and glenoid compared with microfracture for only one side of the joint. There were no surgical complications. 3 patients had subsequent total shoulder arthroplasty at a mean of 5 years and 3 months after microfracture. Overall, 25 of 27 patients were satisfied with microfracture and resumed all of their activities including sport.

Conclusions

Arthroscopic microfracture is safe and effective for treating symptomatic chondral defects of the shoulder. It can delay arthroplasty, which may be particularly beneficial for younger patients.



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805 Arthroscopic Rotator Cuff Repair In A Geriatric Population: Is It Worthwhile?

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Aim

To ascertain whether arthroscopic repair is safe and effective for treating symptomatic rotator cuff tears in the geriatric population.

Background

As our population grows increasingly old, there is a larger proportion of patients in their seventies and eighties who remain physically active. These patients have higher functional demands and higher expectations of treatment. Despite this, little is known on the outcome of arthroscopic cuff repair in over 75s. Optimal management remains controversial and choosing the best treatment can be difficult. Previous studies have mainly focussed on younger patients and smaller tear sizes.

Methods

59 patients (60 shoulders) aged over 75 years underwent arthroscopic rotator cuff repair from 2006 to 2014. Outcome scores collected prospectively were Constant score, pain and satisfaction. Mean follow-up was 20 months.

Results

Mean age was 78 (range 75-86). Tear sizes were 25 massive, 20 large, 12 medium and 3 small. Mean preoperative Constant score was 38.9 (adjusted 55.5) improving to 64.0 (adjusted 91.6) postoperatively ($P < 0.0001$). No difference was seen in males versus females ($p = 0.280$), age > 80 years versus age 75-79 years ($p = 0.960$) or active versus sedentary hobbies ($p = 0.490$). However, mean postoperative Constant score for massive tears was 55.5 (adjusted 77.5) compared to 70.4 (adjusted 102.3) for other sizes ($p = 0.003$). Overall, 55 of 59 patients were satisfied with surgery and resumed all of their previous activities including sport. Surgical complications were one infection and one stiff shoulder. Four patients had subsequent reverse total shoulder arthroplasty. Massive tears had higher risk for reverse shoulder arthroplasty ($p = 0.026$).

Conclusions

Arthroscopic rotator cuff repair is safe and effective for treating symptomatic cuff tears in over 75s. Clinically significant improvements occurred in all patient groups. Arthroscopic cuff repair should be considered as a valuable treatment according to biological, rather than chronological age.



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688 Deltoid Reflection During Reverse Shoulder Arthroplasty – Is It A Viable Technique?

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Aim

The purpose of this comparative study is to investigate the outcomes of patients following reverse shoulder arthroplasty between those who undergo a deltoid reflection technique and a conventional deltopectoral approach.

Background

Deltoid integrity is a crucial element that predicts functional outcome of reverse shoulder arthroplasty (RSA). However, excessive retraction of the deltoid muscle during surgery may result in structural damage and functional compromise of the muscle. We utilise a proximal deltoid reflection technique during shoulder arthroplasty, which preserves deltoid integrity and enhances surgical exposure for component implantation. However, it is unclear if this technique may have a detrimental effect on the functional outcomes of patients following reverse shoulder arthroplasty.

Methods

We investigated shoulder function in a cohort of 37 patients; of which 18 patients underwent a deltoid reflection approach (DR group) versus a cohort of 19 patients undergoing a conventional deltopectoral approach (conventional group) for reverse shoulder arthroplasties. Patients were assessed pre-operatively and post-operatively using the Oxford Shoulder Score (OSS) and ultrasound imaging to assess the integrity of the deltoid musculature post-operatively.

Results

At the last follow-up, there was no significant difference between Oxford Shoulder Scores between both groups ($p=0.3318$). Both groups of patients demonstrated similar ranges of motion in active forward elevation and abduction. Satisfaction rates remain high in both groups. Ultrasound imaging of patients who underwent the deltoid reflection technique demonstrated intact repairs in all cases at minimum of 12 months post-operatively.

Conclusions

A deltoid reflection technique is a safe viable approach that may be employed during shoulder arthroplasty particularly when facing challenging cases in acquiring adequate exposure. Our study demonstrates no significant detrimental effect on post-operative range of motion, shoulder functional scores or integrity of repair when employed in patients undergoing reverse shoulder arthroplasty.



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858 Supracondylar Dome Osteotomy In Cubitus Varus Deformity**Murat Asci**¹, Kürsad Aytekin², Orhan Balta¹, Recep Kurnaz³, Bora Bostan¹, Taner Günes⁴

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Aim

The aim of this study is to evaluate the clinical and radiographic results of supracondylar dome osteotomy for correction of cubitus varus deformity.

Background

Cubitus varus deformity is the common long-term complication of the childhood supracondylar fractures. There is no consensus on whether correction of the deformity and indication criterias. Many surgical techniques has been described for anatomical restoration of the deformity. Patient satisfaction and effectiveness of dome osteotomy have been reported in cubitus varus surgery.

Methods

16 elbows of 16(9 male, 7 female) patients with cubitus varus deformity treated with dome osteotomy were retrospectively evaluated. The mean age of the patients was 14,2(7-26) years. A history of elbow fracture was present in all patients. At the posttraumatic period 8 patients treated by open reduction, 4 patients were treated conservatively, while 4 patients were neglected. Preoperative and postoperative carrying angle, Lateral Condylar Prominence Index(LCPI), Mayo elbow scores and Barret satisfaction scale were analyzed.

Results

The mean preoperative carrying angle was $13.9 \pm 5.96^\circ$ varus. In the postoperative period with a mean of $24.2 \pm 6.03^\circ$ correction, the average carrying angle was $11.2 \pm 5.97^\circ$ valgus. Internal rotation defect was not observed in any patient at the postoperative period. Postoperative Mayo Elbow Performance Score was improved from 72.6 ± 21.33 to 96.0 ± 6.02 ($p=0.012$). LCPI was improved from -1.82 preoperatively to -11.65 postoperatively. According to the Barret satisfaction score, patients and their parents were quite happy. None of the patients had gunstock deformity.

Conclusions

Dome osteotomy provides a wider contact surface, rotational deformities can be corrected, more stable osteotomy line can be obtained, and with this treatment generally made for cosmetic purposes more effective loss of elbow lateral protrusion can be achieved.



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932 Is There Any Clinical Significance Of The Osteolysis Observed Around Absorbable Poly-L-Lactic Anchors Following Arthroscopic Bankart Procedure?**Gábor Skaliczki**, Imre Sallai, Péter Mohos, Imre Antal, Attila Szatmári

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Aim

Recent years absorbable anchors became popular in arthroscopic Bankart procedure. Although the biomechanical properties of absorbable and metal anchors are similar, the exact mechanism of the absorption, its effect on the glenoid bone and its clinical significance is not well known. Our aim was to assess any possible relationship between the osteolysis observed around absorbable anchors and the functional and life quality outcome after arthroscopic Bankart procedure.

Background

It was hypothesized that osteolysis affects the functional results and the life quality.

Methods

Twenty-nine patients were enrolled into a retrospective, single-centre study, who had arthroscopic Bankart repair for anterior shoulder instability. In every case, absorbable poly-L-lactic implants were used. Physical and radiological examinations and MRI scans were performed, functional results and quality of life were assessed using Constant, ASES and Rowe Instability Score.

Results

On average 2.4 years after the surgery, 91% of the patient have good or excellent functional results. The average ASES, Constant and Rowe instability scores were 93.2, 92.3 and 89.6 respectively. Evaluating the x-ray images, 60.71% of the patients had osteolysis around the implant. MRI analysis showed osteolytic process in 70.83% of the cases. The average diameter of the osteolytic defects was 8.9 mm. No significant correlation was found between the development of the osteolysis, the functional results and the life quality.

Conclusions

Osteolysis was found in more than 60 percent of our patients following arthroscopic Bankart repair. This radiological finding had no significant effect nor on the functional outcome, neither on life quality.



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93 Metal Artifacts Hamper MRI Images Of The Rotator Cuff Tendons After Rotator Cuff Repair With Titanium Suture Anchors.

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Aim

Evaluate the diagnostic value of MRI to assess the integrity of the rotator cuff tendons when titanium anchors are present after previous rotator cuff tendon surgery.

Background

The rate of retears after rotator cuff surgery is 17%. To diagnose a re-tear MRI is often used although titanium suture anchors inside are known to cause metal artifacts. No research is available investigating the extent to which these metal artifacts hamper the diagnostic value of MRI. The purpose of our study was to determine to which extent metal artifacts hamper MRI-scans of the repaired rotator cuff and therewith the diagnostic accuracy of MRI after rotator cuff surgery.

Methods

Between June 2013 and June 2015, 20 patients who underwent revision surgery of the rotator cuff due to a clinically suspected re-tear were included. The MRI-scans of these patients were retrospectively analyzed by four specialized shoulder surgeons and compared with intraoperative findings (being the gold standard). Sensitivity and interobserver agreement among the surgeons in assessing retears as well as the Goutallier and Warner classification were examined.

Results

In 36% (range 15-50%) of the MRI-scans, the observers could not review the rotator cuff tendons due to metal artifacts. When the rotator cuff tendons were assessable, a diagnostic accuracy with a mean sensitivity of 0.84 (0.70-1.0) was found, with a poor interobserver agreement ($\kappa = 0.12$). Good agreement was found between the surgeons for the Goutallier and Warner classification. (ICC 0.67 and 0.73)

Conclusions

Metal artifacts prevented accurate diagnosis with MRI of a rotator cuff re-tear. In the daily practice one might therefore consider to use MR or CT arthrography, or low field MRI for imaging of the rotator cuff tendons in patients with recurrent or persisting symptoms after rotator cuff surgery with metal suture anchors.



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144 Arthroscopic Stabilization For Neer Type 2 Fracture Of The Distal Clavicle Fractures

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Aim

We describe the arthroscopic procedure to reconstruct the disrupted ligament and stabilize the fracture as a minimally invasive method.

Background

The distal clavicle fractures are divided into three types according to Neer's classification. Type 1 and 3 fractures are treated with a sling to immobilize the upper extremity. However, the treatment of type 2 fractures is controversial. We paid attention to the anatomic basis of type 2 fractures that the disruptions of the conoid ligament lead to the distraction between the two bony fragments.

Methods

Our study was conducted between 2008 and 2014. The subjects were 12 patients with the distal clavicle fractures (11 males and one female). According to Neer's or Rockwood's classification on plain radiographs, all 12 patients were evaluated as type 2 or 2B, respectively. The mean age at the time of the surgery was 41.9 years old. The right side was affected in 7 patients, and the left side in 5 patients. The mean time of the surgery from the injury was 3.5 days. Our surgical procedure was performed with the patient in the beach chair position. We have used the artificial ligament with an EndoButton as the substitute ligament to reconstruct the disrupted conoid ligament. The mean duration of postoperative follow-up was 2 years and 3 months.

Results

The bony union was achieved in all patients at final follow-up. Concerning the range of motion at final examinations, mean forward flexion was 171 degrees, mean abduction was 165 degrees, mean internal rotation was Th11, and mean horizontal adduction was 132 degrees. There was no intra-operative complication, such as fixation failure or coracoids fracture.

Conclusions

It is possible to treat the distal clavicle fractures by a minimally invasive arthroscopic procedure without open the fracture site of clavicle.



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3 The Effect Of Humeral-Fenestration Diameter In Outerbridge-Kashiwagi Arthroplasty On The Strength Of The Distal Humerus - A Cadaveric Biomechanical Study

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Aim

The purpose of this study was to compare the ultimate strength of distal humeri with olecranon fenestrations of 12 mm and 15 mm in ulnohumeral arthroplasty.

Background

Outerbridge-Kashiwagi ulnohumeral arthroplasty is an effective method in treating elbow osteoarthritis for young patients and athletes; however, distal humerus fracture after surgery can become a critical issue. A previous biomechanical study has showed that the maximum strength of the distal humerus decreases after a fenestration; however, the size of the fenestration hole has not yet been discussed.

Methods

24 fresh-frozen cadaveric distal humeri were obtained. Two drill sizes were chosen for fenestration: 12mm and 15mm in diameter. Two directions of force were applied with a materials testing machine for biomechanical testing: 5-degree flexion for axial loading and 75-degree flexion for anterior-posterior (AP) loading. Each specimen randomly received one of the two fenestration sizes, and force directions. All specimens were loaded to failure at a rate of 2 mm/min.

Results

The failure loads of the 12mm and 15mm groups were not significantly different in either axial loading (mean 3886 (SD 1271) N vs mean 4286 (SD 901) N) or AP loading (mean 2303 (SD 803) N vs mean 1897 (SD 357) N). All specimens loaded with axial force failed via the fenestration holes; however, during AP loading, some specimens failed through the fenestration holes while others at diaphysis ($p= 0.28$).

Conclusions

The maximum strengths of distal humeri with either 12mm or 15mm fenestration holes were not significantly different in Outerbridge-Kashiwagi arthroplasty. As the risk of distal humerus fracture is not exacerbated, a larger-size fenestration hole would help increase the surgery effectiveness.



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14 Rotator Cuff Repair With All-Suture Anchors: An MRI Evaluation Of Repair Integrity And Cyst Formation.

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Aim

To investigate the feasibility and safety of using all-suture anchors in arthroscopic rotator cuff repair.

Background

All-suture anchors can be used for arthroscopic rotator cuff repair. Several studies investigated biomechanical properties, suggesting similar pullout strength compared to traditional anchors. No clinical and radiographic in-vivo studies have been published. One in-vivo animal study showed that all-suture anchors are at risk for clinical failure due to micromotion and cyst-like cavities.

Methods

Magnetic resonance imaging and clinical outcome are investigated in 20 Patients at 1.58 years (1.0-2.0 years) after rotator cuff repair with all-suture anchors. Integrity of the cuff repair, cyst formation (encapsulated fluid signal around the anchor), ingrowth of the bone into the anchor and integrity of the bone tunnel border were evaluated for 48 anchors. Clinical results were evaluated using Constant-Murley score.

Results

MRI evaluation showed a very small rim of fluid around 10% of the anchors. Around none of the anchors cyst formation with fluid diameter more than twice the anchor diameter was seen. Around 90% of the anchors no fluid at all could be detected between the anchors and the edge of the bony tunnel. Furthermore clinical results comparable to an arthroscopic rotator cuff repair, using classic anchors were seen.

Conclusions

This prospective clinical cohort study shows promising early radiographic and clinical results after arthroscopic rotator cuff repair using all-suture anchors. Cyst formation around the all-suture anchors, compromising the rotator cuff repair, could not be observed.



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233 Reversed Shoulder Arthroplasty In CTA - Analysis Of Complications After 6 Years Of Follow-Up.

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Aim

Goal of the study was to analyze the complications of reversed shoulder arthroplasty (RSA) in cuff tear indications (CTA) after 6 years follow up.

Background

RSA has proven to be an effective surgical method to reduce pain and improve function in cuff tear arthropathy (CTA). However, complications remain relatively high and have to be analyzed.

Methods

Out of a prospective multicentre study, 204 cases (average age 75 years) met the inclusion criteria of CTA and a minimum follow-up of 6 years for 58 cases was performed. All patients were treated with the same type of reversed shoulder prosthesis. X-rays, Constant score (CS), ASES score, range of motion and complications were evaluated.

Results

The absolute CS (adjusted CS) increased from preoperative 24 points (34%) to 67 points (100%) after 6 years. The ASES-Score improved from preoperative 20 to 80 points (6 years). Active abduction improved from 64° to 136°.

Overall 7 complications (3.4%) requiring revision surgery were observed. A luxation was treated with exchange of inlay. A hematoma was revised. There were two cases of glenoid component loosening due to patient fall. Additionally, there were 3 cases of aseptic stem loosening (2 cases with uncemented stems). After 6 years inferior notching was observed in 17% (grade 1), 6% (grade 2) und 8% (grade 3).

Conclusions

In our study, an exceptional low rate of complications was observed after 6 years. Since two cases of stem loosening occurred in uncemented stems, change to a stem cementing technique could be a solution in case of borderline bone quality. Successful RSA outcomes require understanding of the potential complications of the procedure.



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16 The Effect Of Switching From Teriparatide To Denosumab On Cancellous And Cortical Bone Of Proximal Humerus In Ovariectomized Mouse

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Aim

The aim of this study is to analyze the effects of teriparatide, denosumab, and switching from teriparatide to denosumab in proximal humerus.

Background

There is accumulating clinical evidence that both teriparatide (PTH) and anti-RANKL antibody effectively increase bone mineral density in patients with osteoporosis. However, differences in detailed histological appearance of humeral bone after administration of PTH, anti-RANKL antibody or switching from PTH to anti-RANKL antibody have not been clarified.

Methods

Twelve-week-old female C57BL/6 mice were either ovariectomized or sham operated (SHAM group). Four weeks after the surgeries, the OVX mice were subjected to one of the following four treatment options; phosphate-buffered saline (PBS) for 8 weeks (OVX group), PTH for 4 weeks followed by PBS for 4 weeks (PTH4W group), PTH for 8 weeks (PTH8W group) and PTH 4 weeks followed by anti-RANKL antibody (SWITCH group). All mice were euthanized 12 weeks after the surgeries.

Results

In cancellous bone of proximal humerus, histomorphometric analysis demonstrated that bone volume was highest in SWITCH group and lowest in PTH4W group. There were significant differences between SWITCH group and the OVX, PTH4W, PTH8W groups. Bone resorption, formation, and formation speed were lowest in SWITCH group and again there were significant differences between SWITCH group and other groups.

In the tendon insertion, the width of the cortical bone and mineralized fibrocartilage layer were widest in SWITCH group. There were significant differences between SWITCH group and other groups. The cortical bone width of the medial and lateral part of tendon insertion was greatest in SWITCH group. In addition, there were significant differences between SWITCH group and other groups.

Conclusions

In cancellous bone, switching from PTH to anti-RANKL antibody increases more bone volume compared to PTH continuation. In cortical bone, switching from PTH to anti-RANKL antibody increases more cortical bone width compared to PTH continuation..



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20 MRI Vs. Ultrasound For The Diagnosis Of Distal Biceps Tendon Tears

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Aim

The purpose of our study was to determine which imaging modality was superior in diagnosis of distal biceps pathology based on correlation to intra-operative findings

Background

As the incidence of distal biceps ruptures has risen over the past few decades, prompt diagnosis and treatment is critical to maximizing patient outcomes. Currently, diagnosis is centered around history and physical exam with imaging modalities, including ultrasound (US) and magnetic resonance imaging (MRI), often utilized to confirm the diagnosis prior to operative intervention.

Methods

We generated a report of all of the patients who had a distal biceps tendon repair performed at our institution between 1988-2016. We then performed a chart review to find the patients who received both an ultrasound and MRI of the affected arm up to 3 months before the surgery. We subsequently identified 21 patients who were placed into 4 categories (0=no tear, 1=unspecified tear, 2=partial tear, 3=complete tear). The operative reports were reviewed and findings were categorized in a similar manner. Statistical analysis was performed to determine the accuracy, sensitivity, specificity of each exam as compared to intra-operative findings

Results

In total, 20 patients had both MRI and US performed prior to surgery along with appropriate description of intra-operative findings and thus met inclusion criteria. The accuracy of MRI was 0.875 while that of US was 0.56 ($p=0.05$). The sensitivities and specificities for MRI are 93% and 50%, respectively, and the sensitivities and specificities for US are 50% and 100%, respectively

Conclusions

The findings of our study suggest that MRI is a more accurate and sensitive imaging modality in examining distal biceps rupture, especially as it related to full-thickness tendon tears. US proved to be more specific for partial thickness tendon ruptures.



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25 Surgical Findings In Professional Rugby Players With Glenohumeral Instability

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Aim

To investigate the characteristic intra-operative findings in professional rugby players with glenohumeral instability requiring surgical management.

Background

Shoulder instability accounts for 14% of the shoulder injuries sustained in rugby but results in the most days missed and the highest rate of recurrence. Literature on specific intra-articular pathologies in the instability cohort of professional rugby players is sparse and inconsistent.

Methods

We identified 40 professional rugby players from a surgical database over a four year period, 18 (24 shoulders) of whom had glenohumeral instability. Mean age at initial surgery twenty-three years (+/-2.6). There were six International and twelve Provincial players. Thirteen forwards (BMI=31.2), five backs (BMI=27.6). Laterality, imaging results and operative findings were recorded. Twenty primary procedures performed: sixteen arthroscopic and four open. There were nine revision procedures in six patients.

Results

Only 33% of tears were focal, all of which were anterior. The remaining 67% had extensive labral tears. 33% (n=8) had combined anterior and posterior tears; 29% (n=7) had combined anterior and SLAP tears, one had combined posterior and SLAP tears and one had a pan-labral tear. Labral tears averaged over half the glenoid circumference (6.2+/-2.24 hours) and were repaired with 5 anchors (4.6+/-1.68). Associated lesions were identified in 63%. These included; Hill-Sachs lesions 25% (n=6); reverse Hill-Sachs 8% (n=2); glenoid lesions 25% (n=6), degenerative changes 13% (n=3), supraspinatus tear 4% (n=1) and a HAGL lesion 4% (n=1). All players returned to professional rugby.

Conclusions

Only 38% of surgeries were performed during the playing season. Playing through subjective instability may increase the rate of multiple intra-articular pathologies. 45% (n=13) of surgeries were identified as having ≥ 3 pathologies. This extensive intra-articular pathology and degeneration in young players is concerning. Earlier intervention should be considered to reduce the rate of multiple intra-articular pathologies.



23 Posterior Shoulder Instability: The Extent Of Intra-Articular Damage In Athletes Is A Concern

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Aim

To investigate the cause of posterior shoulder instability and its associated intra-articular findings.

Background

Posterior shoulder instability recognition and intervention is increasing

Methods

We identified from a single surgeons instability database, forty-one consecutive patients (forty-four shoulders) who underwent an arthroscopic posterior labral repair over a three year period. There were thirty-nine male and two female patients with a mean age of twenty-four years. All imaging results and operative findings were recorded.

Results

The cause of instability was due to sport in 89%(n=39) of cases, 84%(n=37) of which occurred as a result of contact and collision sports (Rugby accounted for 66%(n=29)), non-contact sports accounted for 5%(n=2). In this study 43%(n=19) of the athletes competed professionally. While other mechanisms included Road Traffic Accidents 5%(n=2) and Epilepsy 2%(n=1). Only 18%(n=8) of patients suffered a frank dislocation with the remaining 82%(n=36) reporting a clinical history of either subluxation or chronic pain. Contra-lateral shoulder stabilisation was previously performed in 18%(n=8). All patients had extensive labral tears, all of which had a tear in the posteroinferior aspect of the labrum. 80%(n=35) had combined anterior and posterior tears; 11%(n=5) had a pan labral tear; 7%(n=3) 270° tears; 2%(n=1) had posterior and SLAP tears. Labral tears averaged half of the glenoid circumference (6 hours, SD+/-2 hours) and were repaired with 5 anchors (SD+/-1.2). Associated lesions were identified in 48%. These included; Hill-Sachs lesions 23%(n=10), Reverse Hill-Sachs lesions 30%(n=13), Glenoid defects 9%(n=4), HAGL lesion 2% (n=1), ALPSA lesion 2%(n=1), degenerative joint disease 2%(n=1) and chondral damage 5%(n=2).

Conclusions

Posterior shoulder instability occurs most commonly in collision athletes. The mechanism of injury is predominately through direct trauma to the shoulder. The considerable intra-articular damage seen in these young athletes is concerning. If posterior instability is suspected, early surgical intervention should be considered in an attempt to arrest the intra-articular deterioration.



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155 Endobutton Versus Anchors Suture Repair Of Distal Biceps Rupture Using An Anterior Approach : A Comparison Serie Of 41 Cases

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Aim

The aim of our study was to compare the results of the repair of distal biceps rupture with fixation by anchors versus EndoButton

Background

Reinsertion of the distal biceps on the radial tuberosity is the gold standard for recovering an optimal function of the elbow. However, the method of fixation remains debated.

Methods

Between January 2014 and October 2015, 42 patients, all male, were operated for a distal biceps tendon rupture. Reinsertion was performed in 11 cases using anchors (group A), in 30 cases using EndoButton (group B) and in 1 case by brachial tenodesis. All patients were evaluated at 6 months follow-up using VAS, Quickdash and MEPS scores. Range of motion and strength were also analysed. The results of the 2 groups were compared.

Results

Group A included 11 patients, mean age 45 years. Group B included 30 patients, mean age 48 years

Mean operative delay and operative time were respectively for group A and B : 19 vs 18 days and 37 vs 33 minutes

At 6 months follow-up, the scores were respectively : VAS 0.63 vs 0.67, QuickDash 4.95 vs 6.23, MEPS 94.5 vs 94.8.

Average range of motion : flexion 138.2° vs 139.2°, complete extension for both group, pronation 85.9° vs 86°, supination 87° vs 85.6°.

Strength compared to the opposite side was 95.9% vs 95.5% in flexion and 85.9% vs 87.4% in supination

Mean delay to return to work was 4 vs 3.5 months

Radiographic control did not found any heterotopic ossification in group A and 1 case in group B.

There was no statistically significant difference between the two groups

Conclusions

Reinsertion of the distal biceps by EndoButton or anchors gives similar results which allow very good functional recovery of elbow and a rapid return to normal activities



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154 Repair Of Chronic Ruptures Of The Distal Biceps Tendon. A Report Of 14 Cases**Yacine Carlier**

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Aim

The aim of our study was to evaluate the results of repairs of ruptures of the distal biceps, operated after a minimal post-traumatic period of 3 weeks

Background

The reinsertion of chronic ruptures of the distal biceps on the radial tuberosity is controversial after day 21

Methods

We reviewed 14 patients (mean age 47 years), all male (8 smokers) operated for a distal biceps tendon rupture beyond the 21st day further to causal trauma. All patients were evaluated at 1, 3 and 6 months after surgery using VAS, Quickdash and MEPS scores. Range of motion and strength were also measured

Results

The mean operative delay was 28 days (21-49)

13 biceps have been reinserted on the radial tuberosity, 4 using anchors and 9 using an EndoButton

1 biceps was too retracted for reinsertion, a brachial tenodesis was performed

At 6 months follow-up, for the 13 patients who have had a reinsertion, the mean scores were : VAS 1.15, QuickDASH 9.08 and MEPS 92.5. Average range of motion were full extension, flexion 137°, pronation 85.7°, supination 86.5°

Mean strength was 94.2% in flexion, 82.3% in supination compared to the opposite side.

Average time to return to work was 4.4 months.

There were 4 complications : 1 adhesive capsulitis, 1 cramp biceps, 1 forearm's hypoesthesia, 1 complex regional pain syndrome

The patient with a tenodesis was 44 years old, with an operative delay of 36 days. At 6 months follow-up the scores were : VAS 1, QuickDASH 0, MEPS 85. Average range of motion were full extension and flexion, pronosupination 85°. Strength was 80% in flexion and 50% in supination compared to opposite side. The patient had cramp biceps complication.

Conclusions

Reinsertion after 3 weeks of a ruptured biceps on the radial tuberosity remains feasible and provides good functional recovery of elbow



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161 Intraoperative Ultrasonography Guidance Facilitates Arthroscopic Localisation Of Calcium Deposits In Calcifying Tendinitis Of The Shoulder

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Aim

The aim of this study is to standardize a technique to facilitate the detection of calcification of the rotator cuff by performing a perioperative ultrasound tracking in addition to the arthroscopic gesture

Background

The arthroscopic locating of calcification of the rotator cuff can be difficult and time-consuming and can cause iatrogenic tendinous lesions.

Methods

We performed and analyzed an intraoperative echographic locating technique associated to an arthroscopic evacuation for calcific tendinopathy of the rotator cuff in five patients. The patient is positioned in lateral decubitus. The ultrasound is dressed with an arthroscopic cover for sterile use. Calcification is identified with a percutaneous 21 G hypodermic needle using ultrasound guidance.

The needle is inserted through the calcification, deeply in the cuff to avoid its migration, then arthroscopic debridement is carried out underneath the subacromial mark of the needle. With a knife 11 the cuff is opened along the needle and the calcification is evacuated.

Results

Intraoperative locating of calcic deposit with ultrasound guidance was easily feasible in all five cases. The arthroscopic visualisation of the needle was obtained in less than 10 minutes after debridement in all cases allowing a good evacuation of calcium debris, without creating iatrogenic lesions linked to a search for calcifications by needle trituration.

Conclusions

The use of an ultrasound system in sterile intraoperative conditions facilitates the localization of calcification of the rotator cuff, is reproducible, and allows rapid arthroscopic evacuation without iatrogenic damage for the healthy rotator cuff.



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435 Effect Of Preservation Of Lateral Part In Osteochondritis Dissecans Lesions Of The Capitellum In An Open Autologous Osteochondral Plug Graft

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Aim

The aim of this study was to investigate effect of preservation of lateral part in osteochondritis dissecans (OCD) lesions of the capitellum in an open autologous osteochondral plug graft (OATS).

Background

We hypothesized that preservation of lateral part in OCD lesions in OATS could give a better outcome.

Methods

Among sixty-one patients with OCD who underwent OATS, 35 patients with OCD lesions located in lateral part were enrolled in this study. They were all young baseball players with a mean age of 13.4 years (range, 11-17 years). In 20 patients, OATS was performed after the fragment was totally removed (OATS alone). In 15 patients, OATS was performed and a lateral part of the OCD lesion was fixed (OATS with fixation). To fix the lateral part of the OCD lesion, 11 patients needed internal fixation including PLLA pin in 6, bone peg in 3, DTJ screw in 1, and Profile screw in 1. The remaining 4 did not need the fixation. The mean follow-up was 22 months. We compared the Timmerman and Andrews (T&A) scores between OATS alone and OATS with fixation.

Results

Both preoperative and postoperative T&A scores in OATS alone were significantly worse than those in OATS with fixation; (Preoperative, Postoperative); Alone (132, 178 pts), Fixation (150, 192 pts) ($p < 0.05$, respectively). In OATS with fixation, the improvement from preoperative to postoperative subjective score of T&A tended to be better than that in OATS alone; (Preoperative, Postoperative, Improvement); Alone (67, 96, 29 pts), Fixation: (65, 99, 34 pts) ($p = 0.13$).

Conclusions

In OATS with fixation, the improvement from preoperative to postoperative subjective score of T&A tended to be better than that in OATS alone. These results suggest that preservation of lateral part of OCD in OATS may give a better long-term outcome.



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33 Short-Term Clinical Results Of Frozen Shoulder Treated With Shoulder Manipulation Under Ultrasound-Guided Cervical Nerve Root Block At Outpatient Setting: A Case Series

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Aim

The aim of this study is to evaluate the short-term clinical outcomes of frozen shoulder treatment via shoulder manipulation under ultrasound-guided cervical nerve root block (MUC).

Background

Frozen shoulder is treated using various techniques. Patients who fail to respond to nonoperative management may require invasive interventions, including manipulation under general anesthesia and arthroscopic capsular release; these treatments require general anesthesia and hospitalization. These days, although MUC was reported, the number of articles are little.

Methods

This study included frozen shoulder patients who were unresponsive to conservative therapy for at least 6 months and were then treated with MUC. Patients with a rotator cuff tear, calcifying tendinitis, osteoarthritis, or any other shoulder disorder were excluded following X-ray, ultrasound, and magnetic resonance imaging evaluation. Although 25 patients were initially included, three patients were not followed-up for at least 1 year. We investigated a final total of 22 patients; the average age was 58 years and 59% were female. We measured shoulder pain, shoulder range of motion, and ASES scores immediately prior to MUC, 1 week after MUC, and 1 year after MUC. A SF-36 was administered before MUC and 1 year after MUC. We used the Friedman and Wilcoxon signed-rank tests to identify statistical differences. Significance was defined as $p < 0.05$.

Results

MUC significantly improved shoulder pain during motion, range of motion, and American Shoulder and Elbow Surgeons scores 1 week after MUC. This improvement persisted at the 1-year follow-up. Seven of the eight Short-Form 36-Item Health Survey measures were significantly improved 1 year after MUC. One patient (4.5%) developed Horner's syndrome, although symptoms resolved within several hours without treatment.

Conclusions

MUC for frozen shoulder was safe and resulted in a significant improvement in shoulder pain and range of motion 1 week after the procedure. This improvement persisted at the 1-year follow-up.



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40 Total Elbow Arthroplasty: A Systematic Review

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Aim

The aim was to review the most recent literature reporting on the results of the most commonly performed total elbow arthroplasties (TEA).

Background

Most TEA designs aim to replicate anatomy and provide stability in the treatment of the degenerative elbow joint. Due to promising results in the treatment of complex fractures, indications for TEA are growing.

Methods

A comprehensive literature search was conducted. All relevant studies were reviewed, with a set of predefined inclusion and exclusion criteria. After the initial assessment, two authors extracted data from the included articles. Groups were made based on the design of TEA, the linkage, and the indication for treatment. Outcome parameters were survival rate, pain, range of motion, complications and specific elbow outcome scores.

Results

Seventy-three articles involving a total of 9,379 TEAs were included. The level of evidence was primarily Level IV. Nineteen specific designs of TEA implants were described, including the Souter-Strathclyde (n=2387), Coonrad-Morrey (n=1586), Kudo (n=560), and GSB III (n=498). The most common indication for TEA was rheumatoid arthritis (70%). The weighted mean survival rate for the linked and unlinked prostheses was 85.5% at 7.8 years and 74% at 12.3 years, respectively. For the Coonrad-Morrey, Souter-Strathclyde, and GSB III, the weighted mean survival rate was 87.2% at 7.2 years, 70.6% at 14.2 years, and 81.7% at 9.5 years, respectively. The range of motion after TEA was good overall, with a mean flexion angle of 129° and a mean extension angle of 30°. The complication rates ranged from 11% to 38%, with loosening being the most frequently reported complication (7%).

Conclusions

The results of the TEA are overall respectable. It appears that there are small differences between designs. However, despite the fairly good functional results and elbow scores, the survival and complication rates are still not as favorable as in arthroplasties used in other joints.



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41 The Influence Of Local Bone Quality On Fracture Pattern In Proximal Humerus Fractures.

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Aim

To assess the influence of local bone mineral density on the fracture pattern in proximal humerus fractures.

Background

The significance of bone mineral density in the treatment of proximal humerus fractures has been widely discussed in the literature. Also the fracture pattern is a relevant factor when considering the different treatment options for these fractures.

Methods

From January 2014 to August 2015 we prospectively analyzed all acute, isolated and non-pathological proximal humerus fractures admitted at our emergency department. Two independent board certified orthopaedic trauma surgeons retrospectively classified the fractures according to Neer and measured the humeral head impaction angle (varus/valgus). On the fracture X-ray we also assessed the local bone quality using the Deltoid Tuberosity Index (DTI). Chi-squared test was used to analyse the distribution between DTI and fracture pattern.

Results

191 proximal humerus fractures were included in the study (61 men, mean age 59 years, range 15-91 years; 130 women, mean age 69.5, range 19-99). 77 fractures (40%) were classified as one-part, 72 (38%) were two-part, 24 (13%) were three- and four-part and 18 (9%) were fracture dislocations. 30 fractures (16%) were varus impacted, whereas 45 fractures (24%) were classified as valgus impacted. The mean DTI was 1.48 (SD=0.19, range 1.11 – 2.35). Valgus fracture impaction significantly correlated with good bone quality (DTI \geq 1.4; $p=0.047$) whereas no such statistical significance was found for the Neer fracture types.

Conclusions

This is the first study comparing bone quality and fracture morphology. We found that valgus impaction significantly depended on good bone quality. However, neither varus impaction nor any of the Neer fracture types correlated with bone quality. We conclude that the better bone quality of valgus impacted fractures may be a reason for their historically benign amenability to ORIF. On the other hand good local bone quality does not prevent fracture comminution.



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559 Risk Factors For Revision After Reverse Shoulder Arthroplasty – Nordic Arthroplasty Registry Study

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Aim

The purpose of this study was to evaluate the risk and the risk factors for revision following reverse shoulder arthroplasty (RSA) procedure for cuff tear arthropathy (RCA) and osteoarthritis (OA).

Background

The incidence of reverse shoulder arthroplasty (RSA) is increasing worldwide. Despite reports on good clinical outcome, there is limited evidence regarding the risk factors for revision.

Methods

RSA patients with RCA or OA were identified from the Nordic Arthroplasty Registration Association (NARA) registry data (2004 - 2013). Kaplan-Meier survival analysis was used to calculate survival probabilities. Cox multiple regression analysis was used to calculate adjusted revision rate (RR) for gender, arthroplasty brand, age (<70 years) and year of surgery.

Results

1904 patients were included (69 % women, mean age 64, range 35-97). Altogether 95 arthroplasties were revised, with a 10-year cumulative revision rate of 0.90. The most common reason for revision was infection (n=42), followed by loosening (n=16) and instability (n=12). Most revisions occurred less than 6 months after the primary operation. Men had a significantly increased risk for revision compared to women (RR 3.8, 95 % CI 2.4-6.1). The most common implants were Delta Xtend (n=1366) and Delta Mark III (n=246). RR of Delta Mark III was 2.1 (95 % CI 1.1-4.3) compared to Delta Xtend. Age and year of surgery were not associated with risk for revision.

Conclusions

Risk for revision after RSA is low 5 %. The most common reason for early revision is infection. Male gender is associated with increased risk for revision.



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58 Fatty Infiltration Of Stages 1 Or Higher Significantly Compromises Healing Of Supraspinatus Repairs

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Aim

To report outcomes 10 years after repair of isolated supraspinatus tears and determine if they are influenced by FI of the infraspinatus versus the supraspinatus.

Background

Fatty infiltration (FI) of stage ≥ 2 compromises outcomes of rotator cuff repairs. Most clinicians consider FI of the infraspinatus, whether torn or intact, because it tends to be the most rapidly affected.

Methods

The authors retrieved records of patients who underwent repair of isolated supraspinatus tears in 2003 at 15 centres. The records included 208 patients with pre-operative MRI that enabled assessment of FI. A total of 147 patients were evaluated in 2014 clinically and radiographically (MRI).

Results

Pre-operative FI was greater in the supraspinatus (52% stage ≥ 1) than the infraspinatus (29% stage ≥ 1). The ten-year Constant scores were influenced by FI of the supraspinatus ($p=0.006$) but not of the infraspinatus ($p=0.422$). Referring to the supraspinatus, scores were significantly lower for shoulders with pre-operative FI of stage 1 compared to those at stage 0 ($p=0.015$). Retear rates (Sugaya types IV–V) were also influenced by FI of the supraspinatus ($p=0.001$) but not of the infraspinatus ($p=0.979$). Shoulders that had supraspinatus FI at stages 0, 1 and 2, had retear rates of 10%, 22% and 31%, respectively.

Conclusions

The Constant scores and retear rates were significantly influenced by FI of the torn supraspinatus (stage ≥ 1) but not of the intact infraspinatus. The authors recommend rapid surgical intervention before the accumulation of any fat, especially for young active patients with traumatic rotator cuff lesions.



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54 Incidence Of Shoulder Dislocations In The United Kingdom, 1995-2015: A Population-Based Cohort Study

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Aim

To evaluate the age- and gender-specific incidence of primary shoulder dislocations in the UK.

Background

The incidence of primary shoulder dislocations in the United Kingdom is unknown.

Methods

UK primary care data from the Clinical Practice Research Datalink (CPRD) were used to identify patients aged 16-70 years with a shoulder dislocation during 1995-2015. After coding of primary shoulder dislocations was validated using the CPRD GP questionnaire service, incidence rates per 100,000 person-years were calculated.

Results

Correct coding of shoulder dislocation within CPRD was 89% (95% CI: 83%-95%), and confirmation that the dislocation was a 'primary' was 76% (95% CI: 67%-85%). A CPRD cohort of 16,763 shoulder dislocation patients aged 16-70 years during 1995-2015 were identified. Seventy-two percent of shoulder dislocations occurred in men. The overall incidence rate in males was 40.4 per 100,000 person-years (95% CI: 40.4 to 40.4), and in females was 15.5 per 100,000 person-years (95% CI: 15.5 to 15.5). The highest incidence was observed in 16-20 year-old males (80.5 per 100,000 person-years; 95% CI: 80.5-80.6). Incidence in women increased with age to a peak of 28.6 per 100,000 person-years among those aged 61-70 years.

Conclusions

Using a national database, the incidence of shoulder dislocations in the UK has been documented for the first time. While most primary dislocations occurred in young men, an unexpected finding was that incidence increased with age in women, but not in men. The reasons for this are unknown. Further work is planned to examine treatments and predictors for recurrent shoulder dislocation.



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72 Tenodesis Is Not Superior To Tenotomy In The Treatment Of The Long Head Of Biceps Tendon Lesions. A Prospective, Randomized Comparative Study.

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Aim

To compare the effectiveness of tenodesis and tenotomy in the treatment of long head of the biceps tendon (LHBT) lesions.

Background

The two most common procedures for LHBT pathology are biceps tenotomy and biceps tenodesis. Both techniques have been shown to produce favorable clinical results. A general approach suggests that biceps tenotomy may be indicated for patients aged over 55 to 60 years whereas patients aged younger than 50 years or those involved in heavy activities may benefit from biceps tenodesis. However, few studies directly compare tenotomy and tenodesis and there is lack of evidence supporting the superiority of one technique over the other.

Methods

Fifty-five patients (31 in the tenotomy group and 24 in the tenodesis group) were available for the 6- and 24-month postoperative evaluations. A total of 69 patients with a combined supraspinatus tear and LHBT lesion aged over 40 years entered this prospective comparative study and were randomly assigned to the arthroscopic LHB tenotomy or tenodesis group. The Constant and Murley score (CMS), quality of life, pain, and strength were used to assess patients preoperatively and at 6- and 24-months postoperatively.

Results

There were no statistically significant differences in postoperative CMS, quality of life, pain, and strengths between groups. Higher rates of Popeye's sign were noted postoperatively in the tenotomy group compared to tenodesis.

Conclusions

Despite tenotomy is affected by a higher incidence of cosmetic deformity, there is no superiority of arthroscopic tenodesis over tenotomy in the treatment of LHBT lesion as a concomitant procedure to an arthroscopic repair of the supraspinatus tendon in terms of functional outcomes, quality of life, pain, and strength measured 6 and 24 months postoperatively.



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71 Quality Of Life And Functional Results Of Arthroscopic Partial Repair Of Irreparable Rotator Cuff Tears

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Aim

To evaluate the outcomes of arthroscopic partial repair in different irreparable rotator cuff tears (RCTs) patterns and identify possible outcome predictors.

Background

A complete repair of RCTs is sometimes impossible because of the irreducible tendon retraction and both atrophy and fatty degeneration of the muscle belly.

Methods

Ninety patients (95 shoulders) undergoing an arthroscopic partial repair for irreparable supraspinatus with a reparable infraspinatus were retrospectively reviewed after a median 7 years follow-up. An intact (80 shoulders) or torn but completely reparable (15 shoulders) subscapularis tendon was associated. The Constant and Murley score (CMS) was used to assess patients' functionality pre- and postoperatively. Postoperative patient assessment included the Simple Shoulder Test (SST) and the Short Form Health Survey questionnaire (SF-36). Postoperatively, range of motion (ROM), CMS, and strength were compared with the healthy contralateral side. Postoperative SF-36 was compared with age- and sex matched norms.

Results

The CMS improved from 40 (10-61) to 79 (32-93) ($P < .001$). The median postoperative SST was 9 (1-12). Although the patients had lower postoperative abduction and internal rotation, strength in abduction and CMS in comparison with the measurements from the healthy contralateral side, the median postoperative SF-36 physical and mental component summaries were 98% and 100% of the matched norms. No significant differences were found in postoperative outcomes according to the RCT pattern. Males showed significant higher strengths in abduction, external rotation, and internal rotation (all with $P < .001$). Higher ranges of abduction ($P = .019$) and external rotation ($P < .03$) as well as higher strengths in abduction ($P = .002$) and internal rotation ($P = .006$) were reported in younger patients.

Conclusions

When there is an irreparable supraspinatus but there is still the possibility to repair the infraspinatus and subscapularis, the arthroscopic partial cuff repair should be considered as an effective surgical option.



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62 Clinical And Radiological Results Of Conversions From Failed Anatomic Fracture Arthroplasty To Reverse Total Shoulder Arthroplasty

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Aim

This study evaluates clinical and radiological results after conversions from failed anatomic fracture arthroplasty to reverse total shoulder arthroplasty. The aim of this study is to present mid-term clinical and radiological results after this demanding type of surgery.

Background

Proximal humerus fractures with a high risk of avascular necrosis of the humeral head can be treated with anatomic fracture hemiarthroplasty and concurrent tuberosity reconstruction. Tuberosity malunion or cuff lesions may lead to a severely impaired shoulder function after fracture hemiarthroplasty. Conversion arthroplasty to reverse total shoulder replacement is often the only remaining treatment option in those cases.

Methods

Twenty patients (m=5, f=15; mean age 73 years) were examined 47 months (24-66 months) after conversion surgery from anatomic fracture arthroplasty to reverse total shoulder arthroplasty. Besides the Constant Score range of motion of active abduction and forward flexion were assessed. Radiographs were checked for radiolucency, heterotopic ossifications and scapular notching.

Results

The mean Constant Score at follow-up was 65 (41-91). Forward flexion rated 109 degrees (50-130), while abduction measured 105 degrees (60-140).

One patient (5%) demonstrated radiolucency at the proximal humerus. Heterotopic ossifications were noted in one patient (5%). The overall rate of scapular notching was 30% (3x grade I and 3x grade II). Complications requiring revision surgery occurred in two cases (10%). One case of instability was treated with a larger inlay while one debridement and lavage was carried out for an early infection.

Conclusions

Conversions of failed fracture hemiarthroplasty to reverse total shoulder arthroplasty are related to acceptable clinical mid-term results. Potential complications like infections or instability need to be considered prior to this demanding type of surgery. Conversion shoulder arthroplasty needs to be planned thoroughly concerning instruments for implant removal and the revision implant.



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67 Prevalence Of Osteoarthritis In A Population Of Rotator Cuff Tear Operated At 20 Years Of Follow-UpAnthony Herve¹, Philippe Collin², Hervé Thomazeau¹

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Aim

The aim of our study was to determine the prevalence of osteoarthritis at 20 years of follow-up after RCT operated, to evaluate its clinical impact and to identify links with tendon healing and fatty infiltration (FI).

Background

Prevalence of glenohumeral arthritis after rotator cuff tear (RCT) operated in the long term is unknown.

Methods

Retrospective multicenter study including all patients operated at 20 in 1994 of a RCT. Group 1 (n = 57) grouped patients without arthritis (OA) (Hamada1, 2 and 3, centered humeral heads and Samilson 1 and 2). Group 2 (n = 23) grouped osteoarthritis patients (Samilson 3 or Hamada 4A, 4B and 5). Clinical and radiological outcomes were analyzed between the two groups.

Results

Eighty patients were reviewed with an average follow-up of 20,8 years (19,3-22,5 years). prevalence of OA was 28.75%. The average Constant score was significantly lower in the OA group (60.9 points) than in the non-OA group (70.6 points). Only the strength was significantly lower in the OA group. The mean SSV was 73.5% without significant difference between the two groups. There was significantly more isolated lesion of supra-supinatus tendon (SSN) in the non-OA group (56.1%). There was significantly more massive cuff tears with 3 tendons in the group with OA (26.1%). Patients with healed SSN tendon had significantly less OA(92.5%) than if the tendon wasn't healed. The un-healed tendon of the SSN was significantly associated with a high >3 of the infraspinatus muscle (ISN).

Conclusions

At 20 years of follow-up, more than one patient of four operated of a RCT had an osteoarthritis. OA patients had a significantly lower Constant score than non-OA patients. The healing of SSN was significantly associated with absence of osteoarthritis and a FI<2 of the ISN.



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838 Surgical Dislocation Of The Elbow And 360 Degree Release: A Technique For Severe Post Traumatic Contractures And Ankylosis Of The Elbow

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Aim

To describe a radical yet novel technique to regain functional movement in severe post traumatic contractures and ankylosed elbows.

Background

Primary treatment of complex elbow trauma remains a challenge. it is quite often difficult and often inadequate. heterotrophic ossification and stiffness, sometimes very severe is not uncommon. regaining meaningful range of motion is a significant challenge in this patient group. we describe our technique of surgical dislocation of the elbow that addresses all components of stiffness.

Methods

42 patients who had this procedure and completed 2 years follow up were included. 33 men and 9 women in the group. average age was 35.6 years. (14 to 61). on an average each patient had 2.6 surgeries on their elbow (range 0 to 4 surgeries). flexion extension arc was from 0 to 76 deg., averaging 42.5 degrees. all patients were operated by a single surgeon through a posterior midline triceps splitting approach, with 360 degree release including capsule, both anterior and posterior with bipolar release of the collateral ligaments. joint was dislocated cleared of fibrosis and bone till articular cartilage was visible. Interposition arthroplasty was done in 1 patient. 1 patient also received a radial head replacement. ulnar nerve was isolated and decompressed in situ in all but 2 patients, who had previous transposition. significant pain pre op was a contraindication for this procedure.

Results

All patients were assessed and followed up for at least 2 years post operative. results were marked as per mayo elbow performance index. the average arc of motion was more than doubled to 100.6 degrees, range 90 to 132 degrees. no patient had objectionable instability. 2 patients had ulnar nerve and 2 patients had radial nerve paresis, which recovered. 2 patients had triceps breakdown, 1 was re operated. 10 patients had reduced triceps strength. 38 patients were satisfied with their results.

Conclusions

Persistent severe elbow stiffness is a significantly disabling condition. surgical dislocation is a radical, yet effective way to deal with severe elbow stiffness.



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87 Surgical Treatment Of Infected Shoulder Arthroplasty. A Systematic Review.

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Aim

To investigate the best surgical management of infected shoulder arthroplasty.

Background

The best surgical treatment is still unclear.

Methods

A literature review from 1996 to 2016 identified 15 level IV studies that met inclusion criteria. Persistent infection (PI) was considered as treatment failure. Success was regarded as absence of symptomatic PI without necessity for further treatment. Surgical outcomes were reported according to mean weighted Constant and Murley score (CMS) for each treatment group.

Results

287 patients (146males/141females) were identified at a mean follow-up of 50.4 (range 32-99.6) months. The PI in the whole population was 11.5%. The pooled mean CMS, available for 218 patients, was 39±13. Twenty-seven patients (9.4%) were treated with debridement (PI 29.6%,CMS 41±12), 52 patients (18.1%) with resection arthroplasty (PI 11.5%,CMS 29±16), 33 patients (11.5%) with permanent spacers (PI 6.1%,CMS 31±14), 98 patients (34.2%) with two-stage revisions (PI 14.3%,CMS 42±12) and 77 patients (26.8%) with one-stage revisions (PI 3.9%,CMS 49±11). Debridement showed the highest PI rate (29.6%) and one-stage revisions reported the lowest PI rate (3.9%). Resection arthroplasty and spacers showed the poorest CMS when compared to the other procedures ($p \leq 0,0001$). The debridement PI rate was significantly higher than almost any other procedure. CMS was significantly higher in patients undergoing revision compared to non-revision procedures (45±12 vs. 35±14) ($p < 0.0001$). One-stage revisions achieved significantly better results in terms of the PI rate compared to two-stage revisions ($p = 0.0223$), but not in term of CMS.

Conclusions

Debridement showed the highest PI rate (29.6%) and should be not recommended for the management of infected shoulder arthroplasty. Revisions reported better functional outcomes compared to non-revision procedures. The presence of a significantly lower PI rate with comparably high mean CMS values suggests that one-stage (where technically applicable) could be superior to two-stage revisions.

Unfortunately, well-designed randomized controlled trials using validated patient-based outcomes are lacking in this field.



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88 Anatomic Reinsertion Of The Biceps Tendon To The Radial Tuberosity Using Two Suture Anchors

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Aim

Analysis of clinical outcomes after anatomic reinsertion of the distal biceps tendon to the radial tuberosity using two suture anchors.

Background

For distal biceps tendon reinsertion to the radial tuberosity different operative techniques exist. Using two suture anchors the anatomic course and bony insertion of the distal biceps tendon can be reconstructed with a minimal risk of nerve injuries, heterotopic ossifications, or other complications.

Methods

We retrospectively analysed 30 consecutive patients with a tear of the distal biceps tendon, who were treated by anatomic tendon reinsertion to the radial tuberosity using two suture anchors.

In supination the skin was incised longitudinally for 4 cm, centered over the medial border of the radial tuberosity. The incision started 2 cm distal from the humero-radial joint line. Bluntly the distal biceps tendon stump was found and mobilized. Preparation to and debriding of the radial tuberosity sparing neurovascular structures. Crossing vessel branches were ligated, if needed. Positioning of 2 spreading anchors into the radial tuberosity and reinsertion of the tendon stump.

Postoperative management consisted of adjustable elbow movement orthosis adapted to tendon quality and tissue tension for 6 weeks without active flexion or supination. Degree of extension was gradually increased. After orthosis-treatment was finished after 6 weeks, flexion and supination with weights was not allowed for another 6 weeks.

Results

45 months (min. 15, max. 18 months) postoperatively, the clinical outcome was good or excellent in 99 % of the cases. On average, we found a Mayo-elbow-performance-score of 93 points (min. 65, max. 100 points) and a QuickDash of 5 points (min. 0, max. 39 points).

Conclusions

Reinsertion of the biceps tendon to the radial tuberosity using two suture anchors is safe and showed very good clinical outcomes. Correct anatomy of the distal biceps tendon and its insertion can be reconstructed.



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96 Learning Curve In Elbow Arthroscopy And LUCL-Reconstruction

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Aim

show the learning curve of performing an LUCL-reconstruction

Background

Elbow arthroscopy and ligament surgery is accepted for treating PLRI.

Only few studies show clinical findings after operation.

We questioned whether there is a learning curve for doing a LUCL reconstruction.

Methods

The author started after courses in theory and specimen training under supervision of an experienced elbow surgeon the first 10 operations. The following operations were done without supervision.

We analysed the first 30 operations for OR time, post-op pain - VAS within 48 hours, after 12 and 24 months and oxford elbow score (OES) pre, 6 and 12 weeks, 12 and 24 months post-op.

After 3 years and having performed about 150 reconstructions, another random group of 10 consecutive patients (group D) looking at the same parameters and 2-year results was followed.

Results

The first 30 patients the author operated were included. Regarding the learning curve we split the patients into 3 groups. The overall OES pre-op was 21.3 points. After 24 months the mean score was 42,4 points (of max 48).

Mean ROM pre op was regained within 12 weeks.

VAS within the first 12 hours (night after op) was highest with 6.3 points. It decreased down to 2.5 points at 48 hrs.. After 24 months it was 1.2 points

The first 10 (A), supervised patients, took 100.5 min. The second group (B) took 99.1 min. The third group (C) averaged sign. shorter with 85,4 min OR time. In group D OR time was significantly shorter with 55,8min. Regarding the VAS a significantly lower post-op (12 hrs.) pain score in groups C/D compared to group A. After 2 years there is no significant difference between the 4 groups in OES.

Conclusions

Regarding OR time LUCL reconstruction has a learning curve. It is encouraging that even within the learning curve the post-op results are good to very good.



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95 Mid Term Results After Biceps Tenodesis Using A Unicortical "Biceps Button"

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Aim

This paper wants to show mid term follow up after unicortical button biceps tenodesis.

Background

We describe a unicortical fixation via a suture plate - comparable to a distal biceps re-fixation-performed arthroscopically or mini-open via standard suprapectoral approach. The aim of this study is to show the clinical outcome after 6, 12, 24 and last follow up 48 months

Methods

A consecutive series of 50 (35 male, 15 female) patients at the mean age of 49 years (range 23-75) who underwent tenodesis of the LHB were followed for mean 43 (36-48) months. All patients were operated by a single surgeon. The clinical evaluation included Constant score, Scheibel LHB score and VAS. Structural integrity of the tenodesis was checked by ultrasound control. Integrity of the tenodesis was evaluated indirectly by detecting the LHB-tendon up to the ultrasound-reflex of the button. No tendon at the button-reflex was considered as failure of the tenodesis.

Results

Mean follow-up was 43 (range 36-48) months. The mean preoperative Constant score was 67.4 points (range 45-78) and increased to 83.8 points (range 51-99) at last follow up. LHB-Score was 91.3 points. We identified 4 failed biceps fixations (8%) 2 within the first 2 years and 2 in the 2nd half of the 4 years control. Pain relief was achieved in most patients within the first 12 weeks. After 43 months the mean biceps flexion strength averaged 90% of the healthy arm.

Conclusions

Tenodesis of the LHB with a unicortical suture plate is a safe fixation-technique with good to excellent clinical results after a minimum follow-up of 43 months.



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389 Radiographic Changes Differ Between Two Different Short Press-Fit Humeral Stem Designs In Total Shoulder Arthroplasty**Patrick J Denard**¹, Matthew P Noyes¹, J Brock Walker², Reuben Gobezie³, Anthony A Romeo⁴, Evan Lederman⁵

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Aim

The purpose of this study was to compare the radiographic adaptations of two different short humeral stems.

Background

Short press-fit humeral stems have the theoretical advantage of bone preservation during total shoulder arthroplasty (TSA) but no studies have clinically compared the variety of different designs. The hypothesis was there would be no difference in radiographic adaptations or functional outcome based on stem type.

Methods

A retrospective review was performed of TSAs performed with a short press-fit humeral component. Radiographic adaptations and functional outcome were reviewed at a minimum of 2 years. There were 42 patients in Group A (23 Ascend and 19 Ascend Flex; Wright Medical), and 35 patients in Group B (Apex; Arthrex, Inc.).

Results

Both groups demonstrated significant improvement in range of motion (ROM) and functional outcome scores ($p < .001$) with no difference between groups. There was no difference in radiographic adaptations between the two stems within group A. Radiographic adaptations were more common in group A (62% high changes) than in group B (23% high changes) ($p = .002$). Medial calcar osteolysis was higher in group A (64% partial, 7% complete) than in group B (29% partial) ($p < .001$). Cortical thinning was associated with lower postoperative forward flexion and internal rotation, and SSV improvement, while calcar osteolysis was associated with lower external rotation ($p < .05$). Stem subsidence or shift was observed in 14% of group A and 8.5% of group B ($p = .499$).

Conclusions

There may be considerable difference in the rate of radiographic adaptations between different short stem humeral designs. Cortical thinning and medial calcar osteolysis in particular may influence functional outcome. Further study is needed to examine the long-term progression of these changes and determine the variable stem factors associated with radiographic adaptations.



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106 Preliminary Results Of Arthroscopic Superior Capsule Reconstruction With Dermal Allograft

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Aim

Our purpose was to evaluate the short-term outcomes of arthroscopic SCR with dermal allograft.

Background

Superior capsule reconstruction (SCR) with fascia lata autograft has been proposed as a joint-preserving solution for irreparable massive rotator cuff tears (MRCT). Dermal allograft limits donor-site morbidity, has been used previously in augmentation of rotator cuff repairs, and has been used clinically for SCR. However, no studies have reported on the outcomes of arthroscopic SCR with dermal allograft.

Methods

A multi-center prospective study was performed on patients undergoing arthroscopic SCR for irreparable MRCTs. The minimum follow-up was 1 year. Range of motion and functional outcome according to VAS pain, ASES score, and SANE score were assessed preoperatively and at final follow-up. Radiographs were used to evaluate the acromiohumeral distance (AHD).

Results

53 patients with a mean age of 61.7 years had a minimum follow-up of 1 year. Twenty two patients (41.5%) had a prior rotator cuff repair. Forward flexion improved from 133° preoperatively to 161° postoperatively, and external rotation improved from 39° to 46° respectively ($p < .05$). Compared to preoperative values, VAS decreased from 5.4 to 1.6, the ASES score improved from 44.6 to 78.0, and SANE score improved from 33.0 to 77.0 ($p < .05$). The AHD was 6.8 mm at baseline, and improved to 7.7 mm at the 2 weeks postoperative. Forty patients (75%) were satisfied with the procedure. Nine patients (17%) underwent a revision procedure including 6 reverse shoulder arthroplasties.

Conclusions

Arthroscopic SCR using dermal allograft provides functional improvement and patient satisfaction in the majority of cases. The preliminary results are encouraging in an otherwise difficult to manage patient population. However, further study is needed to examine the long-term outcome and need for secondary procedures, and evaluate the learning curve of the procedure as these results represent our initial patients.



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104 Treatment Of Periprosthetic Shoulder Infections Using Antibiotic Loaded Cement Spacer

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Aim

This study aimed to analyze the eradication rate of infection and the functional shoulder restoration after two-stage revision arthroplasties using antibiotic cement spacer.

Background

The treatment of periprosthetic shoulder infections (PSI) with two-stage revision arthroplasty using an antibiotic loaded cement spacer is a common strategy to treat low-grade infections. The available data about restoration of shoulder function after cement spacer treatment is scarce.

Methods

We retrospectively searched for patients with a PSI treated with a 2-stage exchange using an antibiotic spacer between 2000 and 2013.

The infection eradication rate 2 years after reimplantation was assessed as the primary endpoint and the clinical outcome was defined as the secondary endpoint.

Results

48 patients underwent a two-stage revision arthroplasty using an antibiotic loaded cement spacer. The infection eradication rate was 95%. The complication rate was 58% and the revision surgery rate 38%. In patients who were definitely treated with RTSA (n=23) the CS and RCS improved the most from 31 (2-81) to 51 (14-78) points and from 37 (2-95) to 61 (18-100) % (p<0.01). Those, who were treated with HA (n=6) improved from 22 (7-42) to 24 (11-33) points respectively from 25 (9-45) to 28 (13-45) % and those, where the spacer was left in place (n=9) had a final CS / RCS of 35 (23-45) and 42 (29-59) %. Patients with a 2-stage revision with a definitive reimplantation of a RTSA with 5 or more surgeries before the 2-stage revision showed a significantly lower mean CS.

Conclusions

The infection eradication rate of periprosthetic shoulder joint infection after the use of an antibiotic loaded cement spacer is 95% in our cohort.

Two-stage revision with re-implantation of a RTSA allows the best restoration of shoulder function in our series. Multiple prior surgical interventions worsen the functional outcome of patients with a reimplantation of a RTSA.



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325 Progression Of Muscle Atrophy And/Or Fatty Degeneration In Shoulders With Symptomatic Rotator Cuff Tears: A Prospective Study Of 150 Shoulders

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Aim

The purpose of this study was to demonstrate the relationship between tear progression and muscle atrophy and fatty degeneration.

Background

Our previous study revealed that the tear size of symptomatic rotator cuff tears progressed in 55% of 150 shoulders in average 17 months, and the speed of progression was 5.8 mm/yr in length and 3.1 mm/yr in width. The risk factors for tear progression were smoking, a full-thickness tear, and a tear sized 1 to 2 cm.

Methods

Two hundred and seven consecutive patients with symptomatic rotator cuff tears visited our institute between 2009 and 2015. Of these, 150 shoulders (mean age, 68 year) who underwent at least two MRI examinations were prospectively enrolled. This group of patients consisted of 86 full-thickness tears and 64 partial-thickness tears. The mean follow-up was 17 months. Eighty-two shoulders (55%) had a tear progression (progression group) and no change in tear size in 78 shoulders (non-progression group). Muscle atrophy and fatty degeneration were evaluated with use of Warner classification and Goutallier classification, respectively.

Results

In the progression group, muscle atrophy and/or fatty degeneration progressed in 29/82 shoulders (35%), whereas in the non-progression group, they progressed in 9/68 shoulders (13%). The progression of both muscle atrophy and fatty degeneration was seen in 14/29 shoulders in the progression group but none of them showed progression of both in the non-progression group: only the muscle atrophy was progressed in 6/9 shoulders in the non-progression group. In 29 shoulders with progression of muscle atrophy and fatty degeneration in the progression group, 17 shoulders had moderate tears.

Conclusions

In the progression group, both muscle atrophy and fatty degeneration progressed in most of the cases, whereas in the non-progression group, only the muscle atrophy progressed in most cases. In moderate tears with tear progression, muscle atrophy and fatty degeneration progressed fast.



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123 Glenoid Baseplate Fixation With A Helical Blade As Part Of Reverse Shoulder Arthroplasty : Preliminary ResultsSebastien Zilber¹, Eleonora Camana², Laurent Nove-Josserand²

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Aim

To validate a new concept of glenoid baseplate bone fixation.

Background

Glenoid mobilization is a common cause of reverse total shoulder arthroplasty (RTSA) failure. Graft of the glenoid is often required for revision in these cases because of the lack of bone left by the central peg of most glenoid implants. Helical blades have been used in the hip to optimize bone fixation in proximal femoral fracture. This study presents the initial results of the use of specifically designed helical blade in the shoulder to optimize glenoid bone fixation and preservation.

Methods

43 patients (44 implants) have undergone glenoid helical blade fixation as part of a RTSA between April 2013 and December 2014. 40 shoulders were reviewed for the study. Patients received an uncemented glenoid baseplate with a central helical blade partially coated with hydroxyapatite and the use of 2 or 3 screws. Clinical and X-rays outcomes were performed preoperatively, and at 1 and 2 years follow-up.

Results

All patients have been satisfied and all scores have improved. Two undisplaced glenoid fractures, which did not compromise the baseplate implantation, occur on both shoulders of the same patient. All glenoid implants were in place without any loosening. Incomplete radiolucent lines were observed in 5 cases. Glenoid notch was observed in 12 cases. Bone perforation at the end of the blade was observed in a third of the cases. There was no difference using 2 or 3 screws.

Conclusions

The helical blade seems to be effective for preventing glenoid mobilization in the short term. The cancellous bone is compacted before blade impaction without drilling necessity, the glenoid bone is therefore preserved. Because of its length (21 mm), care should be taken in case of preexisting bone loss by eventually grafting the baseplate or switching to a standard central peg to avoid glenoid fracture.



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124 Arthroscopic Correction Of The Critical Shoulder Angle Through Lateral Acromioplasty: A Safe Adjunct To Rotator Cuff Repair

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Aim

It was the purpose of this study to test the hypotheses that arthroscopic lateral acromioplasty reliably allows to decrease a large critical shoulder angle (CSA), that it does not jeopardize the deltoid origin or cause other complications and that it is associated with a rotator cuff repair (RCR) outcome which justifies further prospective, comparative investigation.

Background

A large CSA is an established risk factor for RC tearing (RCT). CSA reduction experimentally diminishes the load on the supraspinatus and reduction of a large CSA should clinically have the potential to reduce chronic repetitive (over-)loading of the supraspinatus. A safe and reliable operative technique to reduce CSA is not yet described.

Methods

Forty-nine consecutive patients with degenerative full-thickness RCTs and a CSA of $\geq 34^\circ$ underwent combined arthroscopic RCR with lateral acromioplasty. The mean age was 59 (range, 41-78) years. All patients underwent clinical and MRI evaluation preoperatively and at a mean follow-up of 30 (range, 12-47) months.

Results

There were no intraoperative complications and seven structural RC tendon repair failures (14%). The mean preoperative CSA was reduced from 37.5° (range, 34° - 44°) to 33.9° (range, 30° - 38° ; $p < 0.001$). At follow-up there were neither dehiscence nor fatty infiltration nor atrophy of the deltoid. Eighteen patients (37%) had minor scarring at the deltoid origin without discontinuity. Absolute and relative mean Constant scores improved from 59 (range, 10-92) to 74 (range, 37-92) points ($p < 0.001$) and from 66 (range, 12-96)% to 83 (range, 49-100)%; ($p < 0.001$). Mean SSV increased from 45 (range, 5-85)% to 80 (range, 20-100)%; ($p < 0.001$). Postoperative CSA was significantly larger in failed than in healed repairs ($p = 0.026$).

Conclusions

Arthroscopic lateral acromioplasty can reduce the CSA without compromising the deltoid origin or muscle. In this series, a small postoperative CSA was associated with a low retear rate. Prospective randomized trials comparing RCR with and without lateral acromioplasty appear warranted.



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594 Validation Of A Simple Overlay Device To Assess Radial Head Implant Overstuffing

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Aim

The purpose of this study was to determine the accuracy and reliability of an overlay template for the proper sizing of a prosthetic radial head.

Background

Proper sizing of radial head implants is necessary for optimal joint function. Overlengthening of the implant can result in capitellar wear, loss of motion and degenerative arthritis. A simple overlay device (SOD) has been reported based on the navigation concept of a 'three-point fix' to address the need for a reliable measurement system.

Methods

Five fresh frozen cadavers were implanted with sequentially longer implants, adjusted by neck length (0, +2, +4, and +8) mm. Fluoroscopic AP (anteroposterior) images were obtained in supination and pronation in full extension. AP views were also taken at 45 degrees of flexion in neutral and full supination. The measurements were compared to the native radial head (control) to assess for implant overstuffing. Additionally, gapping of the ulnohumeral joint space was measured for comparison purposes, as this is another reported method used to evaluate for overlengthening.

Results

The mean errors for all 4 neck lengths were less than 2 mm, except in one measurement in which the bicipital tuberosity could not be visualized. Observer 1's measurements were compared to the Overlay template, for which the I.C.C. values were 0.96 – 0.99. The ICC values between the two observers were between 0.94 – 0.95. For both observers, neither elbow position, collar height, nor the two variables combined significantly affected the SOD measurements ($p > 0.05$). Measurements of the ulnohumeral joint spaces had higher inter-observer variability and could only reliably detect overstuffing of over 4 mm.

Conclusions

The simple overlay device is a reliable method of assessing radial head overstuffing using x-rays, and can accurately detect 2 mm or more of overlengthening.



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670 Guidelines For Evidence-Based Prevention Of Prosthetic Shoulder Infection Are Lacking: A Survey Of Shoulder Surgeons

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Aim

This study highlights the need for consensus-based guidelines on the prevention of prosthetic shoulder infection, and demonstrates the lack of solid evidence to determine best protocols for infection prevention and the lack of agreement amongst shoulder surgeons around the world.

Background

Infection following shoulder arthroplasty can be a devastating complication that increases patient morbidity and cost substantially. The relatively high prevalence of *Propionibacterium Acnes* in PJI around the shoulder further complicates agreement on prevention strategies. As there are no published consensus guidelines on prosthetic shoulder infection prevention, we sought to gain insight on the views of an international cohort of shoulder surgeons.

Methods

752 shoulder surgeons were surveyed, including members from the American Shoulder and Elbow Surgeons (ASES), members of the Codman Shoulder Society, and former fellows from select ASES-sponsored fellowship programs. 218 surgeons (29%) responded. The survey was constructed with 28 questions focused on surgeons' perceptions towards the adequacy of current infection-prevention recommendations, as well as specific prevention modalities that surgeons have adopted in their own practices to prevent infection. Items for which > 50% of respondents agreed were determined to be a 'consensus' agreement.

Results

82% of respondents agreed that the currently-available data did not clearly support the use of one infection prevention strategy, and 67% felt that the available data guiding surgeons is insufficient. Only 59% based their infection prophylaxis regimen on the available literature on shoulder arthroplasty. The most common modalities of infection prevention, in addition to routine intravenous antibiotics, included antibiotic-impregnated cement when cementing (70%), routine topical vancomycin powder (58%), and dilute betadine lavage (28%).

Conclusions

There is consensus agreement that the available literature and guidelines on the prevention of prosthetic shoulder infection is insufficient. Our results highlight this deficiency and identify it as a necessary area of focus for additional resources and research.



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335 Clinical Outcomes Of Arthroscopic Capsular Release And Manipulation In Shoulder Stiffness With And Without Partial-Thickness Rotator Cuff Tears Involving Less Than One-Half Of The Tendon Thickness

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Aim

We investigated whether residual, unrepaired partial-thickness rotator cuff tears (PTRCTs) affect clinical outcomes after arthroscopic capsular release (ACR) and manipulation in patients with shoulder stiffness.

Background

Rotator cuff tears are frequently associated with shoulder stiffness. Several recent studies have reported overall satisfactory clinical outcomes after single-stage rotator cuff repair and manipulation with ACR in patients with rotator cuff tears and shoulder stiffness. However, whether residual, unrepaired PTRCTs affect the clinical outcome of ACR and manipulation in patients with shoulder stiffness remains unknown.

Methods

We retrospectively reviewed our database and enrolled 26 patients with shoulder stiffness who had undergone ACR and manipulation between 2013 and 2016. Twelve patients (6 male, 6 female; mean age, 63.3 years) had concomitant PTRCTs involving <50% of the tendon thickness (PTRCT group), and 14 patients (9 male, 5 female; mean age, 60.1 years) had intact rotator cuffs (no-tear group). Shoulder stiffness was defined as less than 120° of forward flexion or less than 50% of external rotation relative to the contralateral shoulder. Active shoulder range of motion (ROM) was measured preoperatively; at 1, 3, and 5 months after surgery; and at final follow-up. The mean follow-up period was 12.7 months (range, 5–32 months) in the PTRCT group and 11.5 months (range, 5–42 months) in the no-tear group. Functional outcome was evaluated by using Japanese Orthopaedic Association (JOA) scores.

Results

Both groups had significant improvements in JOA score and ROM at final follow-up ($P < 0.0001$ for JOA score; $P < 0.0001$ for ROM). The PTRCT and no-tear groups did not differ regarding JOA score (91.0 and 90.4 points, respectively) or ROM at 1, 3, or 5 months post-surgery or at final follow-up.

Conclusions

Regardless of the presence of PTRCTs involving <50% of the tendon thickness, patients with shoulder stiffness achieved good functional clinical outcomes after ACR and manipulation.



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140 Clavicle Length And Hand Dominance – Does Asymmetry Exist And What Are The Clinical Implications Of This?

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Aim

To assess the extent of asymmetry within clavicles in the same patient with regards to differences in length.

Background

The assumption of symmetry regarding clavicular length has previously been found unreliable. With the decision to surgically fix clavicle fractures often being based on the degree of shortening, this assumption if untrue may change clinical practice. We hypothesized that asymmetry exists with clavicles on the dominant side being significantly shorter.

Methods

Two individuals clinically measured 508 pairs of Asian clavicles. Length was defined as the distance between either the sternoclavicular joint (SCJ) and acromioclavicular joint (ACJ) or suprasternal notch (SSN) and ACJ. Both individuals measured these in both clavicles twice and in each volunteer twice to determine the extent or lack of symmetry and intra- and inter-observer reliability. Other parameters recorded included age, sex, race, occupation and hand dominance.

Results

Dominant clavicles were found to be significantly shorter by an average of 7mm and a maximum of 31mm. Intra- and inter-observer reliability were both excellent. Even if osteometric measurements are standardized using bony landmarks, we strongly advocate not applying this technique to clavicle measurements in view of the inaccuracy and unreliability, especially if this is going to determine the necessity for surgery in patients with fractures of the clavicle and what is thought to be shortening. Clavicle length is also likely related to hand dominance with clavicles of the dominant arm being shorter.

Conclusions

Both these facts have significant implications on the clinical measurement of clavicular length post-fracture and its use as a determinant for surgery, something all orthopaedic surgeons should be made aware of.



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146 Early Clinical Results Of Arthroscopic Anatomical Suture-Bridge Repair For Rotator Cuff Tear Over 60-Year People**Hideaki Onen Asai**

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Aim

We compared our new method anatomical suture-bridge(a-SB) technique and suture-bridge(SB) technique using re-tear rate after arthroscopic rotator cuff repair(ARCR) .

Background

ARCR with SB is common treatment for complete rotator cuff tear. But, sometimes we have faced the re-tear after the surgery because of excessive tension. To prevent it, we've been performed our new method, a-SB which we insert the small anchor like 1.5mm Jugger knot (Zimmer-BIOMET TDM) or 2.3mm Gryphon BR (Johnson & Johnson TDM) to the edge of greater tuberosity before suture bridging. We reported this technique reduced re-tear rate to the Congress of Japan Shoulder Society in 2015. In this study , we focus on the old age people who are risk factor of failure repaired rotator cuff.

Methods

The materials are 21 shoulders of SB technique and 35 shoulders of a-SB. Mean age are 70.9 y.o. and 68.9 y.o. We define Sugaya classification 4 and 5 as re-tear and compared re-tear rate of both group one year after surgery.

Results

The result was 28.6% of re-tear rate for SB and 5.7 % for a-SB.

Conclusions

a-SB technique might reduce the re-tear rate of ARCR for old age people.



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148 Nerve Stimulator For Reducing The Radial Nerve Injury In Mid-Shaft Humeral Fracture Nail Fixation.**Marwan Haddad**, Maher Khateb, Galit Daniel-Lavee

Galilee Medical Center, Naharyia, Israel

Aim

The aim of our study was to reduce the iatrogenic radial nerve injury.

Background

Mid-shaft humeral fracture is one of the common upper limb fractures. Intra medullary nailing is being more and more popular in this indication.

Methods

Since July 2014 till December 2016, 32 cases of mid shaft humeral fracture were nailed in our department.

The indications were a transvers fracture, a fully displaced fracture and open fracture gultillo grade I.

The surgery was done in a beach chair position and a classic anterograde nail introduction. Nerve stimulator was applied to the guide wire.

An extension of the wrist or fingers while introduction the guide wire convert the close reduction of the fracture to open through 3-4 cm incision to liberate the nerve from the fracture site.

Results

In the 32 cases, 9 were opened. 31 cases were without nerve injury. One case was with neuropraxie post surgery. The nerve recovered completely after 5 months.

Conclusions

using a nerve stimulator is a simple, easy way to avoid radial nerve injury while nailing a humeral shaft fracture.



230 Is There Still A Place For The Nirschl Procedure?

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Aim

We asked whether our long-term results with the Nirschl procedure justify a further extra-articular procedure, or whether we have to change our treatment in the case of lateral elbow pain.

Background

In recent literature, the focus is on intra-articular pathologies in lateral elbow pain such as lateral instability and Plica- syndrome. Increasingly an arthroscopic procedure is required. In our patients, these pathologies are rare.

The aim of the study was to determine the current value of Nirschl's surgical method in simple lateral elbow pain.

Methods

From 2008 to 2010, 34 patients with a painful, therapy-resistant lateral Epicondylitis were surgically treated with the Nirschl technique. The retrospective study was performed on average after 4.8 (range: 3.8 - 6) years.

28 patients (82.3%) are clinically investigated.

The average age of patients (18 women, 10 men) was 45.5 (35 - 54) years. The operation was performed 21 times on the right and 7 times on the left elbow.

All operations were performed in axillary block anesthesia and by one surgeon.

Results

71,4 % of the patients (20) were very satisfied postoperatively, 21,4% (6) satisfied.

The Nirschl tennis and elbow score improved from 32 points preoperatively to 75 points postoperatively. The preoperative pain level could be reduced from 7,6 to 1.8 points postoperative using the Visual Analogue Scale.

Conclusions

The Epicondylopathia humeri radialis is a common disorder of the elbow joint. Conservative treatment methods can achieve very good and reliable results in the majority of cases. But patients with persistent pain suffer from burden insufficiency.

Different surgical procedures have been published. Percutaneous and arthroscopic techniques have been described which are performed in order to release tissue or are used for denervation.

The "Nirschl" procedure is still a fast and cost-efficient method which can be performed on an outpatient setting. It is characterized by reliable, good functional outcome with high patient satisfaction.



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165 Biomechanical Strength Of Rotator Cuff Repairs: A Systematic Review And Meta-Analysis Of Cadaveric StudiesBrendan Shi¹, Miguel Diaz¹, Jiangxia Wang², Uma Srikumaran³

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3. Department of Shoulder Surgery, The Johns Hopkins University, Baltimore, United States

Aim

The goal of this systematic review and meta-regression analysis was to identify the technical and procedural parameters that most reliably predict the biomechanical performance of rotator cuff repair constructs.

Background

An understanding of the most important technical parameters that determine biomechanical strength of a rotator cuff repair can guide surgical decision-making and construct choice.

Methods

We systematically searched the Embase and PubMed databases for biomechanical studies that measured rotator cuff repair performance in cadaveric specimens. We performed a meta-regression on the pooled dataset with study outcomes (gap formation, failure mode, and ultimate failure load) as dependent variables and procedural parameters (e.g., construct type, number of suture limbs) as covariates. Stratification by covariates was performed. An alpha level of .05 was used for all statistical tests.

Results

Data from 36 eligible studies were included in the meta-regression. Higher number of suture limbs correlated with higher ultimate failure load ($\beta = 40$ N per limb, 95% confidence interval [CI]: 28 to 52 N; $p = 0.000$) and less gap formation ($\beta = -0.6$ mm per limb, 95% CI: -1 to -0.2 mm; $p = 0.006$). Other positive predictors of ultimate failure load were number of sutures used, number of mattress stitches, and use of wide suture versus standard suture. When controlling for number of suture limbs, we found no significant differences among single-row anchored, double-row anchored, and transosseous repairs. Higher number of suture limbs and the use of transosseous equivalent repair both increased the probability of catastrophic (type-2) failure of the construct.

Conclusions

This study suggests that the number of sutures, suture limbs, and mattress stitches in a rotator cuff repair construct are stronger predictors of overall strength than construct type. There is a need to balance increased construct strength with higher risk of type-2 failure.



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166 Pullout Strength In Augmented And Wide-Suture Transosseous Rotator Cuff Repair

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Aim

The goal of this study was to evaluate two new methods of improving transosseous rotator cuff repair pull-out strength in osteopenic bone. We analyzed the effect of a) augmenting the lateral tunnel with cement and b) using 2-mm suture tape instead of No. 2 suture.

Background

Rotator cuff tears are increasing in prevalence due to an aging population. Obtaining strong fixation in the osteopenic bone seen in this population is increasingly critical in surgical repair of rotator cuff tears.

Methods

Eleven pairs of osteopenic, cadaveric humeri were identified by DEXA screening. One bone tunnel and one suture were placed in the head of all 22 specimens. Five pairs were randomized to be repaired with No. 2 suture, while the other six were repaired with 2-mm suture tape. One side of each pair received lateral tunnel cement augmentation. Specimens were mounted at 20° to the horizontal and tested to failure with an MTS system. The data was fitted to a generalized linear latent and mixed model with a random effects term to account for pairing. Pullout strength was included as the dependent variable, and augmentation, suture type, BMD, age, and sex were included as independent variables.

Results

Two specimens were excluded due to knot-slipping during testing. Use of suture tape instead of No.2 suture conferred a 75 N increase in pullout strength (P=0.000, 95% CI [37 113]) while cement augmentation conferred a 42 N improvement (P=0.011, 95% CI [10 75]). Other significant predictors of pullout strength were BMD, age, and sex.

Conclusions

This study demonstrates two methods of improving the fixation strength in transosseous rotator cuff repairs performed in osteopenic bone-- replacing No. 2 suture with 2-mm suture tape and augmenting the lateral tunnel with cement. These methods may improve the feasibility of using transosseous repairs in an aging patient population.



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162 Synovitis As A Concomitant Disease In Shoulder Pathologies

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Aim

Aim of the study was to analyze the occurrence of macroscopically visible synovial reaction in the rotator interval in patients with chronic shoulder pathologies and to perform a histopathological evaluation.

Background

Shoulder pathologies are often accompanied by rotator interval synovitis. This phenomenon is poorly described in the literature so far.

Methods

In this prospective, non-randomized cohort study 167 consecutive patients undergoing arthroscopic shoulder surgery for chronic shoulder pathology were included ($n=45$, $n=122$; \bar{x} 54.5 years \pm 12.8). The included patients were divided into subgroups according to the encountered chronic shoulder pathology: 1) impingement syndrome with or without bursal sided partial rotator cuff tear (RCT), 2) articular sided partial RCT, 3) full-thickness RCT, 4) RCT that involves at least 2 tendons, 5) shoulder instability, 6) cartilage damage. Standardized soft-tissue biopsies from the rotator interval were taken. The synovitis score of Krenn/Morawietz was used for histopathological examination.

Results

Differences between all subgroups were detected to be statistically significant ($p=0.001$). Group 1 showed significant decreased synovitis scores compared to all the other groups. Group 4, as well as group 6 showed significant higher synovitis scores than group 3 ($p<0.05$). Moreover, the synovitis score was significantly increased in patients with concomitant pathologies of the long head of the biceps ($p=0.001$).

Conclusions

This study suggests that chronic intra- and extraarticular shoulder diseases are very often accompanied by a macroscopically visible and histopathologically verifiable low-grade synovitis. Intraarticular pathologies seem to induce increased levels of synovitis. Furthermore, the increased size of rotator cuff tears is accompanied by a higher degree of synovitis.



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**163 INDICATION FOR CLAVICLE FRACTURE OSTEOSYNTHESIS
BASED ON SHORTENING: HOW TO MEASURE IT?**

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Aim

To compare three previously described clavicle fracture shortening measurements on 2D radiographs with measurements on CT 3D reconstruction and to assess impact of fracture pattern on shortening.

Background

Indication for midshaft clavicle fracture surgery relies on shortening evaluated by 2D radiographs. This method may not be reliable.

Methods

We created five synthetic fractured bone models and acquired standard radiographs and CT. Shortening was compared between caliper measurements of the models and CT 3D reconstruction. Twenty patients were then retrieved with midshaft clavicle fractures imaged by standard radiographs and CT. Shortening was measured by a musculoskeletal radiologist and an orthopedic surgeon according to three methods (Jeray, Silva and Smekal et al.). Measures were compared with CT 3D reconstruction. The effect of fragments displacement according to 6 degrees of freedom on shortening was finally correlated to shortening in order to assess impact of fracture pattern.

Results

Mean difference in shortening between caliper and CT was 0.7 mm [-2.5; 4.0] ($p=0.56$). Inter-observer reliability was 0.99 for Jeray, 0.97 for Silva and 0.97 for Smekal. Mean difference between CT and standard radiographs was 11.7 mm [7.1; 16.4] for Jeray, -1.2 mm [-5.9; 3.4] for Silva and 9.1 mm [4.5; 13.7] for Smekal. The results based on a mixed linear model didn't show significant difference between Silva and CT measurements ($p=0.51$). The only component of fracture pattern significantly associated with shortening was the translation about the axis (z).

Conclusions

Clavicle fracture shortening measured on CT has an accuracy of 2-4 mm when compared to direct measures. Radiographic measurement according to Silva et al. achieved good inter-observer reliability and an accuracy of 4 to 6 mm. We recommend its use for further studies. Fracture pattern according to six degrees of freedom did not influence shortening in this model. We cannot recommend its assessment for indication to therapeutic modality.



326 Arthroscopic Bare Spot Method Underestimates The True Bone Defect In Bony Bankart Lesion

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Aim

The study aims to verify the validity of bare spot method for arthroscopic quantification of glenoid bone defect using several varieties of posterior portal location.

Background

The need for precise quantification of the glenoid defect should be emphasized in the choice of surgery for Bony Bankart lesion specially in its critical values of 16% to 25%, where precise consideration either for soft tissue repair or bony reconstruction is vital.

Methods

Two intact cadaveric glenoids were prepared for the study. The greatest anteroposterior diameter of the perfect circle concept of the glenoid is identified and center of the circle is marked as glenoid bare spot with 23G needle. Sixteen percent and 25% defect were sequentially created using a saw at 0° axis parallel to the longitudinal axis of the glenoid. These were confirmed by 3D CT glenoid scan based on glenoid rim distances. Each glenoids were mounted on Sawbone dome holder model simulating neutral version. Quantification of Glenoid bone defects were sequentially measured by glenoid bare spot method arthroscopically by 5 shoulder arthroscopy trained surgeons in 5 varieties of posterior portals in 5 cycles. Paired sample t-test was done for arthroscopic over CT scan method of glenoid bone loss quantification. One way ANOVA for portal location analysis was done.

Results

Glenoid bare spot method significantly underestimates 16% and 25% glenoid bone defect to $9\% \pm 2$ and $18\% \pm 2$ respectively compared to 3D CT scan method ($P < 0.05$). There was good intraclass correlation coefficient of 0.97 for interrater reliability. There was no significant difference in quantification in between 5 portal sites by one way ANOVA ($P > 0.05$).

Conclusions

Arthroscopic glenoid bare spot method significantly underestimates glenoid bone loss in critical margin degrees of decision making in shoulder instability surgery. Minimal variation of posterior portal location does not significantly cause difference in Glenoid bone loss quantification.



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268 Evaluation Of Different Preparation Techniques And Replacement Alternatives In A B2 Glenoid- A Biomechanical Analysis

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Aim

The aim of this study was to evaluate under standardized conditions different treatment options in glenoid arthroplasty of a B2 glenoid.

Background

High complication rates after total shoulder arthroplasty in cases with severe glenoid retroversion (RV) or eccentric wear are reported. So far a clear consensus on how to deal with these frequently observed pathologies has not yet emerged.

Methods

The following treatment options in a B2 glenoid (RV 15°) were analyzed: (1) no RV correction; (2) complete RV correction; (3) no RV correction and implantation of a posterior augmented glenoid (PAG). A highly standardized implantation protocol using artificial glenoid bones (n=5 per group) was chosen, and a physiologic shoulder movement was applied in a biomechanical setting. By the use of a 3D optical measuring device the micromotions between glenoid prosthesis and bone were quantified

Results

In three cases of the uncorrected RV group subluxation of the prosthetic head was observed between 2000 and 4000 cycles. Therefore all groups were analyzed after 2000 cycles. In addition the corrected RV group and the augmented group were compared after 10000 cycles. After 2000 cycles significantly more micromotions were observed in the uncorrected RV group than in the corrected RV group ($p < 0.0001$) and the augmented group ($p < 0.0001$). After 10000 cycles more micromotions were measured in the augmented group than in the corrected RV group ($p < 0.0001$).

Conclusions

When possible, RV correction should be performed without removing a substantial amount of the glenoid bone prior to glenoid component implantation. In cases where this cannot be achieved PAG seems to be a viable treatment option. In comparison, high failure rates were observed if glenoid arthroplasty without RV correction was performed, and this should therefore be avoided.



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522 Does The Quality Of Supraspinatus Maintain After Muscle Advancement Procedure For The Treatment Of Irreparable Rotator Cuff Tear?

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Aim

The aim of this study was to investigate if the fatty infiltration and muscle volume of supraspinatus maintained after rotator cuff repair by muscle advancement procedure for the treatment of irreparable rotator cuff tear.

Background

Muscle advancement technique has been reported to be a useful option to decrease over tensioning when repairing massive retracted tears of the cuff. However, the quality of repaired rotator cuff following this procedure has not been clarified.

Methods

From Jan 2010 to Oct 2015, 45 shoulders with irreparable rotator cuff tear were treated by muscle advancement procedure. Shoulders who underwent MRI for follow up at two points of time (within 6 weeks and more than 12 month post operation) were included and the cases of recurrent tears were excluded from this study. Therefore, 15 shoulders in 15 patients met the criteria and were enrolled. There were 9 males and 6 females with a mean age of 65.0 years. The fatty infiltration and the muscle volume of the supraspinatus were assessed by Y-view obtained from the oblique sagittal view on MRI. The fatty infiltration was evaluated by Goutallier classification, and the muscle volume was measured by calculating the occupation ratio of supraspinatus muscle belly to supraspinous fossa. The fatty infiltration and muscle volume of rotator cuff between two points of time after the surgery were compared statistically.

Results

The Goutallier classification improved in 5 cases and did not change in 10 cases. The mean occupation ratio of supraspinatus in two time points were $58 \pm 9\%$ and $56 \pm 14\%$, and there was no significant difference ($p=0.26$).

Conclusions

The fatty infiltration and the muscle volume of supraspinatus muscle maintained after muscle advancement procedure for the treatment of irreparable rotator cuff tear.



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180 Clinical Efficacy Of Hydrodilatation With Joint Manipulation Under Interscalene Block Compared To Intraarticular Corticosteroid Injection For Frozen Shoulder

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Aim

This study compared the clinical efficacy of hydrodilatation with joint manipulation under an interscalene block with that of intraarticular corticosteroid injection.

Background

Hydrodilatation is known to be an effective method of treatment for frozen shoulder. However, hydrodilatation is accompanied by severe pain during the procedure. An interscalene block may relieve the severe pain associated with the procedure of hydrodilatation.

Methods

This prospective randomized controlled study included 121 patients presenting with frozen shoulder. Patients were randomized into two groups: those in group A (60 patients) were treated by hydrodilatation with joint manipulation under an interscalene block, and in group B (61 patients) were managed with intraarticular corticosteroid injection. Pain intensity and patient satisfaction were assessed by using the visual analog scale. Functional outcomes were assessed by the Constant score and range of motion.

Results

At 6 weeks after treatment, the satisfaction level of group A was significantly improved compared to group B. (Group A: from 2.4 ± 0.8 to 7.5 ± 0.5 , Group B: from 2.2 ± 1.2 to 4.4 ± 1.1 , $p < 0.001$) and recovery in range of motion was also improved more rapidly than that of group B. ($p < 0.05$) At 12 weeks after treatment, pain score of group A was higher than that of group B (Group A: from 6.8 ± 0.9 to 2.1 ± 0.4 , Group B: from 6.4 ± 1.0 to 4.5 ± 1.2 , $p < 0.001$) and the Constant score was also significantly improved compared to group B. (Group A: from 37.5 ± 9.8 to 88.1 ± 6.8 , Group B: from 41.7 ± 8.8 to 64.8 ± 7.2 , $p < 0.001$) However, at 12 months after treatment, pain score ($p = 0.717$), patient satisfaction ($p = 0.832$), range of motion ($p > 0.05$), and Constant score ($p = 0.480$), were similar in the two groups.

Conclusions

Hydrodilatation combined with joint manipulation under an interscalene block provided earlier pain relief, and restoration of range of motion and function, compared to intraarticular corticosteroid injection, in patients with primary frozen shoulder.



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177 Does The Subscapularis Tendon Play A Role In Outcomes After Reverse Total Shoulder Arthroplasty?**Chang Hee Baek**, Sang Won Mun, Ji Young Kim, Seung Hoon Yi

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Aim

This study investigated repaired subscapularis integrity after reverse total shoulder arthroplasty (RSA) and compared patients' clinical outcomes on the basis of subscapularis tendon healing.

Background

There is no consensus on the value of concomitant subscapularis tendon repair in reverse total shoulder arthroplasty (RSA). Furthermore, the role of the subscapularis tendon after repair is also controversial.

Methods

Of 109 patients who underwent RSA with subscapularis tendon repair, 48 patients followed for more than 2 years were enrolled. An Aequalis reverse shoulder arthroplasty prosthesis (Tornier, Montbonnot, France) was implanted and subscapularis was repaired in transosseous fashion in all patients, using the deltopectoral approach. Ultrasonography was performed at 2 years after RSA to evaluate subscapularis tendon integrity. Clinical and functional outcomes were compared between patients with and without healed subscapularis using Constant score, American Shoulder and Elbow Surgeons (ASES) score, pain visual analog scale (VAS), and range of shoulder motion.

Results

On ultrasonographic examination, 32 of 48 repaired subscapularis tendons (67%) were healed. Clinical outcomes except for external rotation were improved after RSA in both groups ($p < 0.05$). VAS (healed group 2.2 ± 1.0 , non-healed group 2.5 ± 1.6 , $p = 0.717$), Constant (62.6 ± 3.8 , and 59.1 ± 8.9 , $p = 0.504$), ASES scores (63.9 ± 7.3 , and 60.6 ± 7.4 , $p = 0.120$), and range of shoulder motion ($p > 0.05$) did not significantly differ between the 2 groups postoperatively. Ten patients had scapular notching (31%) in the healed group, and in the non-healed group, 1 had postoperative hematoma (6%), 1 traumatic periprosthetic fracture (6%), and 5 scapular notching (31%), with no significant differences between groups (postoperative hematoma, $p = 0.480$; periprosthetic fracture, $p = 0.480$; scapular notching, $p = 0.973$).

Conclusions

Patients with cuff tear arthropathy demonstrated satisfactory clinical outcomes after RSA regardless of subscapularis tendon healing at 2-year follow-up. Subscapularis healing was not associated with clinical outcomes or complications in this population.



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844 New Technique Of Glenohumeral Ligaments Reinforcement In Arthroscopic Bankart Surgery With Transsubscapular Tenodesis Of Long Head Of Biceps And Anterior Labroplasty.Oleg Nicolaevich Milenin¹, Ruslan Alekseevich Sergienko², Vladimir Vladimirovich Arkov¹

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Aim

To improve treatment results of anteroinferior instability in patients with sick glenohumeral ligaments.

Background

Arthroscopic Bankart procedure and its modifications are still the preferred method of treatment in cases without bone loss in glenoid and humeral head. If ligaments quality is poor - recurrence rate may be high. Therefore, some authors recommend to perform Latarjet for this patients. We proposed an alternative technique.

Methods

After mobilization of capsule and labrum from glenoid we place two double-load anchors at 2 and 4 hours. After tenotomy of long head, biceps is mobilized in subdeltoid space, grasp and output through midglenoid portal. The end of the tendon stitched with suture. After inspection of axillary nerve the subscapularis split is performed on 1/3 and 2/3. The suture grasper place to posterior portal and grab the sutures that fixed to the tip of long head of biceps through the subscapularis split and transferred in to the joint. Then the biceps tendon is fixed to the lower anchor and then the upper anchor with one of the sutures to create bumper. Next step is the fixation of the glenohumeral ligaments to glenoid in the anatomical position with the second pair of anchor sutures across biceps graft.

Results

We performed seven operations for period of observation of 6 to 18 months. The results were evaluated clinically and on MRI. All patients achieved full range of motion and absence dislocations and subluxations as well no pain in biceps groove. MRI revealed a complete reintegration glenohumeral ligaments to glenoid.

Conclusions

In case of absence of significant bone loss our procedure has a advantages over Arthrolatajet. With similar triple mechanism of stability (tenodesis, bumper, capsule), it can significantly reinforce the Bankart repair in case of sick glenohumeral ligaments. It is less traumatic, more easier and faster and can easily revise using standard Latarjet.



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174 Retrospective Comparative Analysis Of Elbow Arthroscopy Used To Treat Primary Osteoarthritis With And Without Release Of The Posterior Band Of The Medial Collateral Ligament.Sung Hyun Lee¹, Jeong Woo Kim¹, Se Jin Kim²

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2. St. Carollo Hospital, Suncheon, South Korea

Aim

To evaluate the clinical and functional outcomes of arthroscopic debridement arthroplasty with release of the posterior band of the medial collateral ligament in patients with primary osteoarthritis.

Background

To the best of our knowledge, no study has compared the effect of posteromedial capsular release and posterior band release in primary osteoarthritis. We hypothesized that the effects of posterior band release of the medial collateral ligament in patients with primary osteoarthritis undergoing arthroscopic debridement arthroplasty would not affect clinical outcomes and range of motion.

Methods

We evaluated 43 patients treated with arthroscopic debridement arthroplasty for elbow osteoarthritis from February 2006 to February 2014. In group A (n=19), the posterior band of the medial collateral ligament was released, and in group B (n=24), it was not released. Mean follow-up period in groups A and B were 55.4 months(range, 24-100 months) and 62.2 months(range, 24-103 months), respectively. Clinical results were evaluated by measuring preoperative and postoperative range of motion (ROM) of the elbow, Visual Analogue Scale (VAS) score, and Mayo Elbow Performance Score (MEPS).

Results

Both groups showed significant improvement in clinical outcome (VAS and MEPS) at final follow-up compared to preoperative evaluation(Group A,P=0.009 and 0.013, respectively; Group B, P=0.015 and 0.008, respectively). Group A showed significant improvement in increased flexion at the 6 months follow-up(P=0.043). However, there was no statistically significant difference in postoperative ROM and clinical results between the two groups at the final follow up(P=0.482).

Conclusions

Arthroscopic debridement arthroplasty with release of the posterior band of the medial collateral ligament was associated with improved flexion at the 6-month postoperative follow-up, but no significant difference between the groups was observed at final follow-up. Therefore, the additional release of the posterior band of the medial collateral ligament may be unnecessary for improving of postoperative range of motion.



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190 Do Concomitant Subscapularis Tears In Massive Rotator Cuff Tears Affect Postoperative Functional And Structural Outcomes? Debridement Or Repair Based On Subscapularis Tear Size.

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Aim

To assess the clinical and structural outcomes of arthroscopic repair of massive rotator cuff tears involving the subscapularis.

Background

The subscapularis tendon is essential in maintaining normal glenohumeral biomechanics. However, few studies have addressed the outcomes of tears extending to the subscapularis tendon in massive rotator cuff tears.

Methods

Between 2010 and 2014, 122 consecutive patients with massive rotator cuff tear underwent arthroscopic rotator cuff repair. Patients were categorized into three groups based on subscapularis tendon status: intact subscapularis tendon (I-Group; n=45), tear involving less than the superior one-third (P-Group; n=35), and tear involving more than one-third of the subscapularis tendon (C-group; n=42). All rotator cuff tears were repaired; however, subscapularis tendon tears in group P were only debrided. Pain visual analog scale, Constant, American Shoulder and Elbow Surgeons scores, and passive range of motion was measured preoperatively and at the final follow-up. Rotator cuff integrity were determined using magnetic resonance imaging (MRI) preoperatively and 6 months postoperatively.

Results

We identified 38 retears (31.1%) based on postoperative MRI evaluation. Retear rate in patients in the C-group (47.6%) was higher than that in the I- (20.0%) or P-group (22.9%) ($p=0.011$). Retear subclassification based on the involved tendons showed that subsequent subscapularis tendon retears were noted only in the C-group. The improvement in clinical scores after repair was significant in all groups, but not different between the groups. Between group comparison showed significant differences in preoperative external rotation ($p=0.021$).

Conclusions

Arthroscopic repair of massive tears results in substantial improvements in shoulder function, despite the presence of combined subscapularis tears. However, this study showed a high failure rate of massive posterosuperior rotator cuff tear repair extending more than one-third of the subscapularis tendon. When combined subscapularis tendon tear was less than the superior one-third of the subscapularis tendon, arthroscopic debridement was a one of reasonable treatment method.



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264 Inhibition Of PDGFR Signaling Prevent Muscular Fatty Infiltration After Rotator Cuff Tear In Mice

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Aim

The aim of this study was to investigate if targeting of platelet-derived growth factor receptor- α (PDGFR α) can be a therapeutic option for preventing fatty infiltration.

Background

Fatty infiltration in muscle is often observed in patients with sizable rotator cuff tear (RCT) and is thought to be an irreversible event that significantly compromises muscle plasticity and contraction strength. These changes in the mechanical properties of the affected muscle render surgical repair of RCT highly formidable. Therefore, it is crucial to develop a therapeutic method to prevent fatty infiltration. Recent reports have shown that PDGFR α -positive mesenchymal stem cells are associated with fatty infiltration in muscle.

Methods

9 weeks old C57BL/6 male mice were used in the present study. The left suprascapularis nerve and the supraspinatus muscle tendon were exposed and severed. In addition, the humeral head was resected to minimize the chance of tendon healing. Mice were treated p.o. with a PDGFR inhibitor imatinib (30 mg/kg; Tx-group) or phosphate buffered saline (Ctrl-group). The gene expression profiles in the suprascapular muscle were analyzed 2 weeks after surgery. Histology and Western blotting were performed using the specimens collected 4 weeks after surgery.

Results

Gene expression analysis revealed a significant decrease in the transcripts of adipogenic differentiation markers, including Cebpa, and Pparg, in the Tx-group compared to the Ctrl-group. In accordance, fatty infiltration was markedly suppressed in the Tx-group. The decrease in the number of the PDGFR α -positive cells and the expression of PDGFR α protein were confirmed by Histology and Western blotting, respectively.

Conclusions

Our data suggest that fatty infiltration can be prevented thorough targeting PDGFR α after RCT in mice.



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277 The Response Of Tenocytes To Inflammatory Stimuli Is Not Affected By The Age And Muscle Fatty Infiltration Of The Donor**Franka Klatte-Schulz**¹, Susann Minkwitz¹, Aysha Schmock¹, Meaghan Stolk², Martina Seifert², Markus Scheibel³, Britt Wildemann¹

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Aim

Determine the effect of age and degenerative status of the tendon on inflammatory processes in tenocytes.

Background

Inflammation and remodeling are two major processes regulating tendon healing. As demonstrated previously, MMPs and TIMPs, which regulate tendon remodeling, are altered in tenocytes of supraspinatus tendons from donors with higher age and degenerative status [Klatte-Schulz et al. 2015]. But do these cells also show differences in inflammatory processes?

Methods

Isolated tenocytes from 12 supraspinatus tendon tissues were stimulated for 3 days with a combination of TNF- α and IFN- γ (10ng/ml). Marker expression was analyzed by flow cytometry for ICAM, VCAM, MHC-class I and II. Collagen I synthesis was analyzed by ELISA. Furthermore, RNA was isolated from tenocytes of 30 different donors. IL-6, IL-1 β , TNF- α , IL-10, IL-33, TGF- β 1 and COX-2 expression was analyzed by qRT-PCR. Statistics: Mann-Whitney-U-Test, $p \leq 0.05$.

Results

Stimulation with TNF- α and IFN- γ significantly increased the number of adhesion molecules (ICAM and VCAM) and the expression of MHC-class I and II on the tenocytes, but significantly decrease the Col I secretion. No significant differences were detected between tenocytes of donors with low and high muscle fatty infiltration. Gene expression analysis revealed high levels of IL-6, TGF- β 1 and COX-2 in tenocytes but low expression of TNF- α and IL-10. No differences in the expression of inflammatory cytokines was observed between low and high fatty muscle infiltration or with age.

Conclusions

Tenocytes are sensitive to inflammatory stimuli and respond with an altered marker profile, which could mediate the attraction and activation of immune cells at the tear site. In contrast to the changes in MMP and TIMP expression with different donor characteristics [Klatte-Schulz et al. 2015], no alterations occurred in the expression of inflammatory cytokines or after cytokine stimulation. This indicates that inflammatory stimuli are independent of donor characteristics, whereas the tendon remodeling depends on age and degenerative status.



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175 Calcifying Tendinitis Of The Shoulder: Needling Versus Complete Calcium Removal And Reinsertion Of The Tendon With Sutures And Anchors.Silvana De Giorgi¹, Alessandro Castagna²

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Aim

Aim of our study was to verify the differences in final results of two arthroscopic techniques: needling versus complete removal of the calcific deposit and suture of the tendon with sutures/anchor technique.

Background

Calcifying tendonitis treatment is generally conservative, but when symptoms persist, it is not clear which arthroscopic technique should be used for its surgical treatment.

Methods

From September 2010 to September 2012, 40 patients with calcific tendonitis of the rotator cuff were arthroscopically treated. Clinical and radiological outcome were evaluated and correlated at 6 and 12 months follow-up comparing needling (Group 1) to the complete removal of the calcific deposit and suture of the tendon with sutures and anchors technique (Group 2). The sample size was calculated by assuming a difference of 50% in the primary outcome (Constant score) between the two groups, $\alpha=0.05$ and $\text{power}=0.9$. The minimum sample size was thus calculated to be 36. Data were analyzed using STATA® software. To verify the differences between the two groups, a student's t-test for unpaired samples was used. Differences in mean values of scores in each group before the treatment and at follow-up, were analyzed using the t-test for paired samples. A p-value of less than 0.05 was considered significant.

Results

In Group 1 and Group 2 there were no differences about the Constant, ASES, UCLA and VAS scores, achieved at final follow-up. The clinical scores were significantly improved from the immediate post-operative time and at 6 and 12 months postoperatively without any statistically significant difference between the two groups.

Conclusions

Both the techniques are effective in solving the symptoms of calcifying tendonitis of the shoulder.



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761 Outcome Of A Metaphyseal Reverse Total Shoulder Replacement In Rheumatoid Arthritis

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Aim

Aim to assess clinical and radiological results of metaphyseal reverse total shoulder arthroplasty (rTSA) in patients with rheumatoid arthritis (RA).

Background

Use of rTSA in RA has been questioned in the literature due to the poor bone quality and high complication risk observed.

Methods

Between 2005 and 2015, 44 shoulders in 37 consecutive RA patients underwent rTSA with a bone impaction technique. 13 of them revisions. Constant Score (CS), Subjective Shoulder Value (SSV), Satisfaction were used and patients prospectively assessed both clinically and radiographically preoperatively, at 3weeks, 3months, 6months, 1-year and yearly postoperatively. Three patients died for unrelated causes.

Results

28 females (32 shoulders) and 9 males (12 shoulders) with mean follow-up of 39 months (range 1y-11y) were available for follow-up. Mean age at surgery was 68.5 years (range 39-86). CS improved from 19.1 (adjusted 26.3) preoperatively to 58.3 (adjusted 81.6) at last follow-up ($P<0.001$). CS 1-year postoperatively were not significantly different from CS at final follow-up ($p=0.603$). Pain improved significantly from 11.4/15 to 2.3/15 ($p<0.001$). Patient satisfaction increased from 1.2/10 to 8.8/10 ($p<0.001$). Mean range of movement improved to 133°flexion, 120°abduction, 34° active external and 70° active internal rotations. Two intraoperative undisplaced metaphyseal and one glenoid cracks occurred and healed with conservative treatment. One early dislocation occurred in a revision case which was re-operated for exchange to a retentive liner. Two late traumatic periprosthetic fractures were revised to a stemmed implant. 37 implants showed no glenoid notching. There were two grade-1, three grade-2 and two grade-3 Sirveaux-Nerot glenoid notching. No lucencies, subsidence, stress-shielding or implant loosening were evident radiographically. The complication rate was like rTSA performed for a mixed aetiology.

Conclusions

Short metaphyseal rTSA shows to be successful and safe in RA. Impaction grafting technique improves humeral component stability. Patients restore good function, resume daily activities and have high satisfaction rates.



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332 Three Dimensional Analysis Of Acromioclavicular Kinematics After Hook Plate Fixation

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Aim

the purpose of this study is to analyze the three dimensional kinematics of scapula relative to thorax, hook of plate and acromion each after hook plated acromioclavicular dislocation in vivo.

Background

some authors reported complications of acromioclavicular reduction using hook plate like transacromial erosion and impingement. but, there are few reports of three dimensional kinematics in acromioclavicular dislocation patients who had been treated with hook plate.

Methods

we studied 12 cases of acromioclavicular dislocation treated with hook plate and 12 contralateral normal shoulders using computed tomography data in neutral and fully forward flexion positions. with computed tomography data, 3 dimensional motion was analyzed using computer simulation program and we measured three dimensional motion of the scapula relative to the thorax during arm elevation. we also measured distance from tip of hook plate to greater tuberosity and angular motion of plate tip to acromion for evaluation of impingement and transacromial erosion.

Results

there was no statistical difference in medial and lateral rotation of the scapula which applied hook plate with normal side in the coronal plane (36.3°/37.3°). otherwise, there were decrease of posterior tilting in the sagittal plane (22.7°/31.7°) and increase of internal rotation in the axial plane (20.0°/7.9°) in affected shoulder. mean value of translation of the hook plate was 4.2mm and angular motion against acromion was 15.3°. minimum value of distance from the hook plate to the tuberosity of humeral head was 10.9mm during arm elevation.

Conclusions

acromioclavicular reduction using hook plate may cause scapular dyskinesis. translational and angular motion of the hook plate against acromion could lead to transacromial erosion. however, hook doesn't seem to impinge humeral head.



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223 Latissimus Dorsi Transfer Augmentation - Favorable Outcome In Patients With Deficient Subscapularis Tear

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Aim

The aim is to report the outcomes of latissimus dorsi tendon transfer augmented by acellular dermal allograft to treat irreparable massive rotator cuff tears.

Background

Successful treatment of massive irreparable rotator cuff tears remains challenging especially in the presence of a deficient subscapularis tendon. Mixed results reported following latissimus dorsi tendon transfer may be due to its tenuous tissue quality and increased tension after transfer leading to decreased tendon healing and early re-rupture. High failure rates (4% to 44%) have prompted investigation using tissue augments to enhance tensile strength and achieve better healing of the transferred tendon.

Methods

This retrospective study includes 24 patients managed with latissimus dorsi transfer using allograft augmentation between March 2009 and December 2015. The allograft was sutured to the latissimus tendon as a bursal-sided onlay and complete superior humeral head coverage was achieved in all cases.

Results

Of the 24 men with an average age of 57 years (range 48 to 70 years), 7 underwent latissimus dorsi transfer as a salvage procedure for previously failed rotator cuff repair and 10 patients presented with a deficient subscapularis tendon. At last follow-up (mean 27 months), all patients were satisfied with the outcome including substantial pain reduction, except one patient with a re-tear 3 months postoperatively. There was a significant improvement in active forward flexion (mean increase of 31°; $p=0.016$), the abduction tended to improve by 25° ($p=0.059$). The acromio-humeral distance remained stable. Previous surgery did not influence the outcome. Patients with a deficient subscapularis tendon did equally well functionally when compared to patients with an intact subscapularis tendon.

Conclusions

Latissimus dorsi transfer augmented with acellular dermal allograft restored function and reduced pain with a low failure rate. It is a reliable procedure for patients with previously failed rotator cuff repair and/or a deficient subscapularis tendon.



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193 Histoanatomical Consideration Of The Rotator Cable Of The Shoulder.**Ryuzo Arai**

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Aim

To investigate the anatomical features which show the formation process of the rotator cable (rCa).

Background

The unique anatomy with cuff balancing function of rCa is well known, but it is still unclear how and why the unique morphology is created.

Methods

In 22 cuff-intact shoulders of formalin fixed cadavers were used for this anatomical study. The cuff was detached and rCa, defined as a semicircular fiber bundle which had medial and lateral capsule-thickness changes, was macroscopically examined from both sides of the capsule. The anteroposterior diameter of the humeral head (D) and the length between the capsule attachment and medial capsule-thickness change (L) were measured. Then the location of rCa on the humeral head was observed. In five additional shoulders histological slices including the greater tuberosity were examined.

Results

rCa was evident only in 14 shoulders including one specimen with rCa of double curve. Twenty specimens showed the single curve of the medial capsule-thickness change and it was located approximately on the flexion point of the humeral head. D of these specimens had a strong negative correlation with L ($r=-0.88$). Histologically rCa had a portion of vertical fiber orientation to the rotator cuff on the flexion point. In rCa fibers chondrocyte-like cells were contained.

Conclusions

As basic principles of biomechanics the soft tissue fibers are formed in response to the mechanical demands and the soft tissue under compression often becomes fibrocartilaginous. Our results meant that rCa is maintained through conversion of the compression force from the humeral head into the semicircular hoop stress around the flexion point like the knee meniscus. As the humeral head morphology has a strong influence on this compression force to the capsule, a variant specimen of double curve rCa and the strong negative correlation between D and L should be demonstrated.



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214 Treatmentrelevant Concomitant Glenohumeral Injuries And Pathologies In Acute High-Grade Acromioclavicular Joint Separations – An Analysis Of 300 Cases

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Aim

The aim of this work was to evaluate the prevalence of concomitant intraarticular injuries and –pathologies of acute acromioclavicular separations type V according to Rockwood in a larger case series.

Background

Compared to open techniques, arthroscopically-assisted treatment of acute acromioclavicular (AC) joint separations offers the major advantage that concomitant glenohumeral pathologies can be diagnosed reliably and addressed simultaneously.

Methods

All patients who received arthroscopically-assisted treatment of acute acromioclavicular joint separations type V according to Rockwood over the past decade were included into this study. Arthroscopically detected concomitant pathologies were assessed with respect to their treatment relevance.

Results

A total of 300 patients (27 , 273 , ø39 Years) were included into this study. Concomitant intraarticular injuries and pathologies were detected in 24% (72/300) of patients. 97,2% (70/72) of those patients exhibited concomitant findings which were addressed surgically. Most frequently detected were partial tears of the anterosuperior rotator cuff (lesions of the supraspinatus tendon (SSP) and subscapularis tendon (SSC) N=25 respectively), pulley lesions and pathologies of the long head of biceps tendon (LHB) (N=7 respectively), as well as superior labral antero-posterior (SLAP) lesions (N=21). Rather infrequent findings included subacromial impingement (SAI) syndrome (N=4) and glenolabral articular disruption (GLAD) lesions (N=2). Reconstructive procedures were indicated rather rarely (SSP-reconstruction N=5, SSC-reconstruction N=9, LHB-tenodesis (TD) N=6, LHB-tenotomy (TT) N=1, SLAP-repair N=2, subacromial decompression (ASAD) N=4, labral refixation and microfracturing N=1). Surgical debridement of affected structures however was carried out frequently (SSP N=19, SSC N=16, pulley-lesions N=7, LHB N=1, SLAP-lesions N=19, GLAD-lesions N=1). Merely 2,8% (2/72) of patients showed lesions that did not require any surgical intervention, these were two findings of glenoidal cartilage damage (N=2).

Conclusions

The results of this study show that concomitant injuries or pathologies are common, reconstructive measures however are required rarely. Future prospective trials need to assess the value of those additional interventions.



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204 Clinical And Radiographic Outcome Of Revision Surgery Of Total Elbow Prosthesis

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Aim

The aim of the current study is to report on the midterm outcome and complications of revision surgery of total elbow arthroplasty (TEA).

Background

Since implantation rates of TEA in younger patients increased, this may lead to an increase in revision procedures due to a higher demand of the affected elbow and prolonged patient survival.

Methods

All patients who had undergone TEA revision surgery between 2009 and 2014 with semiconstrained total elbow prostheses (Coonrad-Morrey) were prospectively enrolled in the study. Records were reviewed for demographic data, baseline measurements and several follow-up moments including Mayo Elbow Performance Score (MEPS), Visual Analogue pain Scores (VAS), Oxford Elbow Score (OES), range of motion (ROM), satisfaction and radiographs.

Results

A total of 19 revision arthroplasties were included. At mean follow-up of 57 months, there had been one re-revision and two removals. One patient was excluded of follow-up, because of confounding comorbidity. At last follow-up MEPS and VAS scores improved both ($p < 0.01$). Combined good and excellent results on the MEPS counted for 53%. The mean VAS in rest and activity was 2 and 4. Fair results of the OES were reported with a mean score of 28 points. ROM improved to an average flexion-extension arc of 108° ($p < 0.01$); and the pronation-supination arc improved to an average of 123° ($p < 0.01$). All elbows were stable at last follow-up ($p < 0.01$). Radiographs showed non-progressive osteolysis around the prosthesis in three (19%) cases and suspicion of loosening in one (6%). In 11 patients post-operative complications occurred. Thirteen of 15 patients (87%) were satisfied with the result of the revision procedure.

Conclusions

Revision surgery using the semiconstrained Coonrad-Morrey prosthesis leads to less pain, better elbow performance and prevention of further deterioration of elbow function. Nevertheless, careful selection of patients seems necessary because of relatively high complication rates.



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222 The “German Shoulder Network Protocol” For Non-Specific And Mild-Specific Shoulder Pain**Dirk Ludovicus Egmond**

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Aim

Is it possible to introduce a systematic and activating physiotherapy practice in Germany based on a protocol for non-specific and mild-specific shoulder pain?

Background

In the Netherlands, the cooperation between physicians and physiotherapists has grown within the last 10 years. Local shoulder networks have been founded on the initiative of physiotherapists and a protocol for non-specific and mild-specific shoulder pain has been developed by the Ruud Schuitemaker and Dick Egmond, emphasizing a systematic and activating physiotherapy practice based on evidence and the biopsychosocial model. Being disseminated to about 1000 physiotherapists working in these local networks, this has contributed to the high quality conservative shoulder therapy established nowadays.

Methods

The Dutch protocol was adapted to the German setting as the “German shoulder network protocol”. A close collaboration between general practitioners, physiotherapists and shoulder surgeons has been achieved by founding local shoulder networks nationwide.

Results

By adapting the Dutch protocol, a systematic and activating physiotherapy practice for shoulder pain has been introduced in Germany, raising awareness among physicians. German physiotherapists who are dedicated to increase the quality of conservative shoulder therapy can participate in the national shoulder network.

Conclusions

The German physiotherapy is increasingly emphasizing a systematic and activating practice based on evidence and the biopsychosocial model. By supporting the German shoulder network - e.g. by presenting the “German shoulder network protocol” on the EUSSER/ESSSE congress - the thriving role of conservative therapy in the management of shoulder pain in Germany can be further highlighted.



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669 Improved Double-Row Rotator Cuff Tendon Healing With Platelet Rich Fibrin Gel At Minimum Of One Year Follow Up

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Aim

The main objective of this study was to evaluate the interest of a fully autologous platelet-rich gel matrix on cicatrisation after Rotator Cuff Repair.

Background

Double-row Rotator Cuff Repair technique is a commonly used procedure. Despite excellent biomechanical properties, the rate of repeated rupture remains important.

Methods

A consecutive series of 62 patients treated with one supraspinatus transfixing rupture were included. The repair technique was always with a SpeedBridge technique.

The main evaluation criteria of this study was the interest of gelled platelet rich concentrate on tendon healing evaluated at 12 months minimum according to the Sugaya score by MRI. A Sugaya score of 1 or 2 was considered as tendon healing. The second criterion was visual analogic scale pain, mobility, Constant score.

66 patients were consecutively operated. The average age of patients was 56.59 years (+/- 7.5). The first 34 patients (Group A) were operated with a double row repair. The following 32 patients (Group B) received an injection of gelled platelet rich concentrate at the junction of tendon-bone interface at the end of the procedure.

The concentrate obtained was completely autologous (thrombin extracted from platelet-poor plasma during the preparation).

Results

The mean follow-up was 25.43 months (+/- 6.43) in group A and 18.57 months (+/- 3.30) in group B. The mean injected dose was 3.5 ml (+/- 1.5) without any complications.

In group A, 80% of repairs were Sugaya 1-2 versus 90% in group B ($p < 0.05$).

The postoperative Constant was 78.9 (+/- 14.02 $p > 0.1$) and 78.73 (+/- 13.49 $p > 0.1$), respectively. There was not different ($p > 0.05$). The pain score was better in group B (2.2) versus group B (2.7) at last look.

Conclusions

In this preliminary study, the group treated with platelet rich matrix showed better results on tendon healing, could be related to the properties of the totally autologous matrix.



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290 Completion Repair Represents Better Healing Characteristics In Comparison With Insitu Repair In The Partial Thickness Bursal Rotator Cuff Tear

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Aim

Is there any difference between the insitu and completion repair technique in the healing of partial thickness rotator cuff tear.

Background

Very little information is available regarding to healing capacity of insitu and completion repair in the treatment of partial thickness rotator cuff tears. Purpose of the study was to analyse the healing characteristics of both techniques by comparing the collagen type I and TNFa concentrations, number and diameter of fibroblasts and neovascularization.

Methods

A partial thickness bursal side tear (>50%) was created in the supraspinatus tendon of 12 adult Sprague-Dawley rats bilaterally. Three rats were served for healthy tendon. Right shoulders were repaired by the insitu and left shoulders were repaired by the tear completion technique on the 10th day after detachment surgery. Rats were sacrificed on the 10th (T1) and 30th (T2) day after repair surgery and tendons were prepared for biochemical and histomorphometric analysis.

Results

Collagen concentration (ng/mg total protein) was significantly elevated in both groups (insitu: 34.56 ± 13.36 , $p=0.02$; tear completion: 32.58 ± 13.77 , $p=0.03$) than healthy tendon (0.78 ± 0.12) at T1, and then decreased in insitu group (31.26 ± 10.22) while the completion repair continued to increase at T2 (41.80 ± 23.31 , $P=0.03$). Cellularity in both groups and fibroblast diameter in insitu group decreased at T2. However, mean fibroblast diameter in completion repair group continued to increase in both time points (T1: 21.52 ± 0.84 , $p=0.003$) (T2: 24.51 ± 1.39 , $p=0.03$). Neovascularization was significantly higher in tear completion (11.33 ± 1.53) compared to insitu repair (5.67 ± 0.57 ; $p=0.02$) at T1. There were no significant differences regarding to TNFa concentration (pg/mg total protein) in both surgical techniques (in situ 2.73 ± 1.98 ; tear completion 3.39 ± 2.13) at T2 ($p=0.883$).

Conclusions

Despite the concerns of detaching the intact tendon, the completion repair showed better healing characteristics at day 30; since the debridement of remaining tendon could promote healing response.



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329 Relationship Between Shoulder Adhesive Capsulitis And Hypercholesterolemia. The Role Of A Gene Polymorphism Of APO A1 Lipoprotein On Etiology And Severity.

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Aim

To assess whether the presence the Apo-A1-G75A-polymorphism, which is correlated to an enhanced HDL function, could be a risk factor for the genesis and severity of adhesive capsulitis (AC).

Background

Relationship between shoulder AC and hypercholesterolemia is known. The connecting link might be represented by the correlation between HDL and transforming growth factor beta (TGF- β): normally, HDLs stimulate TGF- β expression; the latter is employed in the development of fibrous tissue.

Methods

Peripheral blood samples of 27 patients [7M;20F, mean age:54.81(41-65)] with AC and hypercholesterolemia were submitted to polymerase-chain-reaction in order to evaluate the Apo-A1-G75A-polymorphism. Genome database was used as control. Two categories were obtained according to AC severity: Type I (active forward flexion $\geq 100^\circ$) and Type II ($< 100^\circ$). Data were submitted to statistics.

Results

The prevalence of Apo-A1-G75A-polymorphism in the studied and in the control group was 22.2% (10AG;1AA;16GG) and 19% (OR:1,22,IC:0,59-2,53, $p>0.05$), respectively. Patients with Type I and II capsulitis were 11 [flexion: $148,0^\circ$ (range:100 $^\circ$ -165 $^\circ$)] and 16 [flexion: $82,5^\circ$ (range:50 $^\circ$ -95 $^\circ$)], respectively. The prevalence of Apo-A1-G75A in Type I was 18.1% (2AG;9GG) and in Type II was 56.3% (8GA;1AA;7GG), respectively (RR:1.87,IC:1.005-3.482, $p<0.05$).

Conclusions

Apo-A1-G75A-polymorphism is not necessary for the genesis but it is a risk factor for severity of AC.



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208 Why Does Total Elbow Arthroplasty Fail Today? A Systematic Review

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Aim

To determine modes of failure of total elbow arthroplasty in recent literature.

Background

Total elbow arthroplasty is a relatively uncommon type of arthroplasty. Research on improvement requires knowledge of failure mechanisms that can be addressed. In recent years, no systematic review on failure modes has been performed.

Methods

We conducted searches on PubMed/Medline, Embase and Cochrane databases to identify studies describing modes of failure of primary total elbow arthroplasties. The results were coupled per type of total elbow arthroplasty and individual arthroplasty models.

Results

A total of 70 articles were included in this systematic review. 9.308 individual total elbow arthroplasties were identified with 1.253 revisions (13.5%). Aseptic loosening was the most prevalent reason for revision (38%), followed by deep infection (19%) and periprosthetic fractures (12%).

Total elbow arthroplasty for rheumatoid arthritis had a significantly higher revision rate than for trauma ($p < 0,001$) and for post-traumatic osteoarthritis ($p = 0,003$). Trauma and post-traumatic osteoarthritis did not differ significantly ($p = 0,83$).

For linked implants, less aseptic loosening and dislocation was seen than for unlinked implants ($p < 0,005$). However, linked implants had more disassembly, material failure and PE wear than unlinked implants ($p < 0,005$). Infection, periprosthetic fractures and malpositioning were not statistically different ($p = 0,02$, $p = 0,01$ and $p = 0,05$, respectively).

Conclusions

Revision rates have been found similar to a systematic review published in 2003. Aseptic loosening remains the most frequent cause for revision of primary total elbow arthroplasty. Linked and unlinked total elbow arthroplasties have design-specific modes of failure. More research on the occurrence, progression and risk factors of aseptic loosening should be performed and lead to higher implant survival.



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212 Results Of Latissimus Dorsi And Teres Major Transfer For Irreparable Rotator Cuff TearsISOYA Goya¹, Naoki Suenaga², Naomi Oizumi², Chika Yoshioka³, Shintaro Yamane³

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Aim

Purpose of this study is to investigate clinical results of LD transfer for irreparable rotator cuff tear.

Background

We've performed the modified latissimus dorsi (LD) transfer reported by Gerber et al. for irreparable massive rotator cuff tear with external rotation lag.

Methods

24 patients who underwent LD transfer from 2002 to 2014 and were followed-up for more than 2 years postoperatively. 12 patients who underwent rotator cuff repair with LD transfer for massive rotator cuff tear (ORCR) and 12 patients who underwent small humeral head replacement with LD transfer for cuff tear arthropathy (HHR). ORCR mean age was 65.0 (range 50 to 75) years. Averaged follow-up period was 38.3 (range 24 to 57) months. HHR mean age was 69.3 (range 55 to 84) years. Averaged follow-up period was 50.5 (range 24 to 113) months. Pre- and postoperative JOA score, active ROM were evaluated. And osteoarthritis and upper migration of humeral head on plain X-ray in ORCR.

Results

JOA score significantly improved from 38.8 to 80.5 in ORCR, and from 33.7 to 80.2 in HHR. Flexion/ external rotation(degrees) increased from 49.1/15.4 to 135.9/33.3 in ORCR. Flexion/external rotation(degrees) increased from 55.0/15.8 to 137.5/34.6 in HHR. 4 patients showed progress of osteoarthritic change and 4 patients showed progress of upper migration of the humeral head. Suprascapular nerve palsy occurred in 1 patient at 6 years post-operation in HHR.

Conclusions

LD transfer is considered to be useful as cuff reconstruction in patients with both massive rotator cuff tear and cuff tear arthropathy.



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215 Histological And Biomolecular Comparison Of Inflamed And Non-Inflamed Human Biceps Tendons After Tenotomy

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Aim

This study aimed to characterize inflamed and non-inflamed human long head of the biceps (LHB) tendons as a stem cell source and to compare samples histologically and biomolecularly.

Background

It remains unclear to what extent the LHB tendon plays a role in inflammatory processes in the shoulder and if it could serve as a suitable source for mesenchymal stem cells (MSCs) in the inflammatory state.

Methods

22 LHB tendons were resected during shoulder surgery. Macroscopic classification into inflamed (n = 13) and non-inflamed (n = 9) LHBs was performed. For histological analysis haematoxylin eosin, Azan, van Gieson and Masson Goldner trichrome staining was performed. Neuron-specific enolase (NSE) staining served to visualize neuronal tissues. Human MSCs isolated from inflamed and non-inflamed LHB tendons were evaluated with regard to proliferation potential and expression of specific marker genes. Gene expression patterns were investigated using a whole genome array. The osteogenic, adipogenic, chondrogenic and tendogenic differentiation potential of both groups was compared under specific culture conditions using histological staining and RT-PCR.

Results

Histological features of tendinopathy, such as disorganization of collagen structure, infiltration by inflammatory cells, neovascularization and increased presence of free nerve endings, were found in the tendinitis group. Inflamed LHBs showed no significant increase of proliferation rate or expression of tendogenic marker genes, however, a significant over-expression of inflammatory marker genes could be observed. Cells isolated from inflamed and non-inflamed LHB showed an equivalent osteogenic, adipogenic, chondrogenic and tendogenic differentiation potential in histology and RT-PCR analysis.

Conclusions

Both structural and biomolecular differences of inflamed and non-inflamed LHBs could be shown. These findings contribute to the understanding of LHB-tendinitis and provide possibilities for new therapeutic approaches. The LHB tendon has been characterized as a new MSC source. Inflamed and non-inflamed specimens represent a suitable basis for stem cell-based therapeutic approaches in shoulder surgery in the future.



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262 Using All-Suture Anchors During Labral Repair And Remplissage Might Cause Significant Bone Cyst Formation. A CT Evaluation Of 156 Implants.**Miguel Angel Ruiz Ibán**, Rosa Vega Rodriguez, Jorge Diaz Heredia, Raquel Ruiz Díaz

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Aim

To evaluate the development of implant-related osteolysis after implantation of two types of all-suture anchors for the management of labral and Hill-Sachs lesions in shoulder instability.

Background

One of the advantages of using all-suture anchors is reduced bone resection due to smaller implant sizes. There is animal evidence that the all-suture implants also develop osteolysis

Methods

Prospective study of patients with shoulder instability in which either Iconix-1.4mm/2.3mm(Stryker) or Suturefix-1.7mm(Smith&Nephew) implants were used between 2014 and 2016. All patients had 4-view simple X-rays done between 6 and 12 months postoperatively. If any sign of osteolysis was observed, a CT-scan was performed. Number and size of the bone cyst present in relation with the implants was measured using Osirix software. Bone resection volumes were calculated measuring the drills provided. When the bone cyst was larger than the bone removed during implantation, the cyst was considered relevant.

Results

A total of 25 patients were evaluated with X-rays, all had appreciable bone cysts and all had a CT-scan performed. A total of 156 implants were evaluated (62 Iconix-1.4mm; 13 Iconix-2.3mm and 80 Suturefix-1.7mm); 114 in the glenoid (for labral repair) and 42 in the humerus (for remplissage).

In the 114 glenoid implants, no osseous defect was found in 25/114(21.9%) cases and some defect was found in 89/114(79.1%) implants with a mean volume of 21,8+/-14,9mm³. Of these 18/114(15.8%) were larger than the bone resected during insertion.

In all the 42 humeral implants, some defect was found with a mean volume of 71+/-62,0mm³. Of these 30/42(71.4%) were larger than the bone resected during insertion.

Conclusions

When using all-suture implants in instability surgery, bone cysts can be present. In 16% of implants placed in the glenoid the resulting bone cyst was larger than the initial bone resection. This percentage increases in the humerus to 71%.



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302 Does Acromion Index Have Racial Difference In Predicting Rotator Cuff Tear?Myojong Kim¹, Dongho Kum¹, Jaechul Yoo¹, Yongbok Park²

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Aim

To see whether we can reproduce the results stating that there might be some racial difference in relationship between the Acromial index (AI) and rotator cuff tear (RCT)

Background

Acromial morphology has been considered one of the factors for RCT. Previous studies have shown AI to have correlation with RCT, however some study raised a racial difference with this index..

Methods

We retrospectively compared 100 patients of known full-thickness RCT by MRI with 100 patients of the control group with intact rotator cuff tendon on MRI with other shoulder diseases, such as frozen shoulder, instability. Two independent orthopaedic surgeons assessed the AI on radiographs.

Results

The measurement of the AI by two surgeons showed excellent reliability (intraclass correlation coefficient = 0.82). The mean AI with RCT group was 0.68 in an Asian population and it was statistically significant ($P < .0001$). Subgroup analysis revealed no significant differences in acromion index according to the tear size.

Conclusions

Contrary to the findings that suggest racial difference in regards to acromion index and rotator cuff tear, our study showed that the acromion index was a predictive and effective factor for rotator cuff tear in an Asian population. We suggest the AI to be a predictive factor in rotator cuff tear.



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299 Comparison Of Outcomes With Arthroscopic Repair Of Acute-On-Chronic And Chronic Rotator Cuff TearsSeungyeop Lee¹, Seungyeop Song¹, Jaechul Yoo¹, Yongbok Park², Hyung Joo Kim¹

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Aim

To define the preoperative and intraoperative findings (or criteria) of acute-on-chronic RCTs, and to compare the functional and clinical outcomes with acute-on-chronic RCT and chronic RCT.

Background

There are few studies reporting acute-on-chronic RCT.

Methods

This study was conducted in the period from December 2007 to December 2013. Acute-on-chronic RCT was diagnosed with preoperative and intraoperative findings. The study group comprised of 36 patients with preoperative and intraoperative findings indicative of acute-on-chronic RCT. The definition based on preoperative criteria and arthroscopic finding. The criteria were; trauma history within 6 month, loss of function for few days to weeks after the trauma, definite degenerative tear signs in simple x-ray, full thickness large tear on MRI, arthroscopic finding of acute tear component meaning ecchymosis, hematoma, tendon bruise, and large extending to subscapularis or infraspinatus. Another 36 age-, sex- and tear size-matched patients who underwent arthroscopic rotator cuff repair after 6 months of onset of symptoms and definite recollection of trauma history (chronic RCT group) were selected from the database of our institut. Postoperative indirect MRA was obtained after six months of the repair, and rotator cuff integrity was graded according to the previous study. Patients were evaluated using clinical measurement. Scores and measurements were obtained preoperatively and postoperatively at 6, 12 and 24 months after surgery.

Results

The clinical outcomes and ROM recovery were better in the acute-on-chronic RCT group. Although statistically not significant, the acute-on-chronic RCT group's repair appeared closer to the complete repair and the incidence of retear was lower.

Conclusions

We proposed definition of acute-on-chronic tear. Early repair of acute-on-chronic RCTs results in a statistically and clinically superior improvement in outcomes. They also have lower retear rates and a higher potential of being restored to their original footprint coverage.



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225 The Fulcrum Axis: An Accurate Measure Of Glenoid Version On XR And CTClaudia Sidler-Maier¹, Jennifer Aj Mutch², Martin Sidler³, Terry Axelrod¹, Diane Nam¹

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Aim

To measure and validate the fulcrum axis (FA) on plain radiographs (XR), computed tomography (CT) and 3DCT.

Background

Proper glenoid position in total shoulder arthroplasty (TSA) is important. However, traditional glenoid version (GV) measurements overestimate retroversion on XR and CT. The FA uses palpable surface landmarks and may be useful as an intra-operative guide. The FA has not previously been validated on XR or CT in an arthritic population.

Methods

The preoperative XR and CT of patients who underwent TSA at a single institution from 2009-2015 were reviewed. Forty cases were retained for study and 4 observers measured FA and GV on XR, CT and 3DCT. Reliability and accuracy were calculated, with 3DCT as the gold standard.

Results

The average FA and GV were 7.768° and 18.910° on XR, 6.23° and 12.920° on CT, and 8.100° and 7.740° on 3DCT, respectively. FA and GV were significantly different for XR and CT ($p < 0.001$) but not for 3DCT ($p = 0.725$).

The inter-rater reliability, intra-rater reliability and accuracy of FA were not significantly different from GV and were 0.929-0.948, 0.779-0.974, and 0.674-0.705, respectively. However, FA was closer to the gold standard (3DCT) than GV for XR (0.330° vs 11.172°) and CT (1.871° vs 5.178°) ($p < 0.001$).

Conclusions

FA showed comparable reliability and accuracy to GV. However, FA on XR and CT more closely reflected the 3DCT measures than GV.



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226 Performance And Return To Sport In Elite Baseball Players Following Repair Of The Latissimus Dorsi And Teres Major

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Aim

To determine the return to sport (RTS) rate and performance upon RTS of patients who underwent a LD/TM repair.

Background

Tears of the latissimus dorsi (LD) and teres major (TM) are rare but disabling injuries in the overhead athlete.

Methods

All patients who underwent a LD/TM repair between January 1, 2010 and June 6, 2016 with more than 12 months follow up were included. Demographic information and post-operative range of motion (ROM) were recorded. Patients were contacted via phone calls and answered the Kerlan Jobe Orthopaedic Clinic (KJOC) Shoulder and Elbow outcome score and American Shoulder and Elbow Surgeons Shoulder Score (ASES). Performance data for professional players was recorded pre-operatively and post-operatively and compared using paired t-tests.

Results

Eleven male patients aged 29.9 ± 12.4 years were included, 86% of whom were right hand dominant and 86% of whom has surgery on the dominant side. Mean time from injury to repair was 389 ± 789 days with 36% of repairs performed within 6 weeks of injury. Overall, 73% of this cohort were pitchers (seven professional, one collegiate). At final follow-up visual analog pain score (VAS) was 0.7 ± 1.9 , ASES was 100 ± 0 , and KJOC was 93 ± 5 . Professional (major and minor league) pitchers had a mean total years in professional baseball of 6.6 ± 3.9 , with 3.9 ± 2.3 before surgery and 2.7 ± 1.8 after surgery. Among professional pitchers, VAS-pain was 0.0 ± 0.0 , ASES was 100 ± 0 , and KJOC was 89 ± 2 . All professional pitchers returned to the same level of play. No significant differences existed between any of the pre-operative and post-operative performance metrics for pitchers ($p > 0.05$).

Conclusions

Repair of LD and TM tears in both professional and recreational athletes produces reliable functional recovery with minimal pain and the ability to return to preoperative athletic activity, even among elite throwing athletes.



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231 Open Biceps Tenodesis: A Biomechanical Comparison Of Six Fixation Techniques

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Aim

The purpose of this study was to biomechanically compare six biceps tenodesis techniques to evaluate the potential difference of anchor size, type, and configuration.

Background

The long head of the biceps tendon (LHB) has been implicated in multiple pathologic processes of the shoulder including: instability, SLAP tears, rotator cuff tears, and tendinosis. Surgical treatment directed towards addressing LHB pathology consists of tenodesis utilizing various fixation methods.

Methods

42 fresh-frozen cadaver shoulders (mean age, 70.5 years [range 54 to 89 years; SD, 9.8 years]; 69% male specimens) were dissected leaving the proximal humerus, proximal biceps tendon, and pectoralis major insertion. Specimens were randomized to 1 of 6 groups and a sub-pectoral biceps tenodesis was performed. The six techniques were interference screw (IS), cortical button (CB), double-loaded 2.9mm PEEK anchor (DL-2.9), double-loaded 1.9mm all-suture anchor (DL-1.9), single-loaded 1.7mm all-suture anchor (SL-1.7), and soft tissue tenodesis (ST). The specimens underwent load to failure axial traction on a materials testing machine. A generalized linear and latent mixed model with a random effects term was utilized to account for donor specimen pairing during analysis.

Results

The mean failure loads [95% CI] were as follows: IS group 78.6 N [58.1-99.1], ST group 98.3 N [78.8-117.8], DL-1.9 group 110.6 N [89.4-131.7], SL-1.7 group 131.9 N [95.1-168.7], DL-2.9 group 132.9 N [102.9-162.8], and CB group 136 N [102.9-169.1]. Failure occurred at the tendon in most specimens, however 7 specimens failed elsewhere.

Conclusions

Analysis of ultimate failure loads revealed no significant effect by tenodesis fixation technique. Comparing the 95% CI interval of the IS group indicates that it is significantly weaker than the CB and DL-2.9 treatments. These results may be taken into consideration when the orthopedic surgeon selects the appropriate fixation technique, while recognizing that tendon failure is likely to occur before failure of the surgical construct.



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232 Concomitant Fracture Of The Acromion And Coracoid Process. Results Of Surgical Treatment

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Aim

The aim of this study was to gather data about the functional outcome in patients who suffered from a very rare injury: a concomitant fracture of the acromion and the coracoid process.

Background

The studied injury pattern represents a double disruption of the superior shoulder suspensory complex (SSSC). To date, only few case reports exist and the largest reported series comprises of eight cases.

Methods

In a retrospective study, data of patients who were treated surgically during the period from 2009 to 2014 were gathered from medical records and the patients were asked for a follow-up examination. During this visit, patients completed the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire. The clinical examination comprises of a standardized ROM and strength measurement, and the Constant-Murley score was calculated.

Results

There were six patients (5 male, 1 female, average age 43years) who had surgery for double disruption of the SSSC. All but one patient had a high impact trauma mechanism (motor vehicle accident or fall from a height) and other concomitant injuries occurred. The coracoid fracture type was type 1 according to Ogawa and the acromion fracture type was type II according to Kuhn in all six cases. At least one of the fracture sites was stabilized. Two patients showed a concomitant lateral clavicle fracture representing a threefold disruption of the SSSC. In these cases, two fracture sites were operated on. At an average follow-up period of 46.8 months all fractures healed. The average DASH score was 16 points and the average Constant score was 75 points.

Conclusions

This rare injury pattern is usually caused by high impact trauma mechanisms. Other concomitant injuries frequently occur. Nevertheless, clinical results after surgery of at least one site in patients with a double disruption of the SSSC were satisfied.



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257 Correlations Of Coracohumeral Ligament And Range Of Motion In Patient With Anterior Glenohumeral Instability By Magnetic Resonance Arthrography

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Aim

To investigate correlations of thickness of the coracohumeral ligament (CHL) and ROM restriction in patient with recurrent anterior glenohumeral instability.

Background

Evaluation of range of motion (ROM) restriction before treatments of recurrent anterior glenohumeral instability is quite important for predicting the final functional outcomes.

Methods

Between January 2005 and March 2015, 181 shoulders (137 males and 44 females, mean age 29.3) with recurrent anterior glenohumeral instability treated with an arthroscopic Bankart repair were enrolled in this study. We evaluated preoperative ROM, thickness of the coracohumeral ligament (CHL) and obliteration of subcoracoid fat triangle on MR arthrography. ROM measurements, including forward flexion (FF), external rotation with the arm at the side (ER), and hand behind the back (HBB) were measured in a standing position.

Results

There were significant negative correlations between FF and age ($p < 0.001$), between HBB and age ($p < 0.001$), but not between ER and age ($p = 0.11$). The thickness of the CHL significantly increased with age ($p < 0.001$). FF, ER, and HBB were significantly restricted in patients with obliteration compared with those without obliterations ($p < 0.001$, $p = 0.004$, $p < 0.001$, respectively). Analysis adjusted for age and sex showed that obliteration (OR: 10, 95% CI: 3.3-30) and the thickening of the CHL (OR: 1.69, 95% CI 1.18-2.42) were significant independent risk factors for ROM restrictions.

Conclusions

Obliteration of the subcoracoid fat triangle and the thickness of the CHL correlated with ROM restrictions, and these changes were greater with age in patients with recurrent anterior glenohumeral instability.



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713 Emergency Inpatient Treatment Of Proximal Humeral Fractures In England – An Analysis Using The Hospital Episode Statistics (HES) Database

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Aim

Our aim was to assess the trends in the treatment of proximal humeral fractures, in NHS patients, over the time surrounding the end of recruitment, to 1 year following publication of the Proximal Fracture of the Humerus Evaluation by Randomization (PROFHER) trial.

Background

The optimal management of proximal humeral fractures has been a recent focus of the United Kingdom's National Institute of Health Research (NIHR). The PROFHER trial (2015), reported no significant difference in outcome between surgical and non-surgical treatment.

Methods

Data was acquired from the Health Episodes Statistics (HES) database from April 2012 - March 2016. Data were group into 12-monthly intervals. The database was systematically searched for primary procedure codes for all adult emergency inpatient episodes with the ICD-10 code 'Fracture of upper end of humerus'. The primary procedure code was extracted and group into surgical and non-surgical categories. Data were further grouped into surgical procedure performed and whether the data was from a PROFHER recruiting centre.

Results

41,279 emergency inpatient episodes were extracted. The number of emergency admissions has increased year-on-year. Total non-operative procedure increased over the study period from 6449(2012/13) - 7187(2015/16), representing a +4.5% point increase. Total numbers of operative procedures decreased across the study period from 1947 - 1318 representing a -6.75% decrease. Open Reduction Internal Fixation was the surgical procedure that decreased most profoundly over the study period with a -4.7% reduction. PROFHER and Non-PROFHER centres demonstrated similar overall patterns of change, however, operative management with Arthroplasty is increasing in PROFHER centres (+8.5%vs-1.3%).

Conclusions

In NHS hospitals in England, non-operative treatment of proximal humeral fractures is the most common treatment choice. The choice of non-operative treatment in emergency inpatient admissions has increased over the study period. The increasing use of non-operative treatment and decreasing use of operative intervention precedes the 2015 publication of the ProfHER trial.



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431 Assessing Condition-Specific Health-Related Quality Of Life In Lateral Epicondylar Tendinopathy: A Systematic And Standardised Comparison Of Available Instruments

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Aim

To assess the available evidence surrounding outcome instruments ability to quantify condition-specific Health-Related Quality of Life (HRQoL) in Lateral Epicondylar Tendinopathy (LET)

Background

LET is a common, painful condition. It confers significant patient morbidity has a high associated socioeconomic cost. The quest for efficacious treatments in LET relies on the ability to accurately quantify HRQoL.

Methods

Systematic review of the literature, using the PRISMA guidelines, of the Medline, Ovid and Embase databases was conducted. Of the 6448 articles identified, those reporting the development, assessment of metric properties, or use of instruments aiming to quantify LET-specific HRQoL were extracted. Each instrument was assessed by two reviewers, using the Evaluating Measures of Patient-Reported Outcomes (EMPRO) tool, reporting both overall and attribute-specific scores relating to the instruments properties.

Results

15 instruments were identified. 57 articles reported instrument development or metric assessment (1-18 per instrument), 172 articles reported instrument use. Overall summary scores ranged from 21.6-72.5/100. Four instruments met a threshold criteria of an overall score >50, the qDASH (72.5), DASH (66.9), OES (66.6) and PRTEE (57.0). Assessment of instruments use in the literature found the DASH to be reported most frequently (29.7% articles) followed by the PRTEE (25.6%), MEPS (15.1%) and qDASH (8.1%).

Conclusions

Four instruments were found to meet the overall criteria for recommendation of use to quantify HRQoL in LET, with the qDASH scoring the highest. Though these four instruments are frequently reported, the remaining 11 scores, with insufficient evidence of LET-specific validity, continue to be used.

The choice of a validated outcome measure is vital for the design and interpretation of clinical trials. This is the first study to provide guidance on the choice of outcome measures in LET. It has also highlights areas of deficiency in frequently used measures, which may assist in further metric property assessment.



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517 Prevalence And Risk Factors Of Bilateral Rotator Cuff TearHyung Bin Park, **Ji-Yong Gwark**, Mincheol Kam Kam, Jin-Hyung Im

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Aim

The purpose of this study was to investigate the prevalence of bilateral rotator cuff tear (RCT) and to elucidate which factors are associated with bilateral RCT.

Background

There is very little information about the prevalence and risk factors of bilateral RCT in general population.

Methods

Total 1149 volunteers reside in the same province of South Korea. Each volunteer received a questionnaire, physical examinations, blood tests, simple radiographs of both shoulders, MRIs of both shoulders, and EMG study of both upper extremities. We excluded 213 subjects because of incomplete both shoulder MRI evaluation (50), shoulders having other pathologic conditions (53), and medication history affecting serum lipid levels (110). Remaining 1872 shoulders of 936 subjects were included. RCT was diagnosed on MRI examination. Using multivariate logistic regression analysis, we evaluated the strength of association between presence of bilateral RCT and various factors, including general physical factors, the presence of comorbidity, and serum lipid abnormality. P value was set at 0.05.

Results

The bilateral RCT was 24.04% (225/936) among whole subjects and 46.39% (225/485) among subjects had RCT. According to the multivariate analysis, age (odds ratio (OR), 1.078 [95% confidence interval (CI), 1.056 to 1.101]; $p = 0.000$), manual labor (OR, 1.758 [95% CI, 1.151 to 2.685]; $p = 0.009$), and biceps tendon injury in any shoulder (OR, 4.047 [95% CI, 2.819 to 5.811]; $p = 0.000$) were significantly associated with bilateral RCT.

Conclusions

The prevalence of bilateral RCT is relatively high in general population. Age, manual labor, and biceps tendon injury are significantly associated with bilateral RCT.



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518 Prevalence Of Isolated Subscapularis Tendon Tears In The General Population And Its Risk Factor

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Aim

The purpose of the current study was to determine isolated Subscapularis tendon tear (SBT) prevalence in the general population and its risk factors.

Background

SBT is an emerging clinical issue of great interest to shoulder specialists. Although SBT is a common cause of shoulder pain, its prevalence and risk factors are not well-known.

Methods

We recruited 1149 volunteers (2297 shoulders) from the same South Korean province. Each subject received a questionnaire, physical examinations, blood tests, and simple radiographs and MRI evaluations of both shoulders. We then excluded the 446 volunteers with at least one shoulder affected by trauma, previous surgery, calcific tendinitis, osteoarthritis, frozen shoulder or posterosuperior cuff tendon tear. We then excluded 110 volunteers whose medications could affect serum lipid profiles. For each of the 543 included subjects, we randomly chose one shoulder, which was examined by MRI to determine the integrity of the subscapularis tendon. We evaluated isolated SBT's prevalence and risk factors, using logistic regression analyses.

Results

The prevalence of isolated SBT was 19.89% (108/543) [95% confidence interval (CI), 15.76-24.02%]. In multivariate logistic regression analysis, diabetes (OR, 2.462 [95% CI, 1.123 to 5.397]; $p = 0.024$), metabolic syndrome (OR, 1.659 [95% CI, 1.027 to 2.680]; $p = 0.039$), manual labor (OR, 1.792 [95% CI, 1.068 to 3.009]; $p < 0.027$), and biceps tendon injury (OR, 15.840 [95% CI, 7.091 to 35.385]; $p < 0.001$) were significantly associated with isolated SBT.

Conclusions

The prevalence of isolated SBT is relatively high; most tears are intra-articular partial thickness tears. Isolated SBT risk factors include diabetes, metabolic syndrome, manual labor, and biceps tendon tear; of these, biceps tendon tear has the highest strength of association.



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919 Minor Shoulder Instability In A Table Tennis Player

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Aim

We report a case of a federated table tennis player with an acquired instability in overstressed shoulder (AIOS).

Background

"Minor shoulder instability," is responsible for pain and dysfunction in the shoulder. It is defined as shoulder pain secondary to shoulder laxity, which cannot be defined as TUBS or AMBRII. Minor shoulder includes an AIOS and an atraumatic minor shoulder instability (AMSI).

Methods

A 24 year old male, table tennis player, followed in consultation by right shoulder pain with four years of evolution. He complained of diffuse pain in the posterior-superior aspect of the affected shoulder, describing a transient locking. He had no relevant clinical background. On examination, range of motion testing revealed increased external rotation in abduction combined with reduced internal rotation. Strength testing revealed no deficits. Jobe, Neer, Yocum, and Hawkins tests were positive. Conventional shoulder radiographs and magnetic resonance imaging were negative. Magnetic resonance imaging with arthrography showed a labral lesion. There were no signs of SLAP lesion or cuff rotator rupture. The patient underwent physiotherapy previously to the surgical treatment with no clinical improvement. Bankart lesion was repaired arthroscopically using metallic suture anchors carrying nonabsorbable braided sutures. A slight plication of the capsule was performed. There were no perioperative complications. He was immobilized for 4 weeks with brachial suspension. Posteriorly, he entered a physiotherapy program.

Results

He started sports activity 5 months post operatively, starting competition at 9 months after surgery. At twelve months follow-up, the patient has no limitation, is asymptomatic and without functional deficits.

Conclusions

In the case presented, MGHL was apparently intact, however, a lesion of anterior glenoid labrum was found. Our hypothesis is that in this context the MGHL tension was affected. The labrum was repaired arthroscopically. Twelve months after surgery the patient has no limitation and already returned to his sports activity.



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376 Effect Of The Allogenic Dermal Fibroblast To Enhance Rotator Cuff Healing In A Rabbit Model Of Chronic Rotator Cuff Tear

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Aim

To identify the effect of allogenic dermal fibroblast on tendon-to-bone healing in a rabbit model of a chronic rotator cuff tear.

Background

To enhance tendon-to-bone healing in chronic rotator cuff repair, dermal fibroblast is one of the good candidate for tendon tissue engineering due to its easily accessible cell source and its similarity to tenocyte in collagen synthesis, one of major extracellular matrix (ECM) proteins in tendon.

Methods

Total 33 rabbits were randomly allocated into 3 groups (n = 11 each). Supraspinatus tendon was detached and left for 6 weeks for establishing chronic tear model. Torn tendon was repaired using transosseous manner with the injection of 5×10^6 allogenic dermal fibroblast (ADF) with fibrin in group A, fibrin only in group B, and saline injection as a control in group C. At 12 weeks after repair, the mechanical tensile strength test and Masson's trichrome staining was conducted for the biomechanical and histological assessment of tendon-to-bone healing of repaired rotator cuff.

Results

Seven rabbits (1 in group A, 2 in group B, 4 in group C) died before the final evaluation. For the biomechanical test, the mean load-to-failure resulted 46.1 ± 11.9 N/kg, 34.2 ± 9.0 N/kg, 31.5 ± 8.9 N/kg for group A, B, and C, respectively, and group A showed significantly higher load-to-failure than other groups ($p = 0.014$). Although there was no significant difference ($p = 0.413$), group A showed higher incidence of mid-substance tears than insertional tears (mid-substance tear rate was 50% in group A, 22% in group B, 29% in group C). For the histologic evaluation, group A demonstrated better collagen fiber continuity and orientation than the other groups.

Conclusions

The current study verified the potential benefit of ADF for rotator cuff healing in terms of biomechanics and histology.



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443 Prognostic Factors Affecting Clinical Outcomes Of Reverse Shoulder Arthroplasty In The Asian Population

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Aim

The purpose of the current study was to determine the factors affecting the complication rate and clinical outcomes of reverse shoulder arthroplasty (RSA) for cuff tear arthropathy in the Asian population.

Background

Despite the growing use of reverse shoulder arthroplasty (RSA), it is associated with relatively frequent complications and uncertain clinical outcomes. We investigated factors affecting clinical outcomes of RSA in the Asian population.

Methods

Authors evaluated physical findings, radiographic findings, visual analogue scale scores for pain and satisfaction, and functional scores in 179 consecutive patients who underwent RSA in two centers between 2008 and 2014.

Results

In 146 included RSAs (average follow-up: 20.6 months, age: 71 years), pain and forward flexion improved with deltoid lengthening (average: 23.5±9.1mm, p=0.039). External rotation decreased with medialization (average: 16.8±6.0mm, p=0.025), whereas internal rotation showed no correlation with humeral retroversion. Scapular notching (n=44, 30%) significantly decreased with greater inferior glenosphere overhang (average: 2.94±3.0 mm, p=0.001), greater prosthesis scapular neck angle (average: 104±10.3°, p=0.001), greater glenoid neck length (average: 9.8±2.54 mm, p=0.012), lower inferior baseplate tilt angle (average: 105.5±9.2°, p=0.009), and varus humeral neck-shaft angle (p=0.046), and did not affect ranges of motion and pain, satisfaction, and functional scores. Inferior glenosphere overhang was the most important factor preventing notching (area under curve: 0.77, cut off value: 2.645mm). At the final follow-up, medialization related to improvements in pain and satisfaction, and inferior glenosphere overhang to functional scores.

Conclusions

More distalization and medialization of COR during RSA would help recovering pseudoparalysis, while lateralization improving active external rotation. Inferior glenosphere overhang was most important for preventing scapular notching and improving functional outcomes. Therefore, proper amount of deltoid lengthening (mean 2.3cm) and inferior glenosphere overhang (mean 2.9mm) should be chosen for the better outcomes, whilst the COR should be individualized based on patient characteristics in Asian population



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374 Which Is The Optical Method Of Platelet-Rich Plasma (PRP) Application During Arthroscopic Rotator Cuff Repair: A Randomized Controlled Comparative Trial

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Aim

To assess the efficacy of intraoperative Platelet-rich plasma (PRP) augmentation and postoperative injection of PRP in patients undergoing arthroscopic rotator cuff (RC) repair

Background

PRP is thought to enhance tendon-bone healing after RC repair. However, the optimal method of PRP application is still uncertain.

Methods

Total 58 patients underwent arthroscopic RC repair with PRP augmentation intraoperatively. PRP was prepared by double spin centrifugation during the surgery and activated by adding calcium gluconate. Obtained PRP gel was applied to the interface between torn tendon and bone bed of footprint. After randomization, half of patients received single ultrasound-guided injection of PRP around the repaired tendon at postoperative 2 weeks. At 1 year postoperatively, tendon healing was assessed using MRI, and clinical outcomes were evaluated using ASES score. Finally, propensity score matching was performed retrospectively among patients of database who had undergone arthroscopic RC repair without PRP augmentation (conventional repair group). Comparison with anatomical and clinical outcomes was performed.

Results

Finally, 47 patients (24 in PRP augmentation only group (Group A) and 23 in boost injection group (Group B)) were eligible at postoperative 1 year and each group was matched for comparison. The overall retear rate in PRP group was significantly lower than conventional repair group (12.8% vs. 29.7%, $p=0.04$). The retear rate was not different in patients whose tear size was smaller than 2cm, however it was significantly lower in patients whose tear was bigger than 2 cm (12.9% vs. 35.6%, $p=0.04$). There were no statistical differences between Group A and B in terms of the retear rates (8.3% vs. 17.4%, $p=0.416$), and clinical outcomes ($p>0.05$).

Conclusions

PRP augmentation showed superior results in anatomical healing after RC repair. Postoperative boost injection did not improve anatomical healing. At postoperative 1 year, clinical results showed no statistical difference regardless of the PRP augmentation or the presence of retear.



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438 Staged Bilateral Arthroscopic Rotator Cuff Repair -Which Side Is Better And Which Factors Affect Outcome?

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Aim

To compare perioperative characteristics and postoperative outcomes of both shoulders in patients who underwent arthroscopic bilateral rotator cuff repair (RCR) sequentially.

Background

With increasing aging population and the incidence of rotator cuff tear, growing number of patients undergo RCR on both sides.

Methods

Sixty three patients had bilateral RCR between October 2003 and January 2015. The mean age at first surgery was 58.4 years (range,43-77). The interval between first and second surgery was 28.5 months (range,4-96). Perioperative characteristics and functional outcomes (VAS for pain and satisfaction, ROM, ASES score, and Simple shoulder test) of 6, 12 months and final follow-up and imaging studies for the evaluation of healing failure were retrospectively investigated.

Results

Tear size of both shoulders were closely related (OR=20.0, P=0.001), however, no preoperative clinical factors (age, duration of symptom, diabetes mellitus, osteoporosis, preoperative VAS and ROMs) were significantly related with tear size (all Ps>0.05). Postoperative functional outcomes of the first and second surgeries improved significantly compared to preoperative state (all Ps<0.05). Between first and second surgeries, satisfaction at 12 months and functional outcomes (VAS for pain and satisfaction, SST, ROMs) at final follow-up visit were significantly lower in second surgery (all Ps<0.05). Functional scores were significantly lower in shoulders of second surgery at postoperative 6 months in patients whose surgical interval was shorter than 6 month compare to patients whose interval was longer than 6 months (all Ps<0.05). The rates of healing failure were 15.9% after first surgery, 22.2% after second one. Seven patients showed bilateral healing failure, and this meant 70% of initial failure followed subsequent failure in the other shoulder (OR=15.3, P<0.001).

Conclusions

The second shoulder would be better to be repaired after at least 6 months after first surgery. The healing of first rotator cuff repair was most important predictor of healing failure of second surgery.



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451 Subacromial Local Anesthetics Did Not Interfere The Rotator Cuff Healing After Arthroscopic Repair

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Aim

To evaluate the adverse effect of ropivacaine through subacromial pain pump on the outcomes of arthroscopic rotator cuff(RC) repair.

Background

Myotoxic effects of subacromial ropivacaine(SR) infusion in vitro have been reported, and there still is a controversy about these effects on healing of RC in vivo condition.

Methods

By continuous follow-up of the patients in the authors' three published prospective studies regarding pain control after arthroscopic shoulder surgery, 181 patients who had RC repair with radiologic and functional evaluation at least 1 year postoperatively were divided into 3 groups: continuous SR infusion(Group I,n=33), patient-controlled SR infusion (Group II,n=30), and other pain control modalities without SR (IV PCA and/or interscalene block, Group III,n=55). At least 1 year after surgery, the healing of RC tendon and the changes of fatty degeneration(global FD index,GFDI) were estimated. Isokinetic muscle performance test improvement(IMPTI) and functional outcomes were evaluated.

Results

There were no differences in pain VAS, satisfaction VAS, ASES score, Constant score(CS) and ROM at final follow-up(pain VAS:1.1/1.3/0.9, satisfaction VAS:8.3/8.7/8.0,ASES:79.5/81.1/75.7,CS:81.8/77.6/78.2, ROM: FF:167.2°/167.5°/167.4°,ER:66.7°/72.1°/68.6°,IR:T8.4/T8.9/ T8.4;p=0.88, 0.64,0.34,0.31,0.78,0.64,0.91,respectively). There were no differences in the healing rate and in change of GFDI between three groups(HR;72.7%/73.3%/70.9%,p=0.83;GFDI:0.45/0.62/0.41;p=0.79). IMPT were all improved at 1 year postoperatively and no differences were observed(abduction/ER/IR; p=0.73/0.71/0.95,respectively). Re-analyzing into two groups(Group I+II vs Group III) also showed no differences in the functional scores,healing rate,changes of GFDI(Pain VAS:1.1/0.9,Satisfaction VAS:8.5/8.0,ASES: 80.3/75.7,CS: 79.9/78.2,HR:73.0%/70.9%,GFDI:0.51/0.41; p=0.67,0.45, 0.16,0.47,0.55,0.64,respectively). Also, no differences of IMPT were observed (abduction/ER/IR;p=0.65/0.70/0.99,respectively). Side effects of PCA including nausea and dizziness were shown mostly in Group III(33.3% /26.7%/41.8%;p=0.37), and patients in Group I and II showed less complaint on side effects(Group I+II vs Group III:30.2% vs 41.8%,p=0.19)

Conclusions

The current data suggested that the myotoxicity of ropivacaine through subacromial pain pump may be reversible or may not be severe to interfere tendon healing and muscle degeneration, and thereby may not affect postoperative function.



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279 Ten-Year Clinical And Anatomical Follow-Up After Repair Of Anterosuperior Rotator Cuff Tears: Influence Of The SubscapularisLaurent Nové-Josserand¹, Philippe Collin², Jean-François Kempf³

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Aim

Our hypothesis was that the extent of the subscapularis tear influenced the prognosis after repair of anterosuperior rotator cuff tears with a 10-year follow-up.

Background

Anterosuperior rotator cuff tears are more frequent than expected. Collin et al. suggested classifying anterosuperior cuff tears depending on the size of the subscapularis tear. They reported more severe clinical presentation when the subscapularis lesion extends inferiorly but did not conclude regarding the prognosis after tendon repair.

Methods

The study population consisted of all 138 patients that underwent surgery in 14 participating centers in 2003 for full-thickness tears of the rotator cuff with lesions in the subscapularis and supraspinatus tendons. The patients were divided into two groups depending on whether the subscapularis lesion affected only the superior half of the tendon (group A) or extended into the lower half (group B). Ninety-two patients ($56y \pm 7$), 71 in group A and 21 in group B, were available for follow-up after 10 years ($127m \pm 16$), with MRI to evaluate tendon healing and muscle condition.

Results

The mean Constant scores were 59 ± 16 before surgery and 77 ± 14 at follow-up ($p = 1.7 \times 10^{-12}$). The re-tear rates were 25% for the supraspinatus and 13.5% for the subscapularis tendon. The clinical results for group A patients were better than for those in group B. Severe fatty infiltration was observed more frequently in the subscapularis than in the supraspinatus muscle (27% vs 12% of cases). Supraspinatus healing influenced subscapularis healing and fatty infiltration.

Conclusions

Repair for anterosuperior rotator cuff tears is satisfactory at 10 years, particularly if the subscapularis tear is not extensive. An extensive subscapularis tear is a negative prognosis factor. Fatty infiltration of the subscapularis muscle was frequently observed postoperatively despite tendon healing.



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402 Time-Dependent Histomorphological Changes Of The Superior Acromioclavicular Ligament Complex Following Acute Traumatic Disruption

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Aim

Investigation of the intrinsic healing response of the superior acromioclavicular ligament complex (ACLCL) following acute traumatic disruption.

Background

Persistent horizontal instability of the acromioclavicular joint (ACJ) remains a critical issue in treatment of traumatic ACJ disruptions indicating insufficient ACLCL healing. So far, there exists hardly any knowledge about the ACLCL healing potential.

Methods

Biopsies of the superior ACLCL were taken from patients undergoing operative stabilization of Rockwood-V dislocations. We defined 3 groups of patients according to the time interval from trauma to surgery (group 1, n= 5: 0-7 days, group 2, n= 6: 8-14 days, group 3, n= 4: 15-21 days). Samples were studied for histological appearance, cellularity including cell count per high-power-field (HPF), alpha-smooth muscle actin, collagen-1 and collagen-3 content and CD-68 expression.

Results

Cellularity within in the rupture zone steadily increased over time. Significant differences of cell counts were found between group 1 and group 3 related to total cells (48.1/HPF vs. 149.7/HPF; p=0.009), fibroblast-like cells (32.5/HPF vs. 107.8/HPF; p=0.033) and fibrocyte-like cells (6.3/HPF vs. 40.3/HPF; p=0.002). Immunohistochemistry showed activation of myofibroblasts and occurrence of CD68-positive cells within the first days after trauma. Collagen-3 expression reached its peak already within the second week after trauma showing a significantly higher score in group 2 compared to group 1 (3.2 vs. 2.2 vs.; p=0,004) and group 3 (2.8; p>0.05).

Conclusions

The ACLCL shows a dynamic, time-dependent healing response. Collagen-3 content, as a marker of scar tissue formation, already peaks in the second week after injury. Present findings suggest, that operative treatment of acute ACJ dislocations, if indicated, should occur as soon as possible after trauma. Anatomic ACLCL reduction and fixation appears beneficial to achieve best possible biomechanical ACLCL healing and horizontal ACJ stability. These novel insights might help to optimize treatment and lower rates of persistent horizontal ACJ instability following acute repair.



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657 Scapular Dyskinesia: An Observational Study On Asymptomatic Elite Swimmers

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Aim

The purpose of this study is to assess the presence of Scapular Dyskinesia (SD) on young asymptomatic elite swimmers.

Background

SD is often related to the presence of shoulder pain in overhead athletes, but its incidence in asymptomatic athletes has not been adequately investigated.

Methods

The study enrolled 661 asymptomatic elite swimmers [344M-317F; mean age (StdDev): 15.83 (2.2)]. Anthropometric characteristics, swimming training routine, and stroke speciality were recorded. Firstly, scapular position was acquired by static measurements; differences in height, distance and angular degrees were measured for each scapula position: with arms at rest (position 1) and with arms at 90 degrees of abduction, maximal internal rotation and elbow in full extension (position 2). Furthermore, SD was assessed by a dynamic test with a "yes/no" method. Through this test, the scapular movement was evaluated performing the forward flexion, by raising and lowering the arms concurrently in a sagittal plane; five repetitions of each movement.

All of these evaluations were completed with athletes at rest, before their training routine or swimming competitions.

Results

The static and dynamic tests were positive in 69 (10,4%) and 56 (8,5%) swimmers, respectively. A significant difference was found between genders ($p < 0.01$); males were found positive twice as much as females.

No correlation was found between the dominant limb and the dyskinesia side ($p = 0.258$).

However, the breathing and dyskinesia sides proved to be correlated ($p < 0.05$).

Long distance swimmers (800-1500 m.) were found positive twice as much as sprinters (50-100 m.) ($p = 0.01$).

Conclusions

Static measurements might overrate the presence of SD. Due to SD functional characteristics, a dynamic test is preferable to obtain a correct diagnosis. Fatigue and race distance are determinant factors of risk to develop SD in elite swimmers.



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631 Mid Term Results Of Arthroscopic Release Of Tennis Elbow,Preliminary Report In Iran**Hossein Saremi**

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Aim

to evaluate results of arthroscopic treatment of recalcitrant lateral epicondylitis in IRAN

Background

lateral epicondylitis of elbow is a common cause of chronic elbow pain .Although non operative treatment is effective in most of the patients ,recalcitrant cases need surgery.arthroscopic release is a well known and effective procedure for treatment of such cases.as there is no study about the results of this procedure in iran ,we performed this study in order to evaluate the results ,in our population.

Methods

44 patients of recalcitrant tennis elbow were treated by arthroscopic release from october 2012 to june 2015,after at least 6 months of nonoperative management.pain was evaluated by VAS.functional status was evaluated by quick DASH score .mean time of operation and mean time of return to work after operation was also recorded.gripe strength and pinch strength of the affected limb was measured and compared to other side.

Results

4patients did not cooperated for complete followup.Mean time of follow up was 16.8 months.VAS decreased from mean of 7.05 preoperatively to 2.3 postoperatively($p=0/001$)..Quick DASH score diminished from 63.18 to 25.68($p=0/001$).mean time of return to work was 15.9 days .mean time of operation was 13.8 minutes.gripe and pinch strength of the affected side was not different statistically compared to other side.

Conclusions

Arthroscopic release of tennis elbow is an effective procedure for treatment of recalcitrant cases in iran in which we donot have a good results of open surgery of lateral epicondylitis



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291 Midterm Results Of Reverse Shoulder Arthroplasty With 135° Humeral Inclination For Treatment Of Cuff Tear Arthropathy – A Prospective Case Series

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Aim

This study evaluated the complications, functional and radiological results in patients treated with rTSA using a 135° humeral component.

Background

Gaining importance, reverse shoulder arthroplasty (rTSA) has currently been facing several implant modifications in order to improve the original Grammont design.

Similar to anatomic TSA, adapting the implant to patient's anatomy is one of the recent concepts. Humeral inclination of 135° as compared to 155° increases the lateralization of the humerus and decreases deltoid tension. Simultaneously mechanical scapular notching is reduced. It is not known if the promising new design can live up to the expectations.

Methods

Between 05/2012 and 10/2014, 45 rTSAs with 135° inclination were implanted for treatment of cuff tear arthropathy (CTA) by one single surgeon.

After a mean follow-up of 32 (range, 23-42) months we evaluated adverse events (AE), the constant score (CS) and the subjective shoulder value (SSV). Additionally standardized plain radiographs were obtained and assessed in terms of stress-shielding, inlay-wear, scapular Notching and implant loosening.

Results

Twenty-five Patients were available for the final follow-up after 2-4 years. The mean CS improved significantly from 23 (range, 10-38) to 71 (range, 22-94). One patient suffered an axillary nerve injury, furthermore we didn't detect any other AEs. None of the patients had to undergo revision surgery. 3 Patients passed away within the period of follow-up without any relation to the shoulder treatment. Scapular notching grade 1 was detected in 5 cases (20%). We didn't see any component loosening or inlay wear at final follow up.

Conclusions

Over a period of 2-4 years rTSA with 135° humeral inclination doesn't show higher complication rates as compared to data of conventional rTSA in the treatment of CTA. Functional scores as well as range of motion are also similar, however the frequency and severity of scapular notching seems lower than in rTSA with 155° inclination.



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293 Longterm Results Of A Stemless Shoulder Prosthesis – A Case Series

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Aim

Our study evaluates the functional and radiological outcome of patients treated with this stemless implant at a minimum follow up of six years.

Background

Since its introduction in 2005, stemless shoulder arthroplasty is constantly gaining importance. The Eclipse® stemless shoulder prosthesis offers the surgeon the advantage of bone stock preservation and at the same time avoids the drawbacks of a resurfacing arthroplasty. Implant positioning irrespective of the humeral shaft position facilitates the treatment of fracture sequelae. There has only been one midterm study of the outcomes of the Eclipse prosthesis.

Methods

Between 2005 and 2008, one single surgeon treated 28 patients, 29 shoulders respectively with the Eclipse prosthesis. We assessed the range of motion (ROM), constant score, age adjusted constant score (CS), subjective shoulder value (SSV) and radiographs preoperatively as well as postoperatively with a follow-up period of 6 to 11 years.

Results

23 patients were available for the final follow-up after 7,6 years (range 6-11years). The CS showed a significant improvement with 78 (range 34-107) compared to the pre-operative score of 29 (range 21-38). One prosthesis (3,4%) had to be revised due to loosening after 6 months. 5 patients (17,2%) underwent revision surgery to a reverse shoulder prosthesis due to cuff tear deficiency, however 3 of those had a cuff tear arthropathy at the time of the primary surgery. 3 patients passed away without any relation to the treatment. Radiological assessment revealed radiolucent lines and localized osteopenia, which did not have any statistically significant impact on the clinical outcome. External stress shielding was seen in centred implants while internal stress shielding was observed in decentred implants.

Conclusions

The stemless shoulder prosthesis provides a reliable clinical outcome that is comparable to conventional stemmed prosthesis and seems to be an attractive alternative in selected indications. The clinical outcome is not related to radiologic changes.



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289 Midterm Results Of Reverse Shoulder Arthroplasty With 135° Humeral Inclination For Treatment Of Proximal Humerus Fractures – A Prospective Case SeriesMilan Niks¹, Matthias Reiser², Nadine Sadler³, Lars Lehmann³

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Aim

This study evaluated the complications, functional as well as radiological results in humeral head fractures treated with rTSA using a 135° humeral component.

Background

Recent developments of reverse shoulder arthroplasty (rTSA) allow for adapting the implant to patient's anatomy. Humeral inclination of 135° increases the lateralization of the humerus and decreases deltoid tension. Simultaneously mechanical scapular notching is reduced and fixation of the tuberosities is facilitated compared to rTSA with a 155° humeral component. There is little knowledge about the performance of these modern implants over a longer period.

Methods

Between 05/2012 and 10/2014 38 rTSAs with 135° inclination were implanted for treatment of humeral head fractures by one single surgeon.

After a mean follow-up of 31 (range, 22-49) months we evaluated adverse events (=AE), the constant score (CS) and the subjective shoulder value (SSV). Additionally standardized plain radiographs were obtained and assessed in terms of healing of the tuberosities, stress-shielding, scapular Notching and implant loosening.

Results

Eighteen Patients were available for the final follow-up. The mean CS was 57 (range, 22-86) points and SSV 62% (range, 20-100). We didn't detect any AEs and none of the patients had to undergo revision surgery. 2 Patients passed away within the follow-up period without any relation to the treatment. In one case the radiologic assessment showed a non-union of the greater tuberosity, which correlated with a poor functional outcome. Scapular notching grade 1 was detected in 3 cases (17%).

Conclusions

Over a period of 2-4 years, rTSA with 135° humeral inclination doesn't show higher complication or revision rates as compared to data of fracture treatment with conventional rTSA. Functional scores are also similar, however the frequency and severity of scapular notching is lower than in rTSA with 155° inclination. Non-union of the tuberosities is associated with a poor functional outcome.



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288 Tranexamic Acid Reduces Blood Loss Following Primary Shoulder Arthroplasty: A Double-Blind Placebo-Controlled Prospective Randomized Controlled Trial

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Aim

To determine if intravenous (IV) tranexamic acid (TXA) is more effective than placebo in reducing blood loss following primary shoulder arthroplasty.

Background

TXA is an antifibrinolytic that has been shown to decrease blood loss and transfusion rates following hip and knee arthroplasty with limited evidence to support use in shoulder arthroplasty.

Methods

Patients undergoing primary anatomic and reverse total shoulder arthroplasty (TSA) were randomized to receive 1-gram of IV TXA or a placebo of an equivalent volume of IV normal saline administered 10 minutes prior to incision. The primary outcome measurement was calculated postoperative blood loss. Secondary outcomes included transfusion rates, weight of hemoglobin loss, length of hospital stay, and thromboembolic events. Statistical analysis was performed with a two-sample student's t-test for continuous variables and Chi square or Fisher's exact tests for categorical variables.

Results

110 patients enrolled in the study, 2 of whom were excluded because they did not have a postoperative hemoglobin measurement, and the remaining 108 patients were analyzed (52 for TXA, 56 for placebo). There were no significant differences between TXA and placebo groups in preoperative characteristics. For the primary outcome, the TXA group had significantly lower postoperative blood loss of 1100.9 \pm 367.4 mL as opposed to 1274.5 \pm 460.0 mL for the placebo group ($p=0.03$). For secondary outcomes, TXA had lower weight of hemoglobin loss compared to placebo (152.2 \pm 57.3 g vs 178.0 \pm 65.8 g; $p=0.03$). There was no difference in length of stay (2.8 \pm 0.9 days for TXA vs 2.8 \pm 1.5 days for placebo; $p=0.93$). No patients in either TXA or placebo groups experienced a transfusion. There was one deep venous thrombosis in the placebo group and none in the TXA group with no other thromboembolic complications by 90 days postoperative.

Conclusions

Intravenous TXA reduced blood loss following primary TSA compared to placebo with no increase in complications.



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294 Strut Onlay Allografting And Cerclage Wires For Fixation Of Periprosthetic Humeral Fractures Around Well-Fixed Components: Surgical Technique And Preliminary Results

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Aim

To describe a surgical technique for internal fixation of Vancouver B1/C shoulder periprosthetic fractures using cortical onlay allograft and cerclage wires and to assess its preliminary results.

Background

Periprosthetic humeral fractures increase in frequency because of increasing number of shoulder arthroplasty (SA). The bone stock is often of poor quality. Open reduction and internal fixation is a treatment of choice. Various osteosynthesis implants are available and cortical strut onlay allografting seems an attractive option in case of stable humeral components.

Methods

A retrospective study included all patients operated in 2013-2015 for a peri-prosthetic fracture of the humerus (Vancouver B1/C) with well-fixed components. A direct anterior or an anterolateral approach of the fracture was used to reduce the fracture. Two cortical strut allografts were obtained from a fresh frozen tibial allograft and placed around the humerus as a sarcophagus. A stable fixation was obtained with four metallic wires. Rehabilitation was started at 1 month, initially passive then active. The main evaluation criterion was the radiological bone consolidation (humeral cortical continuity and presence of bone bridges between allograft and fracture) on X-ray at 6-month follow-up. Secondary outcome criteria were ASES and Constant scores at last follow-up.

Results

Over this period, 6 women, mean age 74.3 ± 10.9 years were included, 5 reverse SA and 1 stemmed hemiarthroplasty which primary surgical indication was proximal humeral fracture. There was two Type C1 fractures and four Type B1. Consolidation was obtained in all patients at 6-month follow-up without any iterative fracture. Radial paralysis occurred in 1 patient in the immediate postoperative period and fully recovered at 6-month follow-up. At 10 ± 2 months follow-up, the average ASES score was $46.5 \pm 14.3\%$ and the Constant $29.6 \pm 15.5\%$.

Conclusions

Strut onlay allograft and cerclage wires seem a safe and effective technique to treat periprosthetic humeral fractures around well-fixed components.



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305 Efficacy Of Sagittal Oblique View Of MRI In Subscapularis Tear & Atrophy : Compare With Arthroscopic Findings

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Aim

i) to prove usefulness of sagittal oblique views (En-face view & Y-view) in pre-operative MRI and evaluate the subscapularis muscle atrophy ii) to identify the relationship between muscle atrophy and tear size of subscapularis in arthroscopic findings.

Background

According to recent articles, the incidence of subscapularis tendon tear whether isolated or combined with supraspinatus-infraspinatus tear was reported approximately 30-50% in the rotator cuff tear. In this regard, it is important to find the diagnostic method prior to surgery especially using the pre-operative MRI.

Methods

Among the arthroscopic rotator cuff repair cases between Jan. 2012 to May 2015, each 50 patients randomly selected by classified subscapularis tear size according to the Yoo et al. Then, 272 shoulders were included. All patients had preoperatively indirect magnetic resonance arthrography (MRA) with identical protocol. Image evaluation was measured by 2-shoulder fellowship trained orthopedic surgeons. Reviewers selected the same image cut (en-face view, Y-view) and measured subscapularis tendon; grade based on Base-to-tip line (BTL) & tangent line, thickness, overlapped line to BTL, vertical length, caudal width, cephalic width and fluid collection.

Results

No significant difference of fluid accumulation between normal group and tear subgroup in en-face view. BTL associated factor demonstrated a significance from type IIB to type IV. Subscapularis thickness in en-face view, grading based on Tangent line, fluid accumulation, vertical length and cephalic width in Y-view showed a significant difference in type III and IV ($p < 0.0005$). Caudal width in Y-view presented a significant difference only in type IV ($p = 0.0035$).

Conclusions

There were several findings associated with the large tear (type III and IV) of subscapularis. However, By using BTL associated factors, we can suspect partial tear (type IIB) of subscapularis.



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304 Clinical, Radiological Outcomes And Factors Affecting Clinical Results Of Isolated Subscapularis Tendon Tear Treated By Arthroscopic Repair

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Aim

To evaluate the clinical outcomes after arthroscopic repair of isolated subscapularis tendon tears, to evaluate the factors affecting the clinical outcomes, and to find the changing of tendon structural integrity by postoperative interval period on a postoperative MRI.

Background

Isolated subscapularis tendon tears are rare. There is a few articles published on arthroscopic repair of isolated subscapularis tendon tears.

Methods

Between 2005 and 2013, 45 patients with an isolated subscapularis tendon tear were included at 2 institutions. The clinical outcome measures were done with PVAS, ASES, SST score. We evaluate the factors affecting the clinical outcomes; history of trauma, classification of subscapularis tear, sex, age, symptoms duration, preoperative fatty infiltration grade, cross-sectional area, cranial-transversal diameter and caudal-transversal diameter. Subscapularis tendon integrity, and the fatty infiltration of the subscapularis muscle were evaluated by the MRI

Results

There was no significant changing of tendon structural integrity by postoperative duration on a postoperative MRI excepting cross-sectional area. Tendon structural integrity was statistically significant different between tear of less than 1/3 entire subscapularis tendon and tear of more than 1/3. However, there was no statistically significant difference in clinical outcomes. Age was significant factor affecting clinical outcomes. Male was better outcomes than female in Constant and Simple Shoulder Test. The difference of cross-sectional area, cranial-transversal diameter and caudal-transversal diameter were decreased with no statistically significance.

Conclusions

Arthroscopic isolated subscapularis repair achieves a significant functional improvement. Tear of less than 1/3 entire subscapularis tendon has larger structural integrity than that of more than 1/3 with statistically significant. However, there was no statistically significant difference in clinical outcomes. Age was significant factor affecting clinical outcomes. Other factors were fatty infiltration, history of trauma, tear \geq 1/3 of entire subscapularis tendon, sex and cranial-transversal diameter.



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306 Clinical And Radiologic Outcomes Of Arthroscopic "Hybrid" Repair In Large To Massive Rotator Cuff Tear

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Aim

To introduce the concept of hybrid repair (incomplete repair) in posterosuperior rotator cuff tears, and to report the clinical and radiologic outcome of its consecutive cases with minimum two-year follow-up.

Background

In large to massive rotator cuff tears, incomplete repair (barely covering the cartilage) is an option. The basic principle behind our concept of "hybrid" repair is double row in infraspinatus tendon, single row in supraspinatus tendon, medialization of supraspinatus tendon footprint, and transosseous equivalent augmentation. This definition is different from previous literature referring to hybrid technique. The rationale behind this repair is that the in general supraspinatus has more tendon loss and retraction compare to infraspinatus which makes much more difficult to repair. Our concept helps to repair with less tension hoping better healing and less pain.

Methods

From March 2011 and January 2015, 991 patients were diagnosed as rotator cuff tear and underwent repair in our hospital by a single surgeon. We evaluated consecutive 45 patients (average age of 62.6 years; range, 51-74 years) who had received "hybrid" repair among 212 large-to-massive tears. The average postoperative follow-up MRI period was 5.5 months (range, 4.0~7.0 months). Functional evaluation was performed at six months, one year and two years postoperatively. Preoperative and postoperative active range of motion (AROM), PVAS, FVAS, Constant, ASES scores were checked. For the radiological evaluation, postoperative MRI was done in all patients to determined tendon integrity using Sugaya classifications.

Results

Functional outcomes and clinical outcomes improved in patients with hybrid-technique repair at final follow-up.

However results of postoperatively ROM were not significantly different statistically from results of preoperatively ROM ($P>0.05$). The retear occurred in 12 patients (21%).

Conclusions

The arthroscopic hybrid repair showed satisfying clinical outcomes for large to massive rotator cuff tears with relatively low retear rate.



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307 Association Between Pre-Operative MRI Of The Supraspinatus Muscle And Reparability Of Rotator Cuff Tears

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Aim

To give a guideline for SST reparability or amount of mobilization to greater tuberosity.

Background

There are very few parameters which can predict the reparability of the rotator cuff, especially the supraspinatus tendon tear (SST). It is very common to see large supraspinatus tendon tear with minimal infraspinatus tear.

Methods

We evaluated 170 supraspinatus tendon repair patients (average age, 62.3 years (range, 40-83 years)) who had only arthroscopic 50% or less coverage (type II) versus incomplete coverage (meaning reaching only the cartilage portion, type III) of the greater tuberosity. Patients were divided into two groups: 96 patients had underwent a type II repair, 74 patients had underwent a type III repair. Also patients were separated into four groups: i) isolated supraspinatus tears, ii) supraspinatus and infraspinatus tears, iii) supraspinatus and subscapularis tears, iv) tears in all 3 muscles. Muscle atrophy of the supraspinatus was evaluated by using occupation ratio on the most lateral T1-weighted sagittal oblique view. Occupation ratio of supraspinatus muscle in supraspinatus fossa was evaluated visually. The area was measured by 2 independent observers.

Results

On MRI, the supraspinatus muscle occupation ratio was significantly different between the type II and type III repair groups. The mean occupation ratio for type II repair group (42.39 +/- 10.1) was higher than type III repair group (36.64 +/- 6.94), with statistical significance (cutoff value of 41). As expected, the supraspinatus muscle occupation ratio was significantly smaller as the tear increases (P <0.001).

Conclusions

The occupation ratio of supraspinatus muscle less than 41 can be the cutoff value between coverage of greater tuberosity versus incomplete coverage. And there was a significant correlation between tendons (muscle) tear involvement and supraspinatus muscle atrophy ratio. Only SSP tear group had the least degree of muscle atrophy.



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311 Is The Treatment With A Stemless Shoulder Arthroplasty After Posttraumatic Situations As Beneficial As For The Primary Osteoarthritis Cases?

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Aim

The aim of this study is to investigate, if patients treated with a stemless shoulder arthroplasty after posttraumatic situation profit from this type of treatment and if yes, do they profit in the same way as the osteoarthritis cases?

Background

Stemless shoulder prostheses combine advantages of resurfacing with those of standard stem implants and represent a trend in shoulder arthroplasty. Good outcome results and long-term survival are crucial for a long-lasting success of these implants.

Methods

A prospective multicentre study on 267 stemless shoulder prostheses was investigated. 249 cases had at least one clinical follow-up. Median follow-up was 4 years. 179 out of 249 cases were treated for primary osteoarthritis (OA) and 39 for posttraumatic osteoarthritis or fracture sequelae (POA). Constant Score (CS) was assessed at each follow-up. One third of the patients received a hemiarthroplasty.

Results

Median follow-up time was 48.6 months (range, 1.2 to 93.7). At last follow-up the OA patients reached significant better CS (75.1 points) than the POA (60.2 points), $p < 0.0001$. In both patient groups the CS significantly increased from preoperative to last follow-up, $p < 0.0001$. However, the OA group could profit significantly more from the treatment (46.0 points), than the POA group (35.3 points), $p = 0.0041$. Nine implants were revised: 2 in the POA group (cuff tear and pain) and 7 in the OA Group (four cuff tears, one infection, one subcapital fracture and one fall with stem loosening).

Conclusions

At 4 years the patients could significantly profit from the implantation. However, the patients treated for primary osteoarthritis reached significantly better clinical scores than the patients treated for posttraumatic osteoarthritis. The mid-term clinical results are promising, but the indication for anatomical stemless shoulder prosthesis should be considered better, especially in cases where the rotator cuff is already thinned before surgery.



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317 Surgical Outcomes After Arthroscopic Stabilization For Recurrent Anterior Glenohumeral Instability In Handball Players

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Aim

The purpose of this study was to evaluate clinical outcomes of arthroscopic stabilization with or without augmentation in handball players.

Background

Handball is a demanding sport that requires both throwing and contact activities. For handball players with recurrent anterior shoulder instability, we need to securely restore stability without motion loss.

Methods

Subjects consisted of 10 shoulders with arthroscopic stabilization for recurrent anterior glenohumeral instability between 2007 and 2015. The mean age is 18.8 years (range, 15–26). Dominant side was involved in 5 patients. The mean follow-up was 35.3 months (range, 24–92). Bankart lesion was arthroscopically repaired using 4 suture anchors, and rotator interval closure was added as an augmentation depending on risk factors for recurrence including age, Joint laxity, glenoid osseous defects, and Hill-Sachs lesion. Causes of first-time dislocation, intraoperative findings, surgical procedures and clinical outcomes were investigated retrospectively.

Results

Cause of first-time dislocation was contact with opponents in 8 shoulders (80%), throwing in 1 shoulder (10%), and intercept in 1 shoulder (10%). All cases had Bankart lesion, including 5 (50%) osseous Bankart lesions. 3 shoulders (30%) had SLAP lesion. Rotator interval closure was performed in 3 dominant and 5 non-dominant shoulders. Rowe score was significantly improved after surgery, though 1 shoulder (10%) experienced recurrence. No significant motion loss was observed at final follow-up in shoulders with augmentation as well as shoulders without augmentation. The mean time to return is 7 months (range, 5–10) after surgery. No significant differences were detected in time to return between dominant shoulders with and without augmentation.

Conclusions

Arthroscopic Bankart repair with augmentation for handball players demonstrated good functional outcomes and sports return even in dominant shoulders with augmentation. As augmentation procedures may have little effect on throwing activity of handball players, we recommend performing augmentation in addition to Bankart repair even for dominant shoulders for secure stability.



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315 Neurofilament Distribution In The Long Head Of The Biceps Tendon And The Superior Labrum

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Aim

To histologically investigate the distribution of neurofilament in the long head of the biceps tendon (LHBT) and the superior labrum. We hypothesize that neurofilament is inhomogeneously distributed in the LHBT as well as in the anterior and posterior superior labrum.

Background

Type II SLAP repair is accompanied by a prolonged period of pain compared to LHBT releasing techniques like tenodesis or tenotomy. Suture anchors might affect neuronal structures in the superior labrum accounting for the postoperative pain. Thus, anchor positioning could be essential.

Methods

Ten LHBTs including the superior labrum were dissected from human specimen and immunohistochemically stained with neurofilament 200kD. All slides were scanned at high resolution, converted into TIF and regions of interest (ROI) were defined. Segmentation was performed according to the defined ROI's and measurement using a programmed algorithm specifically created for this purpose. The images were thresholded on the blue colour layer to identify parts of the image which may contain stained nerves. The segmented nerves were counted and their total size and the area of other tissue were measured separately for the different ROIs.

Results

Distribution of neurofilament positive cells in absolute numbers revealed a clear but insignificantly higher amount in favour of ROI I, representing the superior labrum anterior to the LHBT origin. Setting ROI I at 100% a significant difference could be seen compared to ROI III, representing the superior labrum posterior to the LHBT origin (ROI I vs. ROI III with a p-value <0.05).

Conclusions

The density of neurofilament is inhomogeneously distributed throughout the LHBT and the superior labrum with the highest number of neurofilament in the anterior superior labrum. Thus, suture anchor placement in type II SLAP repair could play an important role for the postoperative pain related outcome. If possible, anchors should be placed only posterior to the LHBT origin.



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320 Hypertrophy Of The Coracoacromial Ligament In The Youth Overhand Athlete As A Cause Of Overuse Shoulder Pain**Gregory P Nicholson**, Bonnie Gregory, Michael C O'Brien, Madeline Mcewen

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Aim

To report the clinical characteristics, pathology, and results of treatment of an under recognized overuse syndrome in young overhead athletes.

Background

Shoulder pain in the young overhead athlete is more commonly thought to be due to instability and/or SLAP pathology, but not primary subacromial pathology. We encountered a series of young overhead athletes with shoulder pain due to hypertrophy of the anterior CA ligament with bursitis.

Methods

92 young (average age 18 [13-26]) overhand athletes presented with shoulder pain unresponsive to conservative treatment. There were 54 (59%) males and 38 (41%) females. 76% had pain at the acromial corner and 71% a painful arc of motion from Abd/ER to Abd/IR position. 53% had SLAP-type exam findings, but 0% positive instability tests. Sports participation was: Baseball 38.5%, Swimming 16%, Softball 15%, Volleyball 11%. Pre-op avg. ASES= 60, SST= 7.5, VAS pain= 4.3.

Results

Arthroscopy revealed no instability or SLAP pathology, but all had subacromial bursitis and a hypertrophic CA ligament (CAL) that extended laterally under the deltoid. Arthroscopic SAD with excision of hypertrophic CAL edge and lateral extension was performed in all.

Follow-up avg. 2.2 yrs (1-5). All returned to the previous level of sport at an avg. of 5 months (3-8). Avg. post-op scores: ASES= 98, SST= 11.7, VAS= .3 ($p < .05$). There were no complications, re-operations, and no instability revealed.

Conclusions

Consistent factors were youth, and an overhead sport that was being played all year round. Female athletes made up 41%.

We feel this is a variant of impingement, due to overuse in a repetitive overhead sport. This was primary subacromial bursitis with a hypertrophic CA ligament. Arthroscopy was successful in identifying and treating the pathology. An index of suspicion should be utilized in young overhand athletes with shoulder pain for this clinical entity.



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322 Glenoid Bone Grafting In Reverse Total Shoulder: Graft Size And Position Classification

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Aim

To categorize size and position of structural bone graft used in RTSA, document graft incorporation, and stability of baseplate.

Background

Cases in which RTSA is indicated can have a pattern of glenoid wear superiorly and posteriorly.

Methods

38 consecutive primary RTSA for cuff tear arthropathy or OA at minimum 2 yrs follow-up were evaluated. The same flat-backed baseplate was used in all. The native humeral head was matched convex-to-concave fit with the glenoid surface. Grafts were categorized by size and position. AP radiographs utilizing the supraspinatus fossa β -angle as described by Maurer and Gerber measured pre-op and post-op glenoid surface tilt and baseplate position over time.

Grafts were categorized as: Quadrant graft [25-33% of the surface behind the circular baseplate], Half Graft [33-50%], or Horseshoe Graft ["arms" of the graft extending around the post hole]. Position was categorized as: Superior, Posterior-Superior, or Posterior on the glenoid.

Results

Graft size was: 21 (55%) Quadrant, 10 (26%) Half, and 7 (18%) Horseshoe grafts. Graft position in the glenoid wear pattern was: 18 (47%) Posterior-Superior, 14 (37%) Superior, and 6 (16%) Posterior.

The average pre-op tilt β -angle was 76.3° ($\pm 7.3^\circ$). The average post-op β -angle was 93.9° ($\pm 8.6^\circ$). This corresponded with approximately 14° inferior tilt. X-rays at 2 years had no significant change in β -angle (93.1°) indicating stability of the baseplate and all grafts had incorporated. No case had undergone any revision surgery.

Conclusions

The native humeral head is an excellent graft source to "fill" glenoid wear defects (the majority which are posterior-superior or superior) behind flat RTSA baseplates. This maintained tilt and lateral position of the baseplate. We present a bone graft size and position classification to help guide surgeons performing RTSA, and as augmented baseplates become available this data can potentially guide size, position, and placement of those components.



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323 Reverse Total Shoulder Arthroplasty Compared To Anatomic TSA For The Treatment Of Osteoarthritis Without Rotator Cuff Tear**Gregory P Nicholson**, Peter N Chalmers, Terrence Feldheim, Noam Kupfer, Anthony A Romeo

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Aim

To compare outcomes of RTSA for OA with an intact rotator cuff (IRC) to matched controls who underwent anatomic total shoulder (TSA) for the treatment of OA+IRC.

Background

The optimal arthroplasty treatment of glenohumeral osteoarthritis (GHOA) in the elderly (age > 70) remains controversial given the high prevalence of RC dysfunction in this age group.

Methods

25 patients minimum one year status-post RTSA for GHOA were matched via age, sex, body mass index, smoking status, and dominant extremity with 25 patients minimum one year status-post TSA for GHOA. Rotator cuff status was determined to be intact by imaging and intra-operative assessment in all.

Results

RTSA cases had significantly lower pre-op active elevation (AFE, 69° vs. 98°, $p < 0.001$) and a greater change in AFE (71° vs. 45°, $p = 0.01$) but had equivalent AFE at final follow-up (140° vs. 142°, $p = 0.71$) to TSA. Similarly, patients that underwent RTSA had lower pre-op active ER (AER, 11° vs. 34°, $p = 0.01$) and experienced a greater change in AER (47° vs. 21°, $p = 0.06$) compared to TSA but had equivalent AER at final follow-up (53° vs. 51°, $p = 0.21$).

There were no differences in demographics, estimated blood loss, operative time, Walch glenoid classification, pre-operative acromiohumeral distance, standardized outcome measures, complication rates, or range of motion pre-operatively, or at final follow-up. Both TSA and RTSA provided significant improvements in all outcome measures and in AFE ($p < 0.001$).

Conclusions

In patients over the age of 70 with OA, a TSA or RTSA provides similar improvement in clinical outcomes. If there is any concern of rotator cuff dysfunction combined with osteoarthritis, a reverse total shoulder is associated with predictably good results and avoids concerns of future rotator cuff failure in this patient population.



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321 Results And Activity Levels After TSA With An Inlay Glenoid In A Younger Population

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Aim

To report early term results of an inlay glenoid in TSA in high demand younger patients with shoulder OA with regard to return to recreational level and employment level.

Background

In patients with high demands and under 55 yrs, arthroplasty for OA has been compromised by glenoid side failure.

Methods

25 shoulders (23 male, 2 female) with an average age of 53 (43-66) underwent TSA for shoulder OA with a unique inlay glenoid component. Average follow-up was 18 months (12-44). 21 had primary OA, 4 with post-traumatic DJD.

Work demand was categorized by Occupational Titles criteria: Sedentary (4), Light (8), Medium (4), Heavy (6), Very Heavy (2). Type of work: 10 desk job, 6 police and security, 3 construction, 2 assembly line, 2 climbing, 2 truck driver. High level recreational activity: weight lifter 7, swimmer 3, Crossfit 2, cycling 2, yoga 2.

Results

All had improvement in mean outcome scores: ASES: 49 to 86, SANE: 29 to 73, VAS pain: 5.4 to 0.5 ($p < .05$ in all). Active ROM improved AFE: 108 to 159, AER 25 to 58, AIR: 29 to 60 ($p < .05$). X-ray analysis revealed no glenoid component change.

All but two returned to previous employment level and job within an average of 5-7 months. All participated in their recreational activity at the average 5-7 months. 1 had stiffness requiring open release and was back as a carpenter at 10 months post-TSA.

Conclusions

An Inlay glenoid may allow greater activity level as it does not edge load or "lift-off" with humeral head translation that a traditional "onlay" glenoid may encounter. This is especially critical in the younger active population. It provides the proven advantage of polyethylene with better short term results over hemi-, hemi- with biologic glenoid resurfacing, or "ream and run" type procedures.



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918 Surgical Treatment Of Lateral Humeral Condyle Pseudarthrosis In Children - A Case Of Failure

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Aim

Case report of a lateral humeral condyle pseudarthrosis after surgical fixation in children

Background

Distal humerus epiphyseal fracture is the second most frequent injury of the elbow in children and the lateral condyle is by far the more frequent.

Undisplaced fractures may be treated conservatively with casting, but displaced fractures have a high incidence of nonunion, and fractures with more than 2 mm of displacement require surgery fixation.

Methods

6 years old boy, with history of fall with direct trauma of right elbow. Presented to the ER with pain, edema and functional impairment at the elbow.

Radiologically with lateral humeral condyle fracture with extension to the epiphyseal plate, Salter Harris type IV. The fracture had displacement <2mm so he was immobilized with cast. The imaging control in one week didn't show displacement, so conservative treatment was chosen.

Results

In the follow up the fracture showed radiologically no signs of consolidation and epiphyseal plate growth disorder.

The patient was proposed for surgical treatment. A lateral approach of the elbow was performed with fixation of the fragment with 2 Cannulated screws 4.0, placement of "bone peg", without any bloating of the area.

Periodic postoperative surveillance was performed and 1 year after surgery the pseudoarthrosis image was maintained. Clinically it had local bony prominence, without pain or deformity, with normal elbow mobilities.

Conclusions

The non-union rate in the lateral condyle fractures of the humerus with deviation > 2 mm is high, so this type of fracture should be subject to open reduction and internal fixation.

Conservative treatment, although indicated in this case, led to a situation of pseudoarthrosis.

Currently, surgical treatment in these cases (osteosynthesis or corrective osteotomies) presents a good prognosis. Early fixation is preferred because it allows the physis to participate in the process of distal humerus growth.

Internal fixation in the presented case was not successful in the correction of pseudoarthrosis. The patient refused further surgery and given the absence of painful complaints, evident deformity or instability, the authors didn't propose additional surgical treatment.



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645 The Role Of Tuberosity Healing In Reverse Shoulder Arthroplasty For Treatment Of Proximal Humeral Fractures

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Aim

The purpose of this study is to report clinical outcomes of a series of patients having undergone reverse shoulder arthroplasty for treatment the acute proximal humeral fractures and evaluate if tuberosity union affects the shoulder function after surgery.

Background

Proximal humeral fractures are one of the most frequent osteoporotic fractures in the elderly. Reverse shoulder arthroplasty has seen increased use for surgery treatment of these displaced and/or complex fractures. Tuberosity healing has proved to be important for functional recovery after this procedure.

Methods

Nineteen patients (average age: 75 years; range: 65-80 years), underwent reverse shoulder arthroplasty for a complex or displaced proximal humeral fracture, were included in this study retrospective with a mean follow-up of 23 months (range: 6-36 months), from 2013 to 2016. All surgeries were performed using the same type of prosthesis with a standard method of tuberosity repair. For assessment of outcomes we used: radiographies, physical exam and functional scores.

Results

The tuberosity healing rate was 79% (15 cases). In this group the results were in mean: active forward elevation 123°, abduction 108°, external rotation 37°, internal rotation 41°, strength of abduction 5.6 kg, Visual Analog Scale Score for Pain 1.4, American Shoulder and Elbow Society Shoulder Index 77; The Quick Disabilities of the Arm, Shoulder and Hand Score 22.

In patients with non-union or resorption of the tuberosities (4 cases) the results were in mean: active forward elevation 111°, abduction 98°, external rotation 24°, internal rotation 56°, strength of abduction 5.8 kg, Visual Analog Scale Score for pain 0.8, American Shoulder and Elbow Society Shoulder Index 74.5, The Quick Disabilities of the Arm, Shoulder and Hand Score 17.

All patients were satisfied with their surgical outcome and would elect to undergo the same procedure again if necessary.

Conclusions

Our results show that tuberosity union leads to improved active range of motion and functional outcomes, with better results in active forward elevation and external rotation. These findings are in keeping with those of recent studies published.



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803 18-Year Follow-Up Examination After Open Rotator Cuff Reconstruction: Clinical And Sonographic Results

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Aim

The aim was to demonstrate long-term results and efficacy after open rotator cuff reconstruction.

Background

To date, only few long term clinical followup examinations of rotator cuff reconstruction exist. As the number of surgical treatment increases also in the elderly, we wanted to examine the course and results 18 years postoperatively.

Methods

We examined clinically and sonographically 37 patients of a primary sample of 97, who had all been operated from 05/1995 to 01/1999. All patients had an average first follow-up of 7.5 years postoperatively. Patients were assessed using Constant Score, ASES, DASH, SPADI, WORC and OXFORD scores.

The results were compared with the preoperative as well as with the 7.5-year values

Results

Demographics: M: 24, F: 13. Mean age 76y, mean time from surgery to followup:17.5y. The remaining patients couldn't participate in the followup due to morbidity and mortality.

The preoperative CS was an average of 38.6 p. After 7.5 years, the CS was significantly improved to 79.6 (age- and gender-adjusted 102.7%). In the current study, we found a CS of 76.6 (106.2%).

7.5 years postoperatively, there was a rerupture rate in this subgroup of patients of 3%. This increased over time to rerupture rate of 5.5 % after 17.5 years. Remarkable, the whole group of 97 patients had a retear rate of 7,2% after 7.5 years.

Patients with retears had lower results in Constant score and in individual power measurements in relation to patients with retained continuity of the RC and to the opposite side

Conclusions

Our study shows very good results after rotator cuff reconstruction. The rate of recurrent defects has increased only for 2.5 % as age increased. The age- and gender adjusted Constant Score corresponds to an "excellent" result with 106%. The study confirms the view not be too restrictive in the indication of surgery in the elderly.



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475 Sonographic Assessment Of The Subscapularis Following Reverse Shoulder Arthroplasty: Impact Of Tendon Integrity On Shoulder Function

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Aim

To assess structural integrity of the subscapularis tendon after Reverse Total Shoulder Arthroplasty (RSA), and to evaluate the importance of tendon integrity for functional outcome after RSA

Background

RSA is an established procedure for patients with rotator cuff tear arthropathy. The most common surgical approach utilizes the deltopectoral interval requiring tenotomy of the subscapularis, or osteotomy of the lesser tuberosity. Controversy remains over the question whether the subscapularis should be repaired after RSA implantation

Methods

The study included all patients that had undergone RSA in the authors' unit between 2000 and 2016. Subscapularis integrity was assessed sonographically by a single examiner blinded to patient outcome. Function was assessed using the Disabilities of the Arm, Shoulder and Hand (DASH), Constant-Murley, and Oxford Shoulder scores. Internal rotation ability was recorded on a six-point scale. The Mann-Whitney U-test was used for comparison between groups. Data are reported as median and interquartile ranges unless stated otherwise. The level of significance for a two-sided test was defined as $\alpha=0.05$.

Results

Of 67 eligible patients, 9 were deceased, and 15 were unable to come for follow-up. 43 patients (49 shoulders) were included in the study, 27 (57%) were female. Average age was 78.2 years. Median follow-up was 19 months (range, 4-192 months). All shoulders were stable without incidents of instability. Sonography revealed an intact or mildly attenuated subscapularis tendon in 23 (47%) shoulders (intact SSC), while the tendon was deemed severely attenuated or absent in 26 (53%) shoulders (absent SSC). There was no significant difference in average DASH, Constant-Murley, or Oxford Shoulder scores between the two groups. Regarding internal rotation ability, intact SSC shoulders scored significantly higher (4 (2.75-5)) than shoulders with absent SSC (2 (1-3)) ($p=0.004$).

Conclusions

The results of this study suggest that subscapularis tendon integrity helps preserve internal rotation ability, but does not affect overall shoulder function



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339 Mechanoreceptors Distribution In The Human Medial Collateral Ligament Of The Elbow

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Aim

To describe the existence and distribution of the human elbow Medial Collateral Ligament (MCL) mechanoreceptors.

Background

Human elbow maintains the stability mainly by its bony structure. However, the stability is also enhanced by its ligamentous structures. For ligamento-muscular reflex which has protective reflex toward strain and stress, mechanoreceptors are embedded in the ligament to serve its purposes.

Methods

Eight medial collateral ligaments of elbows from fresh frozen cadavers were used. The MCLs were harvested deep to the periosteum from medial epicondyle to ulna. Each specimen was immediately placed in 4% paraformaldehyde. After fixation, the fan shaped ligaments were divided into six pieces regions of interest and stained with modified gold chloride stain. Specimens were cut with 30- μ m sections by sliding microtome later observed under inverted light microscope. Golgi, Ruffini and Pacinian corpuscle were found in every specimen. The number and the distribution of each mechanoreceptor in each regions of interest were recorded. Density of each mechanoreceptor was calculated and presented unit per volume (cm^3)

Results

Golgi, Ruffini, and Pacinian corpuscles were seen in the ligament with small nerve fibers. The density of Ruffini corpuscles was highest for 50% followed by Golgi and Pacinian corpuscle for 38% and 12%. Density of total corpuscles was higher in anterior bundle part (41.5 / cm^3) than in posterior part (34.6 / cm^3) and higher in bony attachment (46.2 / cm^3) than in midsubstance site (36.5 / cm^3). Golgi corpuscle has higher density at midsubstance part.

Conclusions

Elbow mechanoreceptors were distributed in the human MCL. The dominant corpuscle was slow-adapting Ruffini corpuscle. And there is tendency that the density of mechanoreceptors is higher in the bony attachment site and anterior band, which means these part should be respected and remnant preservation should be encouraged during MCL reconstruction.



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334 A Three Dimensional Computed Tomography Modeling For Kinematic Analysis Of Double Strands Lateral Ulnar Collateral Ligament Reconstruction

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Aim

To analyze the kinematics of double strands Lateral Ulnar Collateral Ligament (LUCL) reconstruction with 3 surgical techniques in dynamic mode.

Background

Biomechanical studies showed double strand LUCL reconstruction are superior to restore posterolateral rotatory instability (PLRI) of the elbow joint. Numerous configuration techniques had been described for isometric LUCL reconstruction. To date, studies only limited to single configuration and static analysis.

Methods

Five normal elbow joints were scanned with 0.5mm axial cuts CT scan. Images were imported and converted into patient specific 3-dimensional computer models with MIMICS. Three surgical techniques were applied as horizontal, vertical and triangle configuration. Humeral and both ulnar footprints were registered with freeform patch function in 3-matic software. Three dimensional points and rotational axis were imported into MATLAB software and each degree (1°) increments were simulated from full extension (0°) to full flexion (135°). Tunnel length of Humerus to Proximal Ulna (H-PU) and Distal Ulna (H-DU) were measured. The discrepancy of each tunnel length were measured.

Results

Fifteen double strands configurations were simulated at dynamic mode. The length of H-PU and H-DU for horizontal configuration are 30.95 ± 4.57 and 34.25 ± 5.01 mm. The length of H-PU and H-DU for vertical configuration are 32.54 ± 3.59 and 35.35 ± 4.16 mm. The length of H-PU and H-DU for triangle configuration are 31.96 ± 4.00 and 33.70 ± 3.11 mm. The minimum discrepancy in each graft limb throughout motion arc are 1.12, 0.01 and 1.03 mm for horizontal, vertical and triangle configuration respectively.

Conclusions

This study shows dynamic analysis of the elbow joint provide better understanding for double strand LUCL reconstruction. Vertical double strands configuration provide the minimum tunnel length discrepancy for nearly isometric reconstruction.



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399 The Wide Angled Arthroscope – An Innovation To Improve Arthroscopic Skills Performance.Erica Kholinne¹, Arnold Adikrishna², Maulik J Gandhi³, Hanpyo Hong², In-Ho Jeon²

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Aim

To assess the capability of wide angled arthroscope in improving arthroscopic skills performance

Background

A conventional arthroscope has a field of view of 1050. We have developed an arthroscope with a field of view of 1500. The advantages of such an arthroscope include less motion needed to maneuver within the joint (thereby reducing iatrogenic damage), less optical error (thereby improving accuracy of instrumentation such as anchor position and tunnel placement), and possibly improving the learning curve of novices. We compared performances during simulated shoulder arthroscopy tasks between the 1050 and 1500 angled arthroscopes. This was measured using motion analysis, time and a new validated measure, the Dimensionless Squared Jolt (DSJ). We have shown the DSJ is a superior assessment tool in differentiating experts from novices during simulated shoulder arthroscopy. We hypothesize that performance on the wide-angled arthroscope would be superior compared to the conventional arthroscope.

Methods

We compared 13 arthroscopic novices' surgical skills on the wide-angled versus conventional arthroscope. These novices completed 3 standardized tasks three times. Motion analysis was performed using an optical tracking system. Differences in arthroscopic performance parameter between the 2 arthroscopes was investigated using a T-test.

Results

There was a significant difference between the wide-angled and conventional arthroscope as measured by DSJ ($P=.0008$). The other parameters did not demonstrate a difference.

Conclusions

These results show the value of using DSJ in addition to motion analysis and task completion time as a method of objectively assessing arthroscopic performance. We have also shown its use in evaluating a new arthroscope, and conclude the wide-angled arthroscope has potential to improve arthroscopic performance.



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377 The Dimensionless Squared Jolt (DSJ) – A Novel Objective Parameter That Improves Assessment Of Hand Motion Analysis During Shoulder ArthroscopyErica Kholinne¹, Arnold Adikrishna², Maulik J Gandhi³, Hanpyo Hong², In-Ho Jeon²

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Aim

To test the ability of Dimensionless Squared Jolt (DSJ) as a parameter in performing arthroscopic shoulder surgery.

Background

Attempts to quantify surgeons' hand movements during arthroscopic surgery has made limited progress beyond motion analysis of hands and/or instruments. Surrogate markers such as time has also been used. This study tests the ability of a novel calculated parameter, dimensionless squared jolt (DSJ), in differentiating between expert and novice surgeons (construct validity) whilst performing simulated arthroscopic shoulder surgical tasks.

Methods

Twelve participants were enrolled and categorized into 2 groups (6 residents and 6 orthopedic consultants). Participants performed three validated shoulder arthroscopic tasks under the same experimental setup. Their hand movements were recorded with an optical tracking system. The DSJ, time taken, total path length, multiple measures of accelerations, and number of movements were recorded.

Results

There was no significant statistical difference between each group for time taken ($p=0.673$), average acceleration ($p=0.36$), maximal acceleration ($p=0.321$), number of movements (10m/s^2), number of movements (minimal acceleration) ($p=0.561$), number of movements (average acceleration) ($p=0.523$), total path length ($p=0.267$). There was a significant statistical difference between novices and orthopedic consultants for DSJ parameter ($p=0.023$).

Conclusions

DSJ is an objective parameter that has the ability to differentiate novice and expert surgeons' arthroscopic performance (construct validity). Thus, DSJ could be used as an adjunct to more conventional parameters of arthroscopic assessment when planning strategies to teach, learn, and practice arthroscopic skills in the future.



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350 Static Inferior Shoulder Subluxation: A Case Series

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Aim

The purpose of this study was the in-depth analysis of static inferior shoulder subluxation, a rare variant of shoulder instability. For a series of four patients who are incapacitated due to said disorder, possible treatment options were investigated.

Background

Shoulder instability is a condition well accessible to both conservative and surgical treatment options. Operatively, arthroscopic soft-tissue as well as open bone-block procedures are routinely employed, depending on the underlying pathomorphology. However, these methods seem to be insufficient for certain types of instabilities, such as mentioned above. In the absence of a reliable solution for this patient cohort, further inquiry must be done.

Methods

Four patients aged 20 to 37 are treated for static inferior shoulder subluxation. Clinical, imaging, and neurological/neurophysiological exams, have been performed repeatedly. All have undergone several surgeries. As all measures failed, outside opinions were sought. A group of experts in shoulder surgery were contacted via an online survey and asked to select 1 out of 7 treatment options (no surgery, arthroscopy, (revision) bone block, reversed total shoulder arthroplasty, glenohumeral joint fusion, other) for each patient, and to elaborate on the topic. 43 responses were gathered and analyzed.

Results

Neurological dysfunction was ruled out in all patients. One patient with additional advanced osteoarthritis will be recommended glenohumeral joint fusion (survey vote: 51.2%). In the other cases, the majority of survey respondents opted for conservative treatment, specifically, physical therapy for improvement of delta muscle function, complemented by pain management (survey votes: 30.2, 40.5, and 53.7%). However, some operative solutions, such as open capsular shift, were also proposed and will be considered.

Conclusions

Static inferior shoulder subluxation is a rare condition for which no reliable treatment method is known. In the scope of this study, four cases were presented to an expert panel via online survey. No clear consensus regarding treatment was achieved.



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637 Complete Ulnar Nerve Laceration During Elbow Arthroscopy**Camilo Chaves**, Thibault Lafosse, Jérôme Pierrart, Emmanuel Masmajeau

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Aim

To describe ulnar nerve risks during elbow arthroscopy and expose a case report of a complete ulnar laceration during this procedure. Furthermore, we discuss the diagnostic and treatments of ulnar nerve laceration after elbow arthroscopy.

Keywords: Elbow arthroscopy complications; ulnar nerve laceration, ulnar palsy; nerve graft, neurotization

Background

Elbow arthroscopy is a relatively new and high technically demanding procedure that is currently expanding its indications to complex conditions. Number of neurovascular complications have been reported during this procedure and can be explained by the small articular space and the close relation to the neurovascular surrounding tissues. However, complications are under-reported in the literature and few data describe complete ulnar nerve laceration after elbow arthroscopy.

Methods

In this case report, we expose a case of complete ulnar laceration during elbow arthroscopy on a 20-years old woman. Patient presented complete ulnar palsy postoperatively. Lesion was confirmed by electromyographic assessment and MRI revealed an ulnar nerve neuroma. Patient required neuroma resection and nerve autograft six months after the initial arthroscopy.

Results

Six years after surgery patient reached functional results allowing her to recover normal activities.

Conclusions

Our case exposes the high risk of ulnar lesion during elbow arthroscopy. This high technically demanding procedure requires a long learning curve and important experience to avoid neurovascular risks. In case of complete ulnar laceration; diagnostic requires electromyographic and morphological evaluation. Treatment of this lesion is based on autologous nerve graft or ulnar nerve neurotization. Patients should be informed of risks and possible sequelae of elbow arthroscopy while surgeons should have an important experience and anatomical knowledge of the region to ensure better outcome and avoid long-term morbidity.



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352 Does The Arthroscopic Latarjet Procedure Effectively Correct "off-Track" Hill-Sachs Lesions?

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Aim

To evaluate the ability of the Latarjet procedure to transform an "off-track" to an "on-track" lesion in a clinical population and to follow these lesions up radiologically to see if they remain "on-track" post-operatively despite the well documented natural glenoid remodelling processes.

Background

The glenoid track concept describes the dynamic interaction of bipolar bone loss in anterior glenohumeral instability.

In clinical practice the Latarjet procedure is commonly the preferred treatment in addressing "off-track" Hill-Sachs lesions.

Methods

Patients with "off-track" Hill-Sachs lesions treated with an arthroscopic Latarjet procedure between March 2013 and May 2014 were included. Glenoid track and coracoid graft contact surface area measurements using 3D-CT imaging were performed pre-operatively, and at 6 weeks, 6 months and at least 12 month (final) post-operative follow-up. Mean final follow-up was 23 months. The glenoid diameter, as percentage of the native glenoid, was also calculated from this imaging.

Results

26 patients met the inclusion criteria. Hill-Sachs lesions remained "on track" at all post-operative follow-up time-points. The glenoid diameter changed significantly from 84.6% pre-operatively to 122.8% at 6 weeks ($p < 0.001$) and from 120.5% at 6 months to 114% at final follow-up ($p = 0.005$). This was also reflected in significant remodelling seen in coracoid graft articular contact area over the same time points ($p = 0.024$, $p = 0.002$). This persisting glenoid arc overcorrection at final follow-up avoided an "off track" Hill-Sachs lesions in 9 out of 26 patients (35%), which would otherwise have occurred had the coracoid graft remodelled to native glenoid dimensions.

Conclusions

The Latarjet procedure provides an effective treatment for "off-track" engaging Hill-Sachs lesions, despite an evident glenoid remodelling process.

At a mean of 23 months post-operatively a mean persisting overcorrection of the glenoid arc of 14% beyond native dimensions remained, avoiding a renewed "off-track" lesion in 35% of patients which would otherwise have occurred with complete remodelling.



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363 Clinical Outcomes Of Arthroscopic Stabilization For Recurrent Anterior Shoulder Instability With Glenoid Bone Loss : Arthroscopic Bankart Repair Alone Versus The Augmentation With Bone Graft.

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Aim

This study aimed to clarify the consequence of arthroscopic Bankart repair with bone graft on the glenoid for recurrent anterior shoulder instability with glenoid bone loss.

Background

Glenoid bony defect has been found to contribute to recurrent instability after arthroscopic Bankart repair alone. With significant glenoid bone loss, better results have been reported after arthroscopic Bankart repair with glenoid arc reconstitution using bone graft. However, no reports compare augmentation using bone graft with non-augmentation for glenoid bone loss.

Methods

From 2005 to 2013, we treated 552 patients for anterior glenohumeral instability with arthroscopic Bankart repair by double anchor footprint fixation (DAFF). Of those patients, 69 met the inclusion criteria of glenoid bone loss over 20% and follow-up period of at least 2 years. Patients were divided into 2 groups based on whether with bone graft augmentation for glenoid bone loss (Group A; n=36, mean age; 25.4y) or not (Group B; n=33, mean age; 24.8y). For grafting, autologous iliac bone or artificial bone was used. Rowe score, recurrence rate, and sports activity were used to assess the results. Mann-Whitney U-test and Pearson's chi-square test were used for statistical analysis.

Results

At final follow-up, mean Rowe score was 98.5 and 84.4 for each, respectively ($p < .01$). In Group A, there was one dislocation (2.8% recurrence rate). In Group B, there were 16 dislocations/subluxations (48.5% recurrence rate) ($p < .01$). Of the patients with recurrence in Group B, 13 were contact/collision sports athletes.

Conclusions

Bone graft augmentation provided excellent outcomes with arthroscopic Bankart repair for recurrent anterior shoulder instability with glenoid bone loss. Moreover, according to previous reports, it was considered that arthroscopic Bankart repair by DAFF for patients with glenoid bone loss had somewhat more favorable clinical results than conventional single-row arthroscopic Bankart repair.



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358 Functional Outcomes Of Distal Triceps Tendon Repair Comparing Transosseous Bone Tunnels Versus Suture Anchor Constructs

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Aim

The purpose of this study is to compare the functional outcomes and the reoperation rates following distal triceps tendon repairs using transosseous tunnels and suture anchors.

Background

Distal triceps tendon ruptures are relatively rare. Very little data has investigated functional outcomes following repair. There is no consensus on fixation methods for this injury with both the use of suture anchors and/or transosseous tunnels described.

Methods

A multi-center, retrospective review of all primary triceps repairs done between 2010 and 2015 was performed. Patients were included if they had at least one year of follow-up. Pre-operative basic demographic data included age, gender, hand dominance, and operative side. Intra-operative data recorded included repair method and number of anchors used when applicable. Patients were contacted for functional assessment with the Mayo Elbow Performance Score. Post-operative complications were also queried.

Results

56 cases of primary triceps repair were identified in an all male cohort. Average age at time of surgery was 52.7. 58.9% of patients had transosseous repair and 41.1% had suture anchor repair. The average follow-up was 4.26 years. The MEPS outcomes was quite high, with all patients averaging a post-operative score of 94. There was no difference in MEPS outcomes based on construct type. Post-operative DASH scores showed excellent outcomes as well, with an overall average of 4.81. A statistically significant difference was found with the transosseous group averaging -2.98 points lower versus the suture anchor group. This difference was not found to be clinically relevant. Only 4 patients had re-rupture of the triceps requiring revision (2 transosseous group and 2 suture anchor group). Secondary analysis of a re-rupture patients found no difference in scores.

Conclusions

Primary repair of distal triceps tendon ruptures yields good, durable patient outcomes with minimal re-rupture regardless of repair construct. Patient functional outcomes for the entire group were excellent on average.



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360 Rotator Cuff Repair During Total Shoulder Arthroplasty: Does It Work?

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Aim

The goal of this study was to assess functional outcome, revision rates, and predictors of poor results in patients who underwent anatomic total shoulder arthroplasty (TSA) with concurrent rotator cuff repair (RCR) for treatment of glenohumeral arthritis.

Background

Success of an anatomic TSA requires a well-functioning rotator cuff. This study evaluated patients who underwent concomitant TSA and RCR for functional outcomes, revision rates, and predictors of poor results.

Methods

Retrospective chart review was conducted to identify patients who underwent TSA and RCR. Demographic data, rotator cuff tear and RCR characteristics, range of motion, and radiographic parameters were recorded. Minimum 2-year functional outcomes were obtained. Predictors of reoperation and/or poor clinical results (defined as reoperation, active forward elevation less than 90 degrees, or ASES and SANE less than 65) were determined.

Results

Forty-five patients met inclusion criteria (22 high-grade partial-thickness and 23 full-thickness tears). Fourteen patients (31%) were labeled as having a poor result with 8 of those (57%) requiring reoperation. Five (63%) reoperations were for cuff-related indications. There was a significant difference between the acromiohumeral interval (AHI) distance preoperatively and immediately postoperatively (9.0mm vs 12.4mm, $p=0.013$). However, at an average 83 weeks following surgery, the AHI distance (mean = 8.4mm + 4.8mm, $p=0.86$) was not significantly different from preoperative values. Patients with preoperative AHI of <8mm had a significantly increased rate of cuff-related reoperation ($p=0.003$).

Conclusions

While concomitant TSA and RCR is a reasonable consideration, 31% of patients had a poor clinical result. The improvement in AHI following surgery was not maintained. AHI of <8mm was a predictor of cuff-related reoperation and may be an indication to consider reverse arthroplasty in the setting of joint arthrosis with a rotator cuff tear.



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**675 Rotator Cuff Repair In The Setting Of Osteoarthritis:
Investigation Of Concurrent Rotator Cuff Repair And Microfracture**Matthew M Astolfi¹, Bradley Schoch², **John Gabriel Horneff¹**, Joseph A Abboud¹

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Aim

The goal of this investigation is to determine the pain relief and functional outcomes of patients undergoing simultaneous RCR and microfracture of focal glenohumeral osteoarthritis.

Background

As patients age, both arthritic changes as well as rotator cuff tears become more prevalent. These pathologic changes can occur concurrently in a subset of patients with shoulder pain. Both microfracture of osteoarthritic changes and rotator cuff repair (RCR) have been shown to provide patient benefit individually. However, the benefit of RCR in patients with concurrent osteoarthritic changes remains unclear. Rotator cuff repair has the theoretical potential to increase the compressive force across the glenohumeral joint, further exacerbating OA symptomology.

Methods

Retrospectively, thirty-four patients were identified as having undergone simultaneous RCR and microfracture using procedural CPT coding. Patient demographics, preoperative range of motion, functional outcomes (VAS, SANE, ASES, and SST) and operative metrics were obtained via chart review. Patients were contacted to participate at which time the post-operative functional outcomes were obtained (VAS, SANE, ASES and SST).

Results

Twenty-seven subjects completed follow up at a minimum of one year. The average age of subjects at time of surgery was 64.9 years (range, 56.6 – 78.8). Chronic tears were more common than acute tears (57.7% (n=26) vs 42.3% (n=26)). Functional outcomes were improved upon follow-up with a reduction in mean VAS (6.92 (n=26) vs. 2.00 (n=27)), improvement in SANE (33.82 (n=23) vs. 79.81 (n=27)), ASES (37.98 (n=14) vs. 80.92 (n=27)), and SST (25.55 (n=15) vs. 80.77 (n=26)). Glenohumeral elevation was shown to increase post surgically (116.25 (n=24) vs. 148.33 (n=4)).

Conclusions

Patients who undergo simultaneous RCR with microfracture reported favorable improvements in both pain and function. We demonstrate minimal postoperative pain at a minimum of one year follow-up in a small cohort of patients. Focal glenohumeral osteoarthritis should not be considered a contraindication to rotator cuff repair.



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366 Humeral Bone Resorption After Anatomical Shoulder Arthroplasty Using Uncemented Stem

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Aim

The aim of this study was to investigate the prevalence of humeral bone resorption after different shoulder arthroplasty procedures.

Background

Bone resorption around the femoral stem after total hip arthroplasty is a well-known phenomenon. However, only few studies have evaluated bone resorption after shoulder arthroplasty.

Methods

The study included 147 shoulders that underwent total shoulder arthroplasty (TSA) or humeral head arthroplasty (HHR) with uncemented humeral stem from November 2008 to May 2015 and were followed-up for more than 1 year. The prevalence of humeral bone resorption and risk factors were investigated.

Results

The most advanced grade of bone resorption, Grade 0 occurred in 21 shoulders (14.3 %). Grade 1 bone resorption occurred in 10 (6.8 %), Grade 2 in 28 (19.0 %), Grade 3 in 61 (41.5 %), and Grade 4 in 27 (18.4 %). High occurrence of bone absorption was observed in Zone 1, 2, and 7. Grade 4 bone resorption did not occur in Zone 3 and 5. HHR, on-growth type stem coating, and occupation ratio were significant independent risk factors for \geq Grade 3 bone resorption, while female sex and HHR were significant independent risk factors for Grade 4.

Conclusions

Bone resorption was observed in 126 shoulders (85.7%), and full-thickness cortical bone resorption occurred in 27 shoulders (18.4%). Bone resorption was frequently observed at the greater tuberosity, lateral diaphysis, and calcar region (Zone 1, 2, 7). Significant risk factors included female sex, HHR with rotator cuff reconstruction, on-growth type stem coating, and high occupation ratio of the implant.



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409 The Boot-Lace Margin Convergence Technique For Large-Massive Cuff Tears: Early Outcomes

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Aim

This study describes how the boot-lace technique is more effective to achieve margin convergence in repairing large-massive cuff tears and to investigate the early clinical outcomes

Background

Large-massive cuff tears have poorer outcomes with high re-tear rates. Margin convergence is one of the techniques used in U-shaped tears and is used to narrow the antero-posterior gap in large cuff tears to make it easier to mobilise the tendon laterally to repair it.

Methods

Instead of a single suture for convergence, this technique passes the single suture repeatedly much like the laces of a boot. This makes the convergence stronger, reduces the retraction and makes the repair easier. 96 consecutive patients who had large (3-5cm) to massive (>5cm) cuff tears were recruited. Preoperative and one year postoperative range of motion in the affected shoulder, isometric strength, pain scores and function scores were then compared.

Results

Patients demonstrated significant improvement in range of motion, strength, pain scores and function scores. There was a mean increase in flexion by 30.91° ($p = 0.00$) and abduction by 29.7° ($p = 0.00$). Isometric power of the affected shoulder demonstrated a mean increase by 2.65 pounds ($p = 0.00$). Pain score as measured by visual analogue scale for pain (VAS) decreased by 3.8 units ($p = 0.00$). Constant scores increased by 46.0 ($p = 0.00$). 87.3 percent of patients felt that their expectations for surgery were met and 93.8 percent of patients were satisfied with their postoperative outcomes. This is demonstrated in table 2 alongside other analyzed variables.

Conclusions

Improvement in all aspects was demonstrated in patients with large to massive rotator cuff tear. The boot-lace technique can be recommended as an effective surgical intervention in carefully selected patients.



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718 Non-Operative Treatment Vs. ORIF In Large Anterior Glenoid Rim Fractures - Results Of A Retrospective Comparison Study.

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Aim

The aim of this study was to analyse the results of non-operative and operative (ORIF) therapy within a large patient group.

Background

At what size anterior glenoid rim fractures (Ideberg Ib/ Scheibel Ib and Ic) should be treated non-operatively or by surgery is unclear and no comparative studies are available.

Methods

All patients with a large anterior glenoid rim fracture [GRF] (≥ 5 mm width) were identified retrospectively and $n=52$ ($n=29$ non-operative, average age: 65y; $n=23$ ORIF, 59y) were followed-up using the Constant score (CS), Rowe score (RS) and WOSI-score. Surgery was performed using screws or anchors via subscapularis-tenotomy. Radiographs were analysed regarding morphology and osteoarthritis. For glenoid surface quantification the circle method by Sugaya modified by Wambacher was used in initial trauma CT.

Results

Shoulder dislocation was the predominant cause of trauma. On average, the fractures involved 21% of glenoid surface (non-operative:23%; operative:20%) with an average displacement of 4.5 mm (non-operative:4mm; operative 5mm). Scores: Non-operative group: \bar{x} CS:79 points, WOSI:78%, RS:92 points after a follow-up of \bar{x} 5.2 years. Operative group: \bar{x} CS:73p, WOSI:68%, RS:85p after \bar{x} 5 years. There was a recurrence rate of 11% within the primarily non-operative treated patient group, but without correlation with the fracture size/displacement. Patients with a recurrence showed mainly a straight fracture line and a Hill-Sachs-lesion. Within non-operative treated group, mid- and longterm osteoarthritis was found in cases of fragment size of $>25\%$ glenoid surface and simultaneous displacement. Within operative patient group the external rotation was decreased ($\bar{x}38^\circ$) in contrast to the contralateral site ($\bar{x}61^\circ$).

Conclusions

Non-operative treatment of large GRF usually leads to good or excellent results up to 20-25% fragment size. The operative treatment shows better results in larger fragment size and significant displacement compared to non-operative treatment, but the operative group showed a decreased external rotation presumably because of compromising the subscapularis tendon.



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524 Postoperative And Repeated PRP Injections Do Not Protect Supraspinatus Repairs From Retear In The Mid Term: A Randomised Controlled Trial

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Aim

To investigate whether the mid-term (3-4 years) radiological and clinical outcomes of arthroscopic supraspinatus repairs are enhanced following repeated postoperative application of platelet-rich plasma.

Background

PRP has been applied as an adjunct to rotator cuff repair to improve initial tendon-bone healing. PRP application may potentially also reduce the incidence of late re-tear, and improve longer term clinical outcomes.

Methods

Sixty patients (30 controls; 30 PRP) were initially randomized to receive two ultrasound-guided injections of PRP to the tendon repair site at 7 and 14 days after arthroscopic double row supraspinatus repair. A total of 55 patients (91.6%) underwent clinical review and Magnetic Resonance Imaging (MRI) at a mean of 3.5 years post-surgery (range 36-51 months). Clinical scores including the Constant Score, QuickDASH, Oxford Shoulder Score and Visual Analogue Pain Scale were evaluated. Structural integrity of the surgical repair was assessed by 3 Tesla MRI using the Sugaya grading system.

Results

Despite significant clinical improvement in all patients at 3-4 years post-surgery, there was no evidence for a difference between treatment groups. Sub-group analysis of the Constant score showed no difference between groups for the subjective and range of motion subscales. However a significantly higher Constant strength subscale score was observed in the PRP group (3.3 points, 95% CI: 1.0-5.7, $p = 0.006$). There was no evidence for any group differences in MRI scores or re-tear rates, with 88.9% of PRP patients and 82.1% of control patients allocated Sugaya Grade 1 or 2.

Conclusions

Successful clinical outcomes persist in patients at 3-4 years after supraspinatus repair. However, repeated application of PRP delivered at 7 and 14 days post-surgery provided no additional benefit to tendon integrity. Abduction strength was greater in the mid-term after PRP treatment suggesting it may hold potential for improving functional outcomes.



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408 Analysis Of Tendon-To-Bone Healing After Rotator Cuff Repair In Osteoporotic Rat Model

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Aim

To evaluate the tendon-to-bone healing after rotator cuff repair biomechanically and histologically using an osteoporotic rat model

Background

The repaired tendon-to-bone interface after rotator cuff (RC) repair is identified as a mechanical weak point, which may contribute to re-tear after surgery. Mineralized bone activity at the repaired site would affect the healing process of the repaired tendon, although its influence remains unknown. Therefore, we biomechanically / histologically evaluated the tendon-to-bone healing after RC repair using an osteoporotic rat model.

Methods

Sprague-Dawley rats underwent detachment and immediate repair of the both supraspinatus tendon at 17 weeks after ovariectomy (OVX group, N=6). The age-matched rats were used as a control (control group, N=6). The animals were sacrificed at 2, 4, and 8 weeks after surgery. At each time point, bone mineral density (BMD) and new bone formation (BV) at the repaired site were assessed with micro-computed tomography (μ -CT). Biomechanical and histological analyses were assessed using tensile testing machine, HE, Safranin O, and picrosirius red staining at each time point.

Results

<Biomechanical testing>

At initial phase after RC repair, mechanical properties (Ultimate load to failure, Stiffness, Cross Sectional Area, Ultimate Stress, and Young's modulus) were not significantly different between the two groups.

<Histology>

At two weeks after surgery, fibro-vascular tissue intervened between the repaired tendon and bone. Interface between the fibro-vascular tissue and bone was still immature in both groups; thereafter, the interface was organized by 8 weeks after surgery. A large amount of chondroid tissue was seen in the control group at 4 weeks, but apparent difference was not observed at 8 weeks after surgery.

Conclusions

These data indicate that decreased mineralized bone activity did not influence on biomechanical properties of the tendon-to-bone healing after RC repair, but the healing modality of the repaired site was histologically different.



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442 The Hornsblower's And Dropping Signs To Evaluate The State Of Teres Minor In Patients With Postero-Superior Rotator Cuff Tears

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Aim

This study aimed to investigate the usefulness of hornsblower's and dropping signs to evaluate the state of teres minor (TM) in patients with postero-superior rotator cuff tears (PS-RCTs) and atrophic infraspinatus (ISP).

Background

The state of TM has been reported to be one of the important preoperative prognostic factors for functional outcomes after latissimus tendon transfer and reverse shoulder arthroplasty. Few reports showed the evaluations for external rotator of the shoulder; Walch et al. reported the hornsblower's and dropping signs in evaluation for external rotator in patients with RCTs (JBJS 1998). The TM muscle appeared hypertrophic in patients with RCTs involving the ISP and the progression of ISP muscle atrophy seemed to induce the development of this compensatory hypertrophy (Kikukawa et al., JSES 2014). In patients with PS-RCTs and atrophic ISP, shoulders with compensatory hypertrophy of the TM had greater strength and range of external rotation than those with normal or atrophic TM (Kikukawa et al., JSES 2016).

Methods

According to the criteria of MRI evaluation by Kikukawa et al. (JSES 2014), this study included 36 patients with PS-RCTs and atrophic ISP. They were classified into 3 groups; TM muscle was hypertrophic (n=18), normal (n=10), and atrophic (n=8). Hornsblower's and dropping signs were performed.

Results

In hypertrophic TM group, one had positive hornsblower's sign and none had positive dropping sign. In normal TM group, 4 had positive hornsblower's sign and 5 had positive dropping sign. In atrophic TM group, all had positive hornsblower's and dropping signs. In hypertrophic and atrophic TM groups, sensitivity of hornsblower's sign was 100%, specificity was 94.4%, and accuracy was 88.9%; sensitivity of dropping sign was 100%, specificity was 100%, and accuracy was 100%.

Conclusions

Hornsblower's and dropping signs were useful to evaluate the state of TM in patients with PS-RCTs and atrophic ISP.



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447 Clinical Outcome Of Arthroscopic Modified Bosworth's Technique For Refractory Lateral Epicondylitis

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Aim

We present the clinical outcome of arthroscopic modified Bosworth's technique which can address various possible source of pain in lateral epicondylitis.

Background

Lateral epicondylitis is caused by degenerative tear of common extensor origion, especially extensor carpi radialis brevis(ECRB), and surgical focus is mainly on the ECRB. However, annular ligament and synovial plica have also been noted as source of pain in refractory lateral epicondylitis, and may warrant attention during operation.

Methods

From 2011 to 2015, 30 patients underwent arthroscopic modified Bosworth's procedure for refractory lateral epicondylitis. Any loose or hypertrophic annular ligament was released, and any synovial plica was resected. ECRB was released from its humeral origin. Disabilities of the arm, shoulder and hand(DASH) score and Visual analog scale(VAS) pain score were documented before the surgery and at regular follow-up. Patients were asked to assess satisfaction with the surgery as either much better, better, the same, or worse at the latest follow-up. Postoperative complications and time to return to work were investigated. The mean follow-up period was 25 months (range: 12-36). We used paired t-test for statistical analysis.

Results

The mean age of patients was 52.1 years (range : 22-67). There were 19 women and 11 men. All patients showed significant improvement in VAS score and DASH score, improving from 5.7 to 1.4, and from 57.5 to 12.7 respectively($p < 0.05$). Twenty seven (90%) patients were satisfied with the surgery (16 very satisfied, 11 satisfied). Four patients had painful snapping elbows because of hypertrophic synovial plica in two and lax annular ligament in two which all resolved after surgery. There was no postoperative complication. The average period of return to work was 6 weeks.

Conclusions

The arthroscopic modified Bosworth's technique which address annular ligament and synovial plica as well as ECRB showed excellent outcome without complication.



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**677 Graft Tears After Arthroscopic Superior Capsule Reconstruction (ASCR):
Tear Rates, Mechanism And Clinical Outcome**Sungjoon Lim¹, Hassan Alramadhan², Han-Pyo Hong¹, Jae-Myeong Chun¹, In-Ho Jeon¹

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Aim

To find out the graft tear rate, mechanism of tear and clinical outcome after ASCR.

Background

Massive rotator cuff tears are often irreparable, leaving limited treatment options with unsatisfactory outcome. Arthroscopic superior capsule reconstruction (ASCR) using fascia lata autograft is a new surgical technique that is reported to show favorable outcome in irreparable cuff tear. However, little is known about graft tear after ASCR and its impact on clinical outcome.

Methods

From June 2013 to June 2016, 30 consecutive patients underwent ASCR. Indication for ASCR was massive cuff tear that was irreparable in arthroscopic examination. After harvesting ipsilateral fascia lata, suture anchors were used to attach the graft to the glenoid and double-row suture bridge was used to cover the lateral footprint. Postoperative MRI was used to evaluate the integrity of graft. Graft tear was categorized as mid-substance, medial row, and lateral row according to the location of tear. VAS score, ASES score, and Constant score were documented before the operation, and at the latest follow-up (mean 6 months). Paired t-test and independent t-test was used for statistical analysis.

Results

Five patients were lost to clinical follow-up. Twenty-five patients were enrolled for analysis. Average age of patient was 65.4 years. Eight patients (32%) showed graft tear on follow-up MRI: Five at medial row, two at mid-substance, and one at lateral row. After surgery, there was significant improvement in VAS, Constant, ASES score: 5.9 to 2.5, 49.3 to 71.4, 50.1 to 61.76, respectively ($p < 0.05$). Although the intact group showed better outcome than graft tear group (VAS 2.1 vs 2.6, Constant 62.8 vs 57.7, ASES 76.1 vs 69.29), it was not statistically significant.

Conclusions

Early graft tear rate by MRI study after ASCR was 32%, and tear occurred mostly at the medial row. Graft tear group showed comparable clinical improvement to intact group.



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423 Novel Outcome Predictors For Reverse Shoulder Arthroplasty

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Aim

To correlate novel radiological measurements with outcome scores in reverse shoulder arthroplasty.

Background

Critical shoulder angle (CSA) is the epitome of predicting outcomes for cuff arthropathies. The principles behind the reverse shoulder arthroplasty is to medialize and inferiorise the center of rotation. Therefore by increasing the distance from the center of the humeral head to the edge of the acromion, the anterior and middle fibres of the deltoid works as an abductor.

Methods

20 consecutive reverse shoulder arthroplasties with a minimal follow-up of 24 months were assessed with Constant scores, UCLA scores and oxford scores pre-operatively and post-operatively at 6, 12 and 24 months. Radiological distances were measured digitally in the antero-posterior plane of the roentgenograms of the shoulder in the following manner.

A right angled triangle was drawn with its hypotenuse (z) running from the center of the humeral head to the tip of the acromion with the apex pointing inferiorly. The bases were named as vertical (y) and horizontal as (x). The center edge angle (CEA) was measured as the angle between a vertical line drawn from the center of the humeral head and the hypotenuse. X,y,z and CEA measurements were correlated with post-operative clinical outcomes scores.

Results

There was an equal number of males and females ageing 68.7 years average (55 – 83). All the clinical scores improved with a statistical significance of $p < 0.0001$. Constant scores from 21.1 to 56.5, UCLA scores from 11 to 26.4 and Oxford scores from 39.3 to 20.6. The correlation between the significant measurements and clinical outcomes are as follows. X: Oxford scores ($r=0.562$), y: Constant scores ($r=0.475$), z: Constant scores ($r=0.444$), CEA: Constant scores ($r=0.455$) and CEA: Oxford scores ($r=0.481$).

Conclusions

X,y,z as well as the CEA measurements could be used with great effect to predict the clinical outcomes of reverse shoulder arthroplasty.



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417 Bridging Suture Makes Consistent And Secure Fixation In Double-Row Rotator Cuff Repair

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Aim

To compare the tension distribution along the repaired rotator cuff tendon among three double-row repair techniques.

Background

Inconsistent tension distribution, a risk factor for repair failure, decreases the biomechanical properties of the rotator cuff tendon after double-row repair.

Methods

In each of 42 fresh-frozen porcine shoulders, a simulated supraspinatus tendon tear was repaired by using 1 of 3 double-row techniques: (1) conventional double-row repair (no bridging suture); (2) transosseous-equivalent repair (bridging suture alone); and (3) compression double-row repair (which combined conventional double-row and bridging sutures). Each specimen underwent cyclic testing at a simulated shoulder abduction angle of 0° or 40° on a material-testing machine. Gap formation and tendon strain were measured during the 1st and 30th cycles. To evaluate tension distribution, difference in gap and tendon strain between the superior and inferior fixations were compared among three double-row techniques.

Results

At 0° abduction, gap formation after either transosseous-equivalent or compression double-row repair was significantly less than that after conventional double-row repair ($P < .01$). During the 30th cycle, both transosseous-equivalent repair ($P = .02$) and compression double-row repair ($P = .01$) at 0° abduction had significantly less difference in gap formation between the superior and inferior fixations than did conventional double-row repair. The difference in longitudinal strain between the superior and inferior fixations at 0° abduction was significantly less with compression double-row repair ($2.7\% \pm 2.4\%$) than with conventional double-row repair ($8.6\% \pm 5.5\%$, $P = .03$).

Conclusions

The double-row rotator cuff repair techniques that included bridging sutures (that is, transosseous-equivalent and compression techniques) had smaller differences in gap formation between the superior and inferior fixation sites and less tendon strain than did conventional double-row repair. These results suggest that bridging sutures promote balanced fixation in double-row rotator cuff repairs and may be beneficial for distributing stress evenly.



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419 Treatment Results Of Osteochondral Autograft Transfer For The Osteochondritis Dissecance Of The Capitellum ; Are There Any Differences Between The Location Of The Lesion?

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Aim

This reports evaluated the pre-and post-operative clinical results of the OCD treated by osteochondral autograft transfer(OAT). We supposed the relationship between the location and the clinical score.

Background

Osteochondritis dissecance of the capitellum(OCD) is thought as the overhead sport specific injury, and Lateral type of OCD tend to be a large and severe lesion compared to Central type. But there are few reports whether the location of the OCD lesion affects the clinical results or not.

Methods

Materials are OCD patients treated by OAT in our hospitals, 31 elbows of 31 patients; 29 boys and 2 girls. The average age at the operation was 13.9 y.o. Clinical score was evaluated by Timmerman and Andrews score at the before and 6, and 12 months postoperatively.

Results

The location type was 22 Central type and 9 Lateral type. During the first postoperative year, two elbows needed re-operation(Lateral type). The rest 29 elbows returned to sports. The average lesion size of the Central type and lateral type were analyzed as significant differences. Functional score of 29 elbows were 146 points preoperatively, 182 points at 6 months and 195 points at 12 months postoperatively. The score of Central type was significantly higher than that of Lateral type before the operation, but the differences were not significant at 6 and 12 months postoperatively. The subjective / objective ratio was significantly higher in Lateral type than Central type before the operation. This ratio was graded as Excellent by the protocol, although the overall score was graded as Poor. This score system may not be suitable for evaluating OCD lesion in this point.

Conclusions

Functional score of OCD before the operation showed significantly lower in Lateral type than Central type, but the treatment results of OAT improved despite of the location of lesion.



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724 Measuring The Inclination Of The Inferior Portion Of The Glenoid In Reverse Shoulder Arthroplasty: The RSA Angle ("Reverse Shoulder Arthroplasty Angle")

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Aim

To develop an accurate and reproducible measure of the inferior portion of the glenoid on both X-Rays and CT-scans.

Background

Preoperative measurement of glenoid inclination in RSA planning often underestimates superior orientation.

Methods

45 AP radiographs and CT-scans of shoulders with CTA (age 74y, 48-91) included. "RSA angle" (Reverse Shoulder Angle) was designed to measure the glenoid inferior portion inclination. "TSA angle" (Total Shoulder Angle) measured the global glenoid inclination. Landmarks: R = intersection of the line of the supraspinatus fossa and the line of the glenoid surface, S = inferior glenoid border, T = superior glenoid border, A = vertex of the right triangle (line of the supraspinatus fossa and its perpendicular passing through S). Three observers measured those angles in 2D, on X-Rays and CT-scans of entire scapulae. Measurements were also done in 3D using an automated software (GlenosysTM, Imascap).

Results

RSA and TSA angles measured on plain radiographs were 25±8° and 15±6° respectively. RSA and TSA measured on reformatted CT-scans were 20±6° and 10±5°. RSA and TSA angles measured by 3D software were 20±5° and 11±6°. Interclass correlation coefficient was 0.59 and 0.62 for TSA and RSA on X-Rays and 0.66 and 0.70 for CT-scans. There were no significant differences between radiographic, 2D reformatted and 3D RSA measurements. TSA angle underestimated the inclination by 10±5° compared to RSA angle (p<<0.0001). In Favard-E1 glenoids, difference was 12±4° and the most important. RSA for E1 was significantly different from that of E0, E2 and E3 respectively.

Conclusions

Global glenoid inclination overestimates inclination for RSA implantation. The RSA angle provides a reliable and reproducible measurement of inclination of the inferior portion of the native glenoid. This angle measures the "true" amount of inclination needed to correct and avoid superior tilt of the baseplate



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773 Mid-Term Outcomes Of Modified Single-Incision Latissimus Dorsi Transfer Combined With Bony Increased-Offset Reversed Shoulder Arthroplasty

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Aim

To report the midterm outcomes of a modified single-incision latissimus dorsi transfer (LDT) combined with a bony increased-offset reversed shoulder arthroplasty (BIO-RSA).

Background

The combined loss of active elevation and external rotation (CLEER) is a rare but devastating situation for patients, which severely affects their ability to carry out ADLs.

Methods

Prospective cohort study of 39 consecutive patients (mean age, 72y), operated through a single deltopectoral approach; 17 patients have had previous surgery (10 failed cuff repairs, 3 biceps tenodesis, 2 stabilisations, 2 osteosynthesis). All had positive ER lag, drop and hornblower's signs, as well as radiological signs of cuff-tear arthropathy (Hamada 3, 4 or 5). The LD tendon was harvested, tubularized and fixed in a humeral socket with a cortical button. All patients underwent clinical, radiographic and CT assessment. The mean follow up was 21 months (range, 12 to 39 months).

Results

Three patients had traumatic dislocation, of which two (5%) required revision surgery. The postoperative gain in ROM was +71° for active forward elevation (from 82° to 153°) and +25° for active ER (from -12° to 23°), while the mean IR remained unchanged (between T12-L3). The mean Adjusted Constant, SSV and ADLER scores increased significantly from 42% to 94%, from 33% to 79%, and from 10 to 25, respectively ($p < 0.001$). No aseptic loosening was observed, and all glenoid autografts healed. At the current follow up, no notching more than grade 1 was observed, and 92% of the patients were satisfied with the procedure.

Conclusions

LDT combined with BIO-RSA is a reliable procedure with high patient satisfaction and low failure rates; it allows restoring AFE and ER, while maintaining IR. The combined procedure has a low morbidity since both glenoid bone graft and tendon transfer are performed through a single deltopectoral approach, without detaching the pectoralis major.



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756 Displaced Humeral Surgical-Neck Fractures: Surgical Classification And Results Of Percutaneous Intramedullary Nailing Using A Third-Generation Nail

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Aim

(1) to provide a surgical classification of displaced 2-part surgical-neck fractures, (2) to report the results of minimally invasive percutaneous locked intramedullary nailing (MIPLIN) using third-generation (straight, locking) humeral nail.

Background

High rate of complications and unplanned reoperations have been observed with first- (unlocking) and second-generation (bended design) IM humeral nails.

Methods

41 consecutive patients (mean age 56 years (17-80)) with a displaced surgical-neck fracture were evaluated with pre-operative radiographs and 3D-CT-scans. Patients were treated with MIPLIN using a third generation nail with immediate fracture-site impaction. Patients were prospectively evaluated with serial radiographs, Constant-Murley and Subjective Shoulder Value (SSV) scores. The mean follow up was 26 months (12-53).

Results

The fractures were classified into 3 groups according to displacement: complete medial shaft translation without humeral head angulation (Translation=19 cases), incomplete medial shaft translation with valgus head angulation (Valgus=7 cases), and lateral shaft translation with varus angulation (Varus=14 cases). After MIPLIN, all of the fractures healed primarily. No patient had screw back-out or intra-articular screw penetration. Incomplete reduction was observed in 2 patients. One asymptomatic partial humeral head necrosis was observed. The mean Constant Score and SSV were 71 (43-89) and 82% (60-100), respectively. The mean active elevation was 145° (90-180), and external rotation 45°(20-90). Constant score was significantly better in patients under 60 years (77 versus 62, $p<0.001$). Two patients required further surgery: one to remove a prominent nail and one to release adhesions.

Conclusions

(1) Three types of displaced surgical-neck fractures can be identified: shaft translation, valgus tilt, and varus tilt; (2) Percutaneous insertion of third-generation (straight, locking) IM humeral nail combined with intraoperative fracture impaction provides high rates of fracture healing, excellent clinical outcome scores, and low rates of complications; (3) Patients younger than 60 years old had significant better functional outcomes.



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592 The Muscle Advancement Procedure For Irreparable Rotator Cuff Tears**-Evaluation Of Lateral Advancement Distance And Clinical Score-**

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Aim

The aim of this study was to investigate the lateral advancement distance of the rotator cuff and clinical score following the muscle advancement procedure for irreparable rotator cuff tears.

Background

Muscle advancement procedure is the surgical technique for large and massive retracted rotator cuff. In this procedure, the supraspinatus and infraspinatus muscle are disinserted from the scapula and advanced laterally by keeping fascial continuity with rhomboid muscle. Several satisfactory clinical results have been reported, but the actual advancement distance after this procedure is unclear.

Methods

Thirty-four shoulders in 33 patients (21 males, 12 females, mean age of 64.8 year, mean follow-up period of 32.5 months) underwent preoperative MRI and the muscle advancement procedure. Cuff integrity was assessed by postoperative MRI and 26 shoulders without recurrent tear were enrolled in the study of lateral advancement distance.

On MRI, the distance from the greater tuberosity (superior and middle facet) to the lateral edge of the rotator cuff were measured (preoperative distance, A; postoperative distance, B). The advancement distance of the rotator cuff was obtained by subtracting B from A.

Constant scores were assessed at final follow up period in 34 shoulders.

Paired-t test was used for statistical analysis.

Results

Constant scores improved from 33.6±15.5 points to 66.8 ± 12.1 points after the surgery ($P < 0.001$). The mean advancement distance was 34.9 mm (range, 23.2–47.7 mm) at the superior facet and 43.8 mm (range, 31.3–57.9 mm) at the middle facet.

Conclusions

Muscle advancement procedure is a useful surgical technique for irreparable rotator cuff tears to improve clinical outcome. The mean muscle advancement distance was from 3 to 4 centimeters



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457 The Clinical Outcomes Of Arthroscopic Rotator Cuff Repair For The Elderly Patients.**Atsushi Okubo**, Satoshi Iwashita, Norishige Iizawa, Minoru Yoneda, Shinro Takai

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Aim

The purpose of this study was to analyze characteristics of rotator cuff tears (RCTs) and clinical outcomes of Arthroscopic rotator cuff repair (ARCR) in elderly patients.

Background

The population of elderly people is growing. The incidence of RCTs increases in elderly, with a tendency to occur as part of the degenerative process of aging. In addition, RCTs with associated lesions have been related to advanced age. However, the opinion with clinical outcome in ARCR of the elderly patients is still controversial.

Methods

The subjects of 241 patients treated by ARCR were divided into two groups. 30 patients were elderly group of over 75 years old, which mean age was 76.9 years old. 211 patients were younger group of younger than 75 years old, which mean age was 64.2 years old. The clinical outcomes were evaluated on the basis of the UCLA shoulder score, and the structural outcomes were assessed using postoperative MRI or ultrasound. The average follow-up period was 8.6 months. All data were evaluated statistically by Mann-Whitney U test or chi-square test (≤ 0.05).

Results

Associated lesions were observed in the elderly group more frequently than in the younger group. The average UCLA scores improved from 15.2 points preoperatively to 29.1 points postoperatively in the elderly group, and from 16.1 points to 29.8 points in the younger group. There was not significantly difference between two groups in postoperative UCLA scores at the final follow-up. There was not significantly difference about UCLA scores and range of motion between patients with and without associated lesions.

Conclusions

This study suggests that clinical outcomes of the elderly patients can significantly improve by ARCR. Elderly patients have various lesions associated with RCTs. ARCR with appropriate treatment for associated lesions can provide satisfactory outcomes even in elderly patients with RCTs.



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471 Gastroesophageal Disorders May Increase Risk Of Developing For Post-Operative Shoulder Stiffness.

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Aim

The aim of this study was to document the incidence of post-operative shoulder stiffness and evaluate the role of certain or supposed risk factors in the development of this pathology.

Background

Post-operative shoulder stiffness is a complication of arthroscopic rotator cuff repair, which incidence has been reported variably in literature. Numerous risk factors have been described but gastroesophageal disease haven't yet been mentioned among them.

Methods

Seventy-five consecutive patients aged between 18 and 75 years old with symptomatic degenerative posterosuperior rotator cuff tears that had failed conservative therapy and underwent arthroscopic rotator cuff repair were included. The incidence of post-operative shoulder stiffness was documented with prospective investigation and the presence of 20 potential risk factors was documented retrospectively.

Results

The incidence of post-operative shoulder stiffness in the included patients was 10.4 %. All patients were women, and sex was significantly associated to the development of the pathology ($p = 0.0067$). The presence of gastroesophageal diseases was found to be significantly associated with development of post-operative shoulder stiffness ($p = 0.0046$).

Conclusions

A significant association between the occurrence of post-operative shoulder stiffness and the presence of gastroesophageal diseases was identified. This finding, not yet reported in literature, deserves investigations with further studies. The incidence of post-operative shoulder stiffness encountered in this study falls among previously reported ranges, with females being significantly more affected than men.



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813 Long Term Outcomes Of Arthroscopic Rotator Cuff Repair: Functional And Radiological Results At 10-Years Follow-Up

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Aim

The aim of this study was to evaluate survivorship and functional results of arthroscopic rotator cuff (RC) repairs at a minimum follow-up of ten years. Secondary goals were to compare outcomes in patients with and without re-tears and to relate the lesions' characteristics with clinical, functional and radiological results.

Background

Arthroscopic repair is considered the gold standard treatment for RC tears, but the number of studies describing results at long-term follow-up is minimal and no study exists with a minimum follow-up of ten years.

Methods

Thirty-four patients were prospectively re-evaluated at least ten years after arthroscopic RC repair with shoulder ultrasound, standard radiographs and clinical examination including range of motion (ROM), Constant Murley Score (CMS), strength in forward flexion and abduction. The acromion-humeral distance (AHD) was measured to evaluate progression of glenohumeral arthritis. Two groups of patients were created and compared depending on the echographic integrity of the supraspinatus tendon. Operative reports with Snyder classification were available for all patients.

Results

In 38% of the patients a re-tear of the supraspinatus was diagnosed echographically. Significant differences between patients with and without re-tears were detected in strength (forward flexion: $p=0.0022$; abduction: $p=0.0067$) but not in total CMS and AHD. Patients with smaller (C1-C2) lesions developed significantly greater strength (forward flexion: $p=0.0025$; abduction: $p=0.0452$), wider ROM (forward flexion: $p=0.0301$; abduction: $p=0.0456$) and showed higher AHD ($p=0.0424$).

Conclusions

These long-term results of arthroscopic RC repair appear satisfactory, with more than 60% of the evaluated shoulders showing intact supraspinatus after ten years and without significant total CMS differences between patients with intact and re-torn RC. Strength appeared significantly dependent on supraspinatus integrity. Independently from RC integrity, patients with smaller lesions have superior strength, ROM and AHD than those with larger ones.



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459 Age- And Gender-Adapted Norm Values Of The Oxford Shoulder Score

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Aim

The aim of the present study therefore was to investigate the feasibility and establish age- and gender adapted norm values for a subjective shoulder outcome scale, the Oxford Shoulder Score (OSS).

Background

Average shoulder function, as measured by the Constant score, has been shown to decline with age and to differ between genders. Hence age- and gender-adapted norm values have been proposed for this score. A majority of age- and gender differences have been shown to arise from force measurement results.

Methods

The OSS was obtained from 191 study participants, 99 women and 92 men, with a mean age of 49 ± 15.7 (range, 17 to 80 years). Inclusion was continued until at least 10 persons were included for each gender and every age decade starting from the 3rd to the 7th life decade.

Results

For women aged 29 years or less, mean OSS was 0.5 ± 1.0 , 1 ± 2 for women aged 30 to 39, 4.1 ± 8.3 for age 40 to 49, 3.6 ± 6.3 for age 50 to 59, 2.4 ± 5.4 for age 60 to 69, and 3.5 ± 5.9 for age higher than 69 years of age. The ANOVA was 0.08, suggesting a non-significant trend for age-decade dependent differences in women.

For men aged 29 years or less, mean OSS was 0.6 ± 1.0 , 2.8 ± 5.7 for men aged 30 to 39, 3.3 ± 5.5 for age 40 to 49, 3.6 ± 6.3 for age 50 to 59, 4.5 ± 6.8 for age 60 to 69, and 4.6 ± 7.4 for age above 69 years. The ANOVA was 0.04, suggesting significant age-decade dependent differences in men.

The difference between women and men were found to be significant, with men reporting higher values ($p=0.006$).

Conclusions

Adapting OS score results to age- and gender-related norm values appears reasonable.



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477 Results Of An Arthroscopic Posterior Bone Block Stabilization For Recurrent Posterior Shoulder Instability

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Aim

To investigate the the clinical outcome of an arthroscopic posterior bone block augmentation in combination with a posterior capsule repair.

The procedure was performed in cases with posterior shoulder instability associated with a posterior glenoid deficiency and/or a weak posterior capsule tissue. Further a novel score evaluating posterior shoulder instability (POSI score) was established and evaluated.

Background

The optimum treatment of posterior shoulder instability associated with a posterior glenoid defect or a local posteroinferior glenoid dysplasia is still a matter of debate.

Soft tissue techniques with labrum augmentation and capsule plication are performed in competition to posterior bone block procedures. Since clinical scores that specifically evaluate the degree of posterior shoulder instability do not exist, we assessed the patients shoulder function by a novel posterior shoulder instability score (POSI-score) in addition to established instability scores.

Methods

24 shoulders (18 patients) with unidirectional posterior shoulder instability were treated surgically with an arthroscopic posterior bone block and capsular reconstruction. The mean follow up period was 26 months. The patients were examined pre- and postoperatively using the Constant-Murley score, the Rowe score, Walch-Duplay score, Western Ontario Shoulder index and the novel posterior shoulder instability score (POSI).

Results

At the follow up examination 20 shoulders were classified to be stable, while one patient reported a single redislocation and two further patients reported recurrent posterior subluxation or posterior apprehension. Thus, the recurrence rate was defined to be 12%. The Rowe-Score significantly improved from 50 points preoperatively to 75 points postoperatively. The WOSI-score significantly improved from 37% preoperatively to 66% postoperatively and the POSI-score significantly improved from 19,6 points preoperatively to 73 points postoperatively.

Conclusions

The early clinical results of this arthroscopic bone block augmentation and capsule repair mostly are promising. The novel POSI score was able to measure the severity of posterior instability reliably before and after the operation.



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842 The Effect Of Rotator Cuff Malreduction On Tendon Tension - Evaluation Of A Custom-Made Digital Tensiometer Clamp

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Aim

First, we hypothesized that the tendon tension depends on the technique of tendon reposition and that malreduction of the tendon results in an increased tendon tension. Second, we aimed to demonstrate the inter- and intraobserver reliability of a novel custom-made digital tensiometer clamp.

Background

Rotator cuff tears are common and good-to-excellent clinical outcome is reported after subsequent repair. However, the retear rate of rotator cuff repairs has been shown to be as high as 20%. The reasons for retear seem to be multifactorial, mainly comprised by mechanical and biological aspects. Regarding mechanical causes the role of the tendon tension and malreduction is so far unknown

Methods

A tendon defect of posterosuperior rotator cuff (reverse L-shaped) was simulated in seven cadaveric human shoulder specimens. By use of a custom made tensiometer clamp the supraspinatus tendon was reduced by pulling it in (1) an anterolateral direction (anatomical reduction) and (2) in a straight lateral direction (malreduction) until the footprint was completely covered. The reduction procedure was consecutively repeated to evaluate the inter- and intraobserver reliability.

Results

The mean traction forces for anatomical reduction and malreduction were 16.02 N (SD 8.06) and 19.52 N (SD 9.95), respectively. The difference between the two groups was statistically significant ($p = .028$). The interobserver reliability showed a correlation of $r = 0.757$ (95% confidence interval [CI], 0.092–0.955). The intraobserver reliability of the three surgeons was observed to be between $r = 0.905$ and 0.986.

Conclusions

The malreduction of the rotator cuff has a significant influence on the tendon tension and may therefore affect the healing rate of the tendon after the repair, so that a tension-balanced repair could improve the clinical results.

Furthermore, the application of a novel custom-made tensiometer clamp showed a good interobserver and excellent intraobserver reliabilities



480 Normative Values For Elbow Range Of Motion

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Aim

The primary objective was to determine normative values for passive range of motion and active range of motion, as well as intra-rater and inter-rater reliability. The secondary objective was to provide normative values for sub-populations based on age, gender, hand dominance, and body mass index (BMI).

Background

Previous studies show large variation in elbow range of motion (ROM) values based on small or specific study populations, therefore wide reference values are used in daily practice.

Methods

Active ROM and passive ROM were measured bilaterally in healthy adults using a universal goniometer. In two samples of subjects, intra-rater and inter-rater reliability was calculated. The influence of factors affecting the ROM was calculated by t-tests and Pearsons Correlation Coefficient.

Results

The study population (n=352) consisted of 47.2% male and 52.8% female subjects, subdivided into six age categories, with at least 25 subjects each. For active ROM (dominant hand), mean flexion was 146°, extension -2°, pronation 80° and supination 87°. Differences between dominant and non-dominant hand were less than one degree, and passive ROMs were 3° to 5° larger than active ROMs (p<0.001). Male subjects had smaller ROM compared to females (p<0.001). There was a moderate negative correlation for age with passive pronation and supination and BMI with flexion. Intra-rater intra class coefficient (ICC) ranged from 0.74-0.96 with standard error of measurement (SEM) from 2° to 4° and the smallest detectable difference (SDD) from 5° to 11°. Inter-rater ICCs ranged from 0.79-0.98 with standard error of measurement from 1° to 3° and smallest detectable difference from 3° to 9°.

Conclusions

Elbow ROM is influenced by age, gender and BMI. The ROM of the uninjured side can serve as a reference in case of an injured elbow.



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483 Impact Of Vertical And Horizontal Malrotation On Measurements Of Antero-Posterior Radiographs Of The Scapula – Need For Standardized Images In Modern OmometrySamy Bouaicha¹, Armando Hoch¹, Thorsten Jentzsch¹, Beat Kaspar Moor²

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Aim

To improve reliability of radiographic parameter measurements using distinct omometric criteria in order to standardize image acquisition of antero-posterior radiographs of the shoulder.

Background

An increasing number of parameters measured on antero-posterior radiographs are used for the evaluation of the bony geometry of the scapula. Inhomogeneous acquisition of images is common due to the lack of standardization in radiographic positioning. Images with malrotation around the horizontal axis of the scapula are particularly frequent. We hypothesize that malrotated images result in large variations of measured radiographic parameters and that image standardization using qualitative and semi-quantitative omometric criteria decrease these variations of measurements.

Methods

A total of 210 antero-posterior radiographs of seven cadaveric shoulder specimens were obtained. Every scapula was incrementally rotated (steps of 3 degrees [°]) around its horizontal and vertical axis with a total range of 42° per each axis. Five radiographic parameters were measured on every image and their change with malrotation was observed. Further, four omometric criteria defining an appropriate (presence of ≥3 criteria) radiographic image were introduced to improve standardization of scapular image acquisition.

Results

Overall, measured values remained stable within a narrow range of +/-9° of malrotation. Beyond this range, values of all parameters significantly deviated (> +/- 2°) from the initial value. Measurements on appropriate images were significantly less prone to deviation. Within the appropriate images, four criteria showed a higher specificity than images with three criteria.

Conclusions

There is significant variation in values of measured radiographic parameters of antero-posterior radiographs of the scapula with substantially malrotated images. With the use of the newly-introduced four semi-quantitative and qualitative omometric criteria, which define an appropriate image, reliability of the measured parameters can be significantly improved.



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492 Do Subacromial Bursa Tissue Cells Influence Tendon-To-Bone Healing After Rotator Cuff Tears In A Rat Model?

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Aim

The aim is to analyze the influence of migration of mesenchymal stem cells from autologous bursal tissue on tendon to bone healing after rotator cuff repair in a rat model. Another aspect investigates if there is a difference in using inflammation bursal tissue or bland bursal tissue for application onto the tendon-bone interface.

Background

Stem cell migration from bursal tissue might aid in faster healing processes of tendon-cartilage-bone interfaces and may be an indication for applying bursal tissue.

Methods

204 Sprague-Dawley rats were randomly assigned to either untreated, plain bursal tissue application or inflamed bursal tissue application group in a rotator cuff repair. After separating the supraspinatus tendon (SSP) close to the greater tubercle, the tendon was re-attached either unaltered, with a plain bursal tissue patch or an inflammation-induced bursal patch sewn onto the interface. Histologic Analysis 1 week and 7 weeks after SSP reinsertion and biomechanical testing of the tendon 6 and 7 weeks after reinsertion was performed.

Results

Histologic results show less cellularity and vascularization and more interface organization tissue in the plain bursal and inflammation induced bursal groups after 1 and 7 weeks. The mean interface region, represented by collagen II in the tissue, was significantly larger in the bland bursal (0.27 0.06 mm²) and inflammation group (0.27 0.05 mm²) after 1 week in comparison to the control groups (p= 0.042). Similar results could be found in bland bursal (0.29 0.08 mm²) and inflammation bursal tissue (0.32 0.03 mm²) after 7 weeks (p= 0.036). No significant difference was detected between inflammation bursal tissue and bland bursal tissue groups after 1 week (p= 0.971) and 7 weeks (p= 0.416).

Conclusions

The results show migration of bursal tissue cells to tendon-bone interface after rotator cuff repair with no difference between attaching bland bursal tissue or inflammation bursa in rat models.



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495 Arthroscopic Classification System For Posterolateral Elbow Instability.**Mustafa Kaynak**, Denise Eygendaal, Bertram The

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Aim

Introducing and implementing an arthroscopic classification tool for grading the severity of posterolateral elbow instability.

Background

Posterolateral elbow instability is usually diagnosed with physical examination alone. However, clinical and radiographic signs of instability are in many cases subtle (symptomatic mild elbow instability) and is therefore sometimes difficult to access. Therefore, we introduced a new classification tool in order to avoid diagnostic misunderstandings and simultaneously compromise a universal classification system.

Methods

A total of 30 arthroscopies were performed in 30 patients. All recordings of the arthroscopies were collected, blinded and labelled. Three orthopedic surgeons viewed and scored all 30 recordings three times with a period of at least 7 days in between. Cohen's and Gwet's & Fleis' kappa were used to determine respectively the intra-observer and inter-observer agreement. The classification consisted of five different grades: Grade 0: Obturator cannot be inserted in the ulnohumeral joint; Grade 1: Obturator is introduced, but cannot reach the trochlear groove (<50%); Grade 2: The obturator can be advanced up to the trochlear groove (50%); Grade 3: Obturator advances beyond the trochlear groove (>50%); Grade 4: "Drive through sign".

Results

Indication for elbow arthroscopy included: impingement (n=7), OCD (n=5), pain (n=7), osteoarthritis (n=6) and other (n=5). The kappa value for intra-rater reliability was 0.71 indicating good reliability, while the kappa value for inter-rater reliability was 0.38 indicating fair reliability.

Conclusions

We introduced a new arthroscopic classification tool to aid in better understanding of normal and pathologic lateral-sided ligamentous behaviour under direct view, as well as provide orthopaedic surgeons with means to communicate using a standardized grading system. We demonstrated good intra-rater reliability with fair inter-rater reliability. We recommend this tool to other orthopaedic surgeons for use and aspire to further improve this classification tool.



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508 Early Mobilization Following Arthroscopic Rotator Cuff Repair: A Single-Blind Randomized Control Trial

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Aim

To evaluate the outcomes following arthroscopic rotator cuff repair treated with early mobilization compared to a standard protocol.

Background

There are few studies assessing the impact of active motion in the first 6 weeks following arthroscopic rotator cuff repair on pain, range of motion, strength, health related quality of life, and rotator cuff healing.

Methods

210 patients with a full-thickness rotator cuff tear undergoing an arthroscopic rotator cuff repair were randomized following a pre-operative assessment of shoulder pain, range of motion, strength, and health related quality of life. During the first 6 post-operative weeks, subjects randomized to early mobilization (n = 104) self-weaned from the shoulder immobilizer and performed pain free active range of motion while the standard group (n = 106) wore a sling for 6 weeks with no active range of motion. Shoulder range of motion, pain, and health related quality of life were assessed at 6-weeks, 3-, 6-, and 12-months post-operatively. At 6- and 12-months, strength was re-assessed. Ultrasound was performed at one year.

Results

The two groups were similar pre-operatively ($p > 0.12$). The early mobilization group had consistently more pain with activity than the standard group ($p = 0.05$), but the group difference was less than 10%. There was no difference between groups in abduction power ($p = 0.5$), Western Ontario Rotator Cuff Index ($p = 0.9$), pain at rest ($p = 0.2$), pain at night ($p = 0.4$), SF-36 ($P > 0.2$), and ultrasound findings ($p > 0.2$).

Conclusions

Early range of motion did not show significant benefits for minimizing long-term stiffness and pain, but clinically there was no compromise of their postoperative strength or health related quality of life. Consideration should be given to allowing pain free active range of motion within the first 6 weeks following an arthroscopic rotator cuff repair.



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539 Arthroscopic Arthrolysis For Primary Osteoarthritis Of The Elbow With Cubital Tunnel Syndrome

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Aim

The purpose of this study is to assess clinical outcomes of arthroscopic arthrolysis and concomitant anterior transposition of ulnar nerve in patients with primary elbow osteoarthritis combined with cubital tunnel syndrome.

Background

Symptomatic primary osteoarthritis of the elbow is often accompanied by ulnar nerve symptom. And most surgeons prefer open arthrolysis with anterior transposition of ulnar nerve for this condition. However, arthroscopic arthrolysis has been advanced with the potential advantages of minimal invasiveness and rapid recovery compared with open arthrolysis. Thus, we performed arthroscopic arthrolysis combined with anterior nerve transposition for primary elbow osteoarthritis with cubital tunnel syndrome.

Methods

From Jan 2015 to Mar 2016, we retrospectively reviewed consecutive patients who had symptomatic primary osteoarthritis of the elbow and concomitant cubital tunnel syndrome, and who were treated with simultaneous arthroscopic arthrolysis and anterior transposition of ulnar nerve. Clinical outcomes are assessed by Visual Analogue Scale (VAS) pain score, range of elbow motion, grip and pinch strength, two-point discrimination, DASH score, and Modified Bishop's (MB) score preoperatively and at last follow-up.

Results

Fourteen patients were involved, and mean age was 57.3 (49-62) years and mean follow up period was 8.4 (6-18) months. The mean VAS pain score was 5.3 ± 1.7 preoperatively, and 2.1 ± 1.8 at last follow-up ($p < 0.001$). The mean flexion contracture and flexion-extension arc were $22.5^\circ \pm 8.0^\circ$ and $86.8^\circ \pm 18.7^\circ$ preoperatively, and $10.0^\circ \pm 5.9^\circ$ and $112.1^\circ \pm 16.1^\circ$ at last follow-up ($p < 0.001$ and < 0.001). Grip and pinch strength were 19.4 ± 8.2 kg and 3.1 ± 1.5 kg, and after operation those values were 30.9 ± 8.7 kg and 4.1 ± 1.8 kg ($p < 0.001$ and $p = 0.008$). The preoperative DASH score was 65.0 ± 11.6 , and DASH score of last follow-up was 19.5 ± 12.5 ($p < 0.001$). According to MB score, nine patients had excellent result, and four was good, and one was fair.

Conclusions

Arthroscopic arthrolysis and anterior transposition of ulnar nerve seems to be effective for patients with elbow osteoarthritis and cubital tunnel syndrome.



535 Comparison Of Dynamics In 3D Glenohumeral Position Between Primary Dislocated Shoulders And Contralateral Healthy Shoulders

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Aim

The purpose of this study was to measure and analyze changes in glenohumeral translation in patients with shoulder dislocation and compare these changes with healthy shoulder.

Background

After shoulder dislocation, kinematic changes in shoulder, including translation of the humeral head, ensue. There have been many attempts to measure these changes using motion measurement techniques, but in vivo three-dimensional (3D) glenohumeral changes have not been appreciated until now.

Methods

We included 20 subjects who had suffered shoulder dislocation for first time, and 3D models of their humerus and scapula were obtained using computed tomography and fluoroscopic images during scapular plane abduction and external rotation of shoulder with elbow flexed at 90° and arm abducted at 90°. We measured the superior/inferior (SI) and anterior/posterior (AP) translations for both shoulders.

Results

No statistically significant difference between healthy and dislocated shoulders was detected in SI translation for scapular plane abduction with increasing elevation angles. In AP translation, the humeral head was located 2.29 mm more anteriorly in the dislocated shoulder than in the healthy shoulder. However, no statistically significant difference was seen. For internal to external rotation, the angle of the rotated arm had an effect on AP translation. However, no statistically significant difference was detected. In the apprehension test, there was no significant difference in the mean value of AP translation

Conclusions

Compared with the contralateral healthy shoulder, changes in glenohumeral translation during in vivo movement after shoulder dislocation were found to be non-significant.



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538 Effects Of Short Malunion Of The Clavicle On In Vivo Scapular KinematicsDoo-Sup . Kim¹, Yeo-Seung . Yoon², Dong-Woo . Lee²

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Aim

This study aimed to measure and compare in vivo three-dimensional (3D) scapular kinematics between normal shoulders and shoulders with short malunion using 3D-two-dimensional (2D) model image registration techniques.

Background

Short malunion of the clavicle after fracture can change scapular kinematics and alter clinical outcome. However, the effects of malunion on kinematics and outcomes remains poorly understood because there have been no in vivo studies measuring changes during active motion with malunion.

Methods

Fifteen patients with clavicle fracture that had been treated conservatively were enrolled in this study. In these patients, the angle of scapular upward rotation, posterior tilting, and external rotation were compared between shoulders with short malunion and contralateral, normal shoulders. A 3D-2D model image registration technique was used to determine the 3-D orientation of the scapula.

Results

: Scapular upward rotation increased following increase of the arm elevation angle and also showed a significant difference by arm elevation in both groups ($p=0.04$). Posterior tilting of the scapula gradually increased as the arm abduction angle increased, and this varied significantly between groups ($p=0.01$). Shoulders with short malunion also showed a more internally rotated position than the contralateral, normal shoulders between 100° and the maximum abduction angle ($p=0.04$).

Conclusions

Our results suggest that clavicle shortening of more than 10% greatly affects scapular kinematics in vivo. Further studies will be needed to determine the clinical implications of short malunion of the clavicle.



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523 Benefits From Running A Local Shoulder Arthroplasty Register – A 10 Years' Experience

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Aim

To present our experience from the first 10 years since the implementation of a local shoulder arthroplasty register (SAR).

Background

Large arthroplasty registers allow investigations of short to long-term outcome using predetermined quality parameters and the recognition of potential advancements for patient care, notably by the early detection of emerging problems. In 2006 a local SAR was introduced in our clinic to comprehensively document all patients with shoulder arthroplasty surgeries.

Methods

Since 2006 all surgeries with implantation or revision of a shoulder prosthesis were included in the register. The completeness rate of the registration was validated by comparison with data from the hospital information system. The baseline documentation and the regular postoperative controls (after ½, 1, 2, 5 years and then all further 5 years) include clinical examinations, imaging evaluation and a patient-based questionnaire set. Revisions and their causes were recorded for the computation of implant survival rates.

Results

A total of 2247 consecutive shoulder arthroplasty surgeries were documented. The preoperative documentation rate reaches 98% and thereby excels international benchmarks (>90%). The 5-years follow-up rate reaches 65% and is particularly affected by deceased patients (10%) and missing compliance (14%). So far 4% of the 2009 primary arthroplasties had to be revised. An anatomic shoulder prosthesis system attracted attention with a high revision rate of more than 20%, which led to an early implantation stop. The data are used for the internal quality assurance as well as increasingly for scientific publications and congress presentations (n=3 resp. n=8 in 2016).

Conclusions

10 years since the implementation the clinic can rely on a functional SAR, which serves as a tool for continuous surveillance and quality control but also allows assessments for clinically relevant research questions. The goal for the future is harmonization of the documentation for potential collaborations with national and international shoulder arthroplasty registers.



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525 Comparison Between Suture Bridge Technique With Or Without Medial Tying In Rotator Cuff Tears.HIROKAZU Honda¹, Masafumi Gotoh¹, Yasuhiro Mitsui¹, Isao Shirachi¹, Naoto Shiba²

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Aim

The aim of this study was to compare clinical and structural outcome between suture bridge (SB) techniques with or without medial tying.

Background

Significance of medial tying in SB technique still remains unknown.

Methods

Between 2011 and 2013, 124 patients with rotator cuff tears underwent arthroscopic rotator cuff repair (ARCR) in our institute. Of these, 53 patients were subjects for this study: 29 shoulders (11 small / medium and 18 large / massive tears) treated by SB technique with medial tying (WMT group) and 24 shoulders (9 small / medium and 15 large / massive tears) without medial tying (WOMT group). Clinical assessment consisted of Japanese Orthopedic Association (JOA) and University of California, Los Angeles (UCLA) scoring systems. Structural outcome was evaluated by magnetic resonance images using Sugaya's classification. These were assessed before, three months, one year and two years after surgery.

Results

There were no significant differences on preoperative demographic data between both groups. There were significant improvements between preoperative and postoperative UCLA / JOA scores in both groups. Postoperative re-tear rate (Sugaya Types 4 & 5) was not significant between the groups (WMT group: 7 / 29 cases and WOMT group: 6 / 24 cases); however, incomplete healing (Sugaya Types 2 & 3) was significant higher in WMT group at final follow-up.

Conclusions

No significant difference between both group was noted in clinical outcome but also in re-tear rate. However, incomplete healing was significantly higher in WMT group than WOMT group, suggesting the negative effect of medial tying on the repaired site.



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548 Synthetically Augmented Locking Plate Osteosynthesis Of Displaced Proximal Humeral Fractures – Outcomes And “Matched Pair” Analysis In Comparison To Primary Reversed Shoulder Arthroplasty.

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Aim

To evaluate the functional outcome following synthetically augmented locking plate osteosynthesis, in comparison to primary reversed shoulder arthroplasty.

Background

Augmentation of locked plating by use of synthetic bone substitutes or bone cement was introduced recently, however functional outcomes are lacking.

Methods

Between 04/2014-10/2016 60 patients (mean age: 74.5 years, 76.7% female) with a displaced proximal humeral fracture (type III-2: n=18, IV/V-3: n=23, IV/V-4: n= 13, VI-Headsplit: n=6) were treated by synthetically augmented ("filling the void" vs. "screw tip augmentation") locking plate osteosynthesis. All patients were prospectively followed, and functional outcomes were obtained by use of the Constant-Score. The outcome was then compared to the outcome of 60 matched individuals (age, gender, and fracture-type) from the institutional register, that had been treated with primary reversed arthroplasty.

Results

Of 60 patients treated with synthetically augmented locking plate osteosynthesis, the mean Constant-Score was 69.3 (80.2% to the uninjured side). In 52 cases (86.6%) fracture union was confirmed within 9 months from surgery, in 4 cases (6.7%) secondary displacement with "cut out" occurred, and in 4 cases (6.7%) partial or complete necrosis of the humeral head was identified. Revision surgery was conducted in 5 cases (8.3%).

Of 60 age-, gender- and fracture type-matched individuals, treated by primary reversed arthroplasty, the Constant-Score was 68.1 (81.6% to the uninjured side). In one patient of primary reversed arthroplasty, a deep infection was noted and revision surgery was necessary.

Conclusions

Synthetic augmentation of locking plate osteosynthesis results in good functional outcome, thus, it may be obtained if bone quality is compromised (i.e. osteoporosis). However, the data also shows that, in a relatively old cohort of patients, complications still exist, hence, indications should be verified thoroughly, with regards to alternative treatment options. Functional results following synthetically augmented osteosynthesis and primary reversed arthroplasty are similar.



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706 Comparison Of All-Suture Anchor To Bioabsorbable Anchor In Double-Pulley Suture Bridge(DPSB) Technique For Medium Sized Rotator Cuff Tear

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Aim

We want to know the effectiveness of two different type of suture anchor in the arthroscopic repair for medium sized rotator cuff tear

Background

We tried to compare all-soft anchor with bioabsorbable anchor on the functional outcomes and radiological results in DPSB technique

Methods

We evaluated 58 patients who received arthroscopic DPSB repair for the medium sized tear, and divided into two groups according to medial anchor types (Group1, bioabsorbable anchor; N=31, Group2, all-soft anchor; N=27). The functional outcomes were evaluated using the ASES index, the Constant score, the UCLA score, and the Korean Shoulder Scoring (KSS) system. Postoperative cuff integrity using Sugaya classification and the fluid collection around anchors were evaluated on MRI at least 1 year after surgery.

Results

The mean functional scores of ASES, the Constant score, the UCLA score, and the KSS were improved to 94.0, 92.1, 33.4, and 93.5 in Group1 and 94.6, 93.6, 33.7, and 94.0 in Group2 at the last follow-up, respectively. However, there was no statistical difference between the groups in the postoperative scores. In the postoperative MRI, intact cuff, partial re-tear, and complete re-tear were observed in 28 (90.3%), 2 (6.5%) and 1 (3.2%) of Group1 and 22 (81.5%), 3 (11.1%) and 2 (7.4%) of Group2, respectively. There was no statistical difference between the groups in postoperative cuff integrity. The fluid collection around anchor was observed 5 (16.1%) in Group1, 13 (48.1%) in Group2. The prevalence of the fluid collection around anchor of Group2 was significantly higher than Group1 (p=0.009).

Conclusions

In arthroscopic repair for medium sized rotator cuff repair using DPSB technique, the prevalence of the fluid collection around medial anchor was higher in all-soft suture anchor than bioabsorbable suture anchor, regardless of comparable re-tear rate and functional outcome.



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542 Added Diagnostic Value And Complications Of Elbow Arthroscopy Prior To Mini-Open Tennis Elbow Release.**Andrew King**, James Beazley, William Thomas, Christopher Smith

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Aim

To define the extent to which additional and unexpected pathology is detected and treated during routine diagnostic elbow arthroscopy prior to mini-open tennis elbow release.

Background

Surgical release of tennis elbow can be coupled with diagnostic arthroscopy to provide a thorough assessment of intra-articular pathology at the time of surgery and this is done routinely at our institution. Whilst some studies have looked at the prevalence of co-existing pathologies we set out to define the impact this technique was having on our surgical management of these patients.

Methods

A consecutive series of patients treated surgically for tennis elbow by the two senior authors were identified using theatre records between May 2013 and May 2016. Demographic details were obtained along with operative findings and additional procedures performed from our theatre software. Follow up was assessed using clinic letters and medical notes post-operatively.

Results

30 patients were identified. The average age was 46 (36-65) at time of surgery. Mean follow up was 21 months (range 9-45). Pathology in addition to ECRB degeneration was identified in 14 (47%) patients. Most commonly seen was the presence of a plica in 7 (23%) patients. Radial head cartilage degeneration was present in 6 (20%) patients. Capitellar cartilage degeneration was seen in 3 (10%) of patients. Additional procedures were performed in 6 (20%) of patients. Most commonly, plica excision was performed in 5 (17%) patients, followed by open microfracture in 2 (7%) patients. 2 patients suffered with superficial wound infections that resolved with a course of antibiotic treatment. 1 patient suffered with symptoms of ulnar nerve compression which improved following open release.

Conclusions

Our series demonstrates that unexpected pathology is present in 47% of patients undergoing mini-open tennis elbow release and additional procedures were performed in 20% of patients. We therefore recommend performing routine elbow arthroscopy when treating tennis elbow.



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536 Clinical Value Of Pre-Operative Gleno-Humeral Arthrography In The Treatment Of Shoulder Instability**Shaul Beyth**, Ran Shabtai, Ori Safran

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Aim

This study was designed to evaluate potential clinical value of MRI-arthrogram for decision making in the pre-operative evaluation of patients with post traumatic anterior shoulder instability.

Background

MRI arthrogram is part of the routine preoperative evaluation of patients diagnosed with traumatic anterior shoulder instability. In addition to its well described complications, shoulder arthrography is associated with significant discomfort to patients, economic burden for the healthcare system and potentially hindering surgical procedure and rehabilitation. However, the clinical value of data acquired by shoulder arthrogram of young patients with isolated post-traumatic anterior shoulder instability is unclear.

Methods

In this IRB approved study we retrospectively analyzed the medical records of 48 consecutive patients (ages 15 to 40, 100% males), who were diagnosed with post-traumatic anterior shoulder instability after a documented anterior dislocation, referred for arthroscopic stabilization and underwent an MRI arthrogram as part of the pre-operative workup. Imaging studies were retrieved and read by a blinded musculoskeletal radiologist. MRI findings were evaluated for cases in which obtained data may affect clinical course.

Results

MRI arthrogram findings in our cohort showed Hill-Sachs lesion in 42 patients (87%), anterior labral tear in 37 patients (77%), GHJ tear in 15 patients (31%) and SLAP tear in 12 patients (25%). The surgical decision was not altered in any of the cases however the timing of surgery was delayed by an average of 3 months.

Conclusions

Our results indicate very limited clinical value for MRI arthrogram in young patients referred to surgical stabilization of the shoulder following a documented anterior dislocation. With arthroscopic stabilization advocated for first time dislocation, the contribution of MRI arthrogram to clinical decision making and its effect on treatment course should be weighed against complications, inconvenience and delay in rehabilitation.



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555 Can We Evaluate Horizontal Instability After AC-Joint Reconstruction? – A Comparative Study Between Bi-Cortical Coracoclavicular Button Fixation With And Without Additional Acromioclavicular Cerclage In Acute Acromioclavicular Dislocation

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Aim

Our aim is to evaluate if an additional AC-cerclage after acute AC-dislocation will provide clinical advantages compared with an CC-ligament reconstruction only. Our first hypothesis is that both techniques show good clinical results. The second hypothesis is that the additional AC-cerclage will show less radiological loss of reposition compared to the CC-fixation only technique.

Background

The current treatment for acromioclavicular (AC) dislocation lacks a gold standard and previous literature concludes that coracoclavicular (CC) fixation with additional AC cerclage fixation adds stability and is a useful adjunct to augment these repairs.

Methods

In total, 56 consecutive patients with acute (less than 3 weeks) AC-dislocations Rockwood grade IV and V from 2013-2014 underwent arthroscopic bi-cortical (Dogbone, Arhtrex, Munich) CC-ligament reconstruction. Patients were assigned to the surgeon depending on the day of clinical presentation. One surgeon only used bi-cortical CC-ligament reconstruction; the other surgeons used an additional PDS-cerclage according to recently published biomechanical results and surgical technique using an 8-loop configuration over the AC-joint. Clinical and radiological data were generated 12 and 24 months after the surgical procedure. Statistical analysis was conducted using a students T-test.

Results

A total of 52 patients, 2 female 50 men (mean age 36.5 ± 13.4) were included. Three patients were lost to follow-up (6%), 5 patients underwent revision surgery due to failure of primary procedure (3 without cerclage and 2 with cerclage) and therefore excluded from the study. Three patients had revision surgery for implant removal and therefore included. Preliminary data after 24 months for 50 patients have been collected. Final data and clinical results will be available by the end of August 2017.

Conclusions

Recently published biomechanical data have shown that an additional AC-cerclage is superior for horizontal stability. Our collected data will show if the biomechanical results can be confirmed with clinical and radiological findings.



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561 The Incidence Of Propionibacterium Acnes In Shoulder SurgeryYUKIHIRO N/A Kajita¹, Yusuke N/A Iwahori², Ryouzuke N/A Takahashi²

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Aim

The purpose of this study is to investigate incidence of Propionibacterium acnes in shoulder surgery and how these rates differ with procedural and demographic factors.

Background

Propionibacterium acnes is implicated as the chief causative pathogen in postoperative infection in shoulder arthroplasty and open shoulder procedures because of its high concentration about the skin of the shoulder.

Methods

Patients undergoing shoulder surgery were enrolled. Patients with a history of shoulder surgery or any concern for active or previous shoulder infection were excluded. Initial cultures were obtained before the skin preparation by swabbing the skin. In the shoulder surgery, a second culture was obtained at the surgical site. All cultures were plated for 42 days. We evaluated age, sex, diabetes, preoperative contracture, diagnosis, procedure (open / arthroscopy), operation time, or examination of the blood.

Results

We studied 64 patients (40 male, 24 female, average age at operation: 53.3 years old) who underwent shoulder surgery (open 11 cases, arthroscopy 53 cases).

Cultures showed a 68.8% Propionibacterium acnes superficial colonization rate: 41.7% of female and 85.0% of male patients. We identified a deep culture positive inoculation rate of 10.9%, all with positive Propionibacterium acnes skin colonization. No correlation could be made concerning diagnosis, age, sex, diabetes, preoperative contracture, diagnosis, procedure (open / arthroscopy), operation time, or examination of the blood.

Conclusions

The rate of skin colonization with Propionibacterium acnes is high, especially in men. Despite standard skin preparation and prophylactic antibiotics, the rate of deep tissue inoculation with Propionibacterium acnes in shoulder surgery is high. The clinical importance of culture growth still remains uncertain.



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562 Clinical Results Of Shoulder Manipulation Under Ultrasound Guided The Fifth And Sixth Cervical Nerve Root Block For Frozen Shoulder.

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Aim

The purpose of this study is to investigate the clinical results of shoulder manipulation under ultrasound guided the fifth and sixth cervical nerve root block for frozen shoulder. We indicated this procedure for frozen shoulder resistant to conventional conservative treatment including physical therapy, medication, and injection.

Background

Cervical nerve root blockade is a good option for anesthesia or analgesia of the shoulder. Recent advancements in ultrasonographic imaging equipment have enabled the visualization of nerves, facilitating ultrasound-guided nerve block.

Methods

Subjects consisted 80 shoulders of 72 patients (29 males and 43 females), mean age was 52.4 years old (range: 38-72 years old), and 13 patients were associated with diabetes. We evaluated complications, range of motion (ROM) and Japan Orthopaedic Association score (JOA score) (pre-manipulation, post 3 months, and 6 months).

Results

The results of shoulder ROM and JOA score (pre-manipulation, post 3 months, and 6 months) were as follows: elevation (109.3°, 150.9°, and 151.4°), extension (23.9°, 37.6°, and 37.9°), abduction (99.8°, 144.2°, and 149.4°), external rotation (24.1°, 40.7°, and 45.1°), internal rotation (L5, L2, and Th11 level), and JOA score (58.8, 86.6 and 90.6 points), respectively. The shoulder ROM and JOA score of post-manipulation improved significantly from those of pre-manipulation. Regarding complication related to block procedure, two patients had vagovagal reflex and one patient had panic attack, resulting in full recovery without treatment. Regarding complication related to manipulation, one patient had an avulsion fracture of the inferior glenoid rim turned out to heal spontaneously without any residual functional impairment.

Conclusions

Shoulder manipulation under ultrasound guided the fifth and sixth cervical nerve root block for frozen shoulder brought significant improvement of ROM and ADL.



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574 Quantifying Extensibility Of Rotator Cuff Muscle With Tendon Rupture Using Shear Wave Elastography: A Cadaveric Study

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Aim

To determine if quantified mechanical properties of the supraspinatus muscle using shear wave elastography (SWE) could be used to predict the extensibility of the musculotendinous unit on cadaveric specimens.

Background

Surgical repair for large or massive rotator cuff tear remains challenging because of the tear size and altered mechanical properties in terms of poor extensibility. Insufficient extensibility might cause incomplete reconstruction; moreover, excessive stresses after repair may result in failure without healing process. Therefore, the extensibility of the cuff muscles can help in preoperative planning to prevent unexpected scenarios during the operation.

Methods

45 fresh-frozen cadaveric shoulders were used for the study. Passive stiffness of 4 anatomical regions in the supraspinatus muscle was first measured based on an established SWE method. After detaching the distal edge of supraspinatus muscle from other cuff muscles, detached muscle was axially pulled with the scapula fixed on a device. The correlation between the SWE modulus and the extensibility of the muscles under 30 and 60 N loads was assessed.

Results

Specimens included 25 intact and 20 shoulders with rotator cuff tear. There was a significant negative correlation between the SWE measurements and the experimental extensibility. Especially, SWE modulus for the anterior-deep region in the supraspinatus muscle showed the strongest correlation with the extensibility under 30 N ($r = 0.70$, $P < 0.001$) and 60 N ($r = 0.68$, $P < 0.001$).

Conclusions

Quantitative SWE assessment for the supraspinatus muscle was highly correlated with the extensibility of the musculotendinous unit on cadaveric shoulders. This technique may be used to predict the extensibility for rotator cuff tears for pre-surgical planning.



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570 Clinical Outcome Of The Surgical Treatment Based On The Glenoid Track Concept For Patients With Recurrent Shoulder Dislocation

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Aim

To assess the clinical outcomes of patients with anterior shoulder instability who underwent surgical treatment according to the glenoid track concept.

Background

Biomechanical studies have identified the osseous defect in both glenoid and humerus which may or may not affect the stability for anterior shoulder instability. Although the concept of the glenoid track has been developed to determine the optimal treatment to regain the stability, there are few clinical studies to complement this efficacy.

Methods

We retrospectively analyzed 88 patients with anterior shoulder instability who underwent surgical treatment according to the glenoid track concept with >2-year follow-up. Using preoperative three-dimensional CT images, surgical options were selected; patients with an on-track lesion and a glenoid defect under 25% underwent arthroscopic Bankart repair. Among patients with an off-track lesion, arthroscopic Bankart repair with remplissage was performed in those with <25% glenoid defect, and Latarjet procedure was performed for >25% glenoid defect. The prevalence of recurrence was assessed over 2-year follow-up after surgery.

Results

Seventy-nine patients underwent arthroscopic Bankart repair, 2 underwent arthroscopic Bankart repair with remplissage, and 7 underwent Latarjet procedure. Four patients treated with arthroscopic Bankart repair had recurrence (5%). No recurrences were observed in off-track cases treated with Latarjet procedure.

Conclusions

This study indicates the application of glenoid track concept in preoperative assessment is useful in determining the optimal surgical option.



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581 Comparison Of Subscapularis Tenotomy To Subscapularis Peel In Shoulder Arthroplasty: A Prospective, Randomized, Controlled TrialPeter Lapner¹, J W. Pollock¹, Adnan Sheikh², Tinghua Zhang³, George S. Athwal⁴

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Aim

To determine if a difference exists between subscapularis tenotomy and subscapularis peel using subscapularis strength as primary outcome at 24 months post-operative in total shoulder arthroplasty

Background

Controversy exists regarding the optimal technique of subscapularis tendon mobilization during shoulder arthroplasty. The purpose of this randomized double-blind study was to compare subscapularis strength and functional outcomes between the subscapularis tenotomy and subscapularis peel during shoulder arthroplasty.

Methods

One hundred eleven patients undergoing total shoulder arthroplasty were randomized to receive either a subscapularis tenotomy or a subscapularis peel. The primary outcome was subscapularis strength, as measured by an electronic hand-held dynamometer at 24 months post-operatively. Secondary outcomes included the WOOS and ASES scores.

Results

Fifty-nine patients were allocated to subscapularis tenotomy, and 52 patients to subscapularis peel. Eighty percent of the study cohort returned for the 24 months follow-up. The primary outcome of subscapularis strength at 24 months follow-up revealed no significant difference ($p=0.43$) between the tenotomy (4.1 kg, SD 3.2) and the subscapularis peel (4.7 kg, SD 2.3). Comparison of secondary outcomes including the WOOS, and ASES scores demonstrated no significant differences between groups at any time point. Compared to baseline measures, mean subscapularis strength, WOOS, and ASES scores all improved significantly in both groups at 24 months follow-up ($p<0.001$).

Conclusions

No statistically significant differences in the primary or secondary outcomes of function were identified between the subscapularis tenotomy and subscapularis peel. For the parameters investigated, this trial does not demonstrate any clear advantage of one subscapularis management technique over the other.



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597 Pyrocarbon Humeral Head In Hemi Shoulder Arthroplasty: Preliminary Results From A Prospective Multicenter Study At 2-Year Follow-Up

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Aim

The aim of the present study is to report clinical and radiographic outcomes of a novel pyrocarbon humeral head implant designed to be used in Hemi Shoulder Arthroplasty (HSA) in association with a short humeral stem (Aequalis Ascend™ Flex, Tornier Inc.).

Background

In young patients with degenerative shoulder arthropathy and functional rotator cuff, HSA is preferred to preserve the glenoid bone stock and has given satisfactory results.

Nevertheless, patients can present with postoperative pain due to glenoid erosion presumably caused by the metallic humeral heads. To address this issue, pyrocarbon was found to be the best material for humeral heads due to its tribologic and elastic properties.

Methods

The authors prospectively studied 38 consecutive patients that underwent HAS with a pyrocarbon humeral head. The mean age at surgery was 58 (19-84) years. The indications were primary glenohumeral arthritis in 21, secondary arthritis in 10, and osteonecrosis in 7 patients.

Results

At a mean follow-up of 25.5±2.1 months, the Constant score increased by more than 30 points (from 29±7 preoperatively to 72±15) with a gain of more than 8 points for pain. The Subjective Shoulder Value (SSV) improved from 29±14 to 78±18%. Radiographic analyses revealed that 34 glenoids remained unchanged and 4 were slightly remodeled as compared to their preoperative status.. 4 revisions were reported but none were related to the pyrocarbon implant as, according to the authors, they would have occurred identically with a metallic head.

Conclusions

2 years after the surgery, clinical and radiological assessments demonstrate good outcomes for pyrocarbon humeral heads in term of pain relief, mobility restoration and glenoid evolution. Even if 2 years of follow-up is not sufficient to conclude, these satisfactory short term results allow to draw some perspective and give confidence in the continuation of the use of pyrocarbon implants in the shoulder.



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603 Subscapularis Structural Integrity And Function After Arthroscopic Latarjet At A Minimum 2 Years Follow-Up: Isokinetic And Imaging Study

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Aim

To evaluate the structural integrity and function of subscapularis after arthroscopic Latarjet

Background

While clinical results of arthroscopic Latarjet have been published, data on the subscapularis postoperative performance are missing.

Methods

Forty consecutive patients (mean age, 31.2 years) that underwent arthroscopic Latarjet were clinically evaluated including WOSI and Rowe scores and specific subscapularis tests (lift-off hand to back distance and strength) and an isokinetic study (maximum body mass adjusted peak torque and external/internal rotator ratio). CT evaluation included consolidation rate, graft positioning, subscapularis integrity, mean muscle attenuation, cross-sectional area and muscle diameters. Results were compared to the contralateral shoulder at a minimum 2-year follow-up

Results

There was a significant improvement in functional scores ($p < 0.001$). There were 4 recurrences and 3 of them underwent further surgical treatment.

Maximum body mass adjusted peak torque (N/kg) was 43.3 (SD 13.2) for the operated side and 47.2 (SD 13.8) for the contralateral side ($p = 0.02$). There were not differences in external/internal rotator ratio and lift off strength between sides ($p = 0.82$ and $p = 0.38$ respectively). Hand to back distance was 16.7 cm (SD 9) for the operated side and 21.7 cm (SD 6.8) for the non-operated ($p < 0.001$).

Consolidation was complete in 85% of the cases. There was a decrease in mean muscle attenuation when comparing subscapularis to infraspinatus/teres minor ($p < 0.001$). There were statistically significant differences between upper subscapularis and lower subscapularis ($p = 0.03$) and between upper subscapularis and infraspinatus/teres minor ($p = 0.02$). No signs of muscle atrophy were recorded.

Conclusions

Arthroscopic Latarjet provides satisfactory clinical and radiological results. There was a decrease in lift-off hand to back distance and internal rotation strength, but not in lift-off strength or in the external/internal rotator ratio.



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680 Long-Term Clinical Outcomes After Microfracture Of The Glenohumeral Joint: Minimum 8-Year Follow-Up

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Aim

The purpose of this study is to present long-term clinical outcomes of patients undergoing microfracture of full-thickness articular cartilage defects of the glenohumeral joint.

Background

Microfracture is an effective, minimally-invasive surgical treatment for full-thickness cartilage defects of the knee; however, little is known regarding long-term outcomes following microfracture in the shoulder.

Methods

Sixteen consecutive patients (17 shoulders) who underwent arthroscopic microfracture of the humeral head and/or glenoid surface between 2001 and 2008 were retrospectively reviewed. All patients completed preoperative and postoperative surveys containing the visual analog scale (VAS), American Shoulder and Elbow Surgeons (ASES) score, and simple shoulder test (SST). Complications and reoperations were analyzed. Failure was defined by reoperation, including conversion to arthroplasty.

Results

Of the original 16 patients (17 shoulders), 14 shoulders in 13 patients (6 males, 7 females) were available for follow-up at an average 10.2 ± 1.9 years following microfracture (range, 8.5 to 15.8 years), for an overall clinical follow-up rate of 82%. The patients had an average age of 36.1 ± 12.9 years at time of microfracture. The average size of humeral and glenoid defects was 5.20 cm² (range, 4.0-7.84 cm²) and 1.53 cm² (range, 1.0-3.75cm²), respectively. Three patients (3 shoulders – 21.4%) progressed to shoulder arthroplasty at an average 5.7 years (range, 0.2 to 9.6 years) after microfracture. For the remaining patients there were statistically significant improvements in VAS, ASES and SST compared to preoperative values, and there was no significant change between short-term follow-up (2.3 years) and long-term follow-up (10.2 years).

Conclusions

The management of full-thickness chondral defects of the glenohumeral joint is challenging. For some patients, microfracture can result in enduring improved function and reduced pain, however, in this small series, 21.4% of patients required conversion to arthroplasty less than 10 years following the index microfracture procedure. Additional studies with larger patient cohorts are needed.



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612 Does Prior Shoulder Surgery Negatively Impact Shoulder Arthroplasty Outcomes?

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Aim

To determine the impact of prior shoulder surgery on patients undergoing shoulder arthroplasty.

Background

The impact of prior ipsilateral shoulder surgery on outcomes following total shoulder arthroplasty (TSA) and reverse total shoulder arthroplasty (RSA) is unknown.

Methods

715 consecutive patients undergoing TSA or RSA between 1/2010 and 5/2014 with a minimum 2-year follow-up were reviewed. All patients were evaluated at follow-up with the American Shoulder and Elbow Society (ASES), Simple Shoulder Test (SST), Functional Score, Visual Analog Scale (VAS) and range of motion outcomes assessments. Outcomes in patients undergoing prior ipsilateral shoulder surgery (PS group) were compared to those in patients without history of prior surgery (NPS group).

Results

Of the 715 patients, 506 (263 TSA, 243 RSA) were available for analysis (71% follow-up rate). A total of 144 patients (29%) underwent an average of 2.0 ± 1.1 ipsilateral shoulder surgeries, including rotator cuff repair (RCR) in 65%, prior to arthroplasty, while 362 (71%) did not undergo prior surgery. PS group patients were significantly younger at the time of arthroplasty compared to the NPS group (61.6 ± 10.2 vs. 68.2 ± 8.6 years, $P=0.035$). At an average follow-up of 42.8 ± 16.4 months, both groups experienced significantly improved ASES, SST, Functional, VAS scores, and range of motion ($P < 0.05$ for all). All outcomes scores in the PS group were significantly lower compared to the NPS group ($P \leq 0.005$ for all). The PS group also exhibited significantly lower postoperative forward elevation (133.8 ± 33.4 vs. 142.3 ± 26.4 degrees, $P < 0.0001$). Within the PS group, there were no significant differences detected in outcome scores or magnitudes of change in outcomes between patients undergoing RCR or any other procedure.

Conclusions

While patients who have undergone prior ipsilateral shoulder surgery derive benefit from shoulder arthroplasty, these patients are significantly younger, and their magnitude of improvement and final scores are significantly lower than patients without prior surgery.



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614 90-Day Complications Following The Distal Tibia Allograft Procedure

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Aim

The purpose of this study was to describe complications occurring within 90-days following the DTA procedure.

Background

The utilization of distal tibia allograft (DTA) for the treatment of anterior shoulder instability has increased over the past decade; however, the rate and types of complications associated with this procedure are unknown.

Methods

Consecutive patients undergoing DTA for anterior glenohumeral instability by fellowship-trained surgeons were included for analysis. Indications for DTA included primary or recurrent anterior instability with clinically significant anterior glenoid bone loss, failed prior arthroscopic stabilization, and/or failed prior Latarjet. All complications that occurred within 90-days of surgery were analyzed and correlated with demographic factors.

Results

A total of 63 consecutive patients (average age 26.4±8.2 years, 90% male) were included. Fifty patients (79%) had undergone prior ipsilateral shoulder surgery, including 8 undergoing prior Latarjet. There were 5 total complications within 90 days of surgery, for an overall short-term complication rate of 7.9%. The 58 patients without complications had an average age of 26.2±7.9 years (95% male), with 45 (78%) having had prior shoulder surgery. Three of these 5 required subsequent surgery, including 1 revision DTA for hardware failure, 1 subscapularis repair, and 1 debridement for retained surgical sponge. The remaining 2 complications were transient and resolved with non-operative treatment, including 1 patient with postoperative pain requiring a subacromial injection, and 1 patient with a stitch abscess treated with oral antibiotics. The 5 patients experiencing complications had an average age of 29.0±11.5 years (40% male), with all 5 (100%) having had prior shoulder surgery. There were no episodes of recurrent instability.

Conclusions

The overall 90-day complication rate following DTA is 7.9%, substantially lower than the previously described rate of 25% in patients undergoing Latarjet. This information can be used to counsel patients on the risks of early complications following DTA.



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608 90-Day Complications Following The Latarjet Procedure

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Aim

The purpose of this study was to describe complications occurring within 90-days following Latarjet.

Background

While the utilization of the Latarjet procedure for the treatment of anterior shoulder instability has increased over the past two decades, complication rates remain unacceptably high.

Methods

Consecutive patients undergoing the Latarjet procedure for anterior glenohumeral instability by fellowship-trained surgeons from a single institution were included for analysis. Indications for Latarjet included primary or recurrent anterior instability with clinically significant anterior glenoid bone loss and/or failed prior arthroscopic stabilization. All complications that occurred within 90-days of surgery were analyzed and correlated with demographic factors.

Results

A total of 133 consecutive patients (average age 28.5 ± 11.8 years, 75% male) were included. Ninety-two patients (69%) had undergone prior ipsilateral shoulder surgery. There were 10 total complications within 90 days of surgery, for an overall short-term complication rate of 7.5%. Six of these 10 required subsequent surgery, including two for recurrent instability (overall rate 1.5%), two for infection (overall rate 1.5%) and one for musculocutaneous nerve palsy (overall rate $<1\%$). The remaining four complications were transient, resolving with non-operative treatment. The 123 patients without complications had an average age of 28.3 ± 11.9 years (75% male), with 85 (69%) having had prior shoulder surgery. The 10 patients experiencing complications had an average age of 30.9 ± 10.9 years (77% male), with 7 (70%) having had prior shoulder surgery.

Conclusions

In a series of 133 patients in which 69% have had prior surgery, the overall 90-day complication rate following Latarjet is 7.5%, substantially lower than the previously described rate of 25%. This information can be used to counsel patients on the risks of early complications following Latarjet, particularly when Latarjet is utilized as a revision stabilization procedure.



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610 Clinical Outcomes Of Distal Tibia Allograft Reconstruction For Posterior Shoulder Instability With Posterior Glenoid Bone Loss

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Aim

To assess the clinical outcomes of patients with recurrent posterior shoulder instability treated with distal tibia allograft (DTA) reconstruction.

Background

While a variety of bone grafts have been described for posterior glenoid rim reconstruction in patients with recurrent posterior instability, clinical outcomes remain concerning, often with high recurrence and/or complication rates.

Methods

Consecutive patients with recurrent posterior instability with $\geq 15\%$ posterior glenoid bone loss undergoing posterior DTA reconstruction at a single institution were included. Patients were evaluated at ≥ 2 years postoperatively with American Shoulder and Elbow Surgeons (ASES), Single Assessment Numeric Evaluation (SANE), Simple Shoulder Test (SST), Visual Analog Scale (VAS), and Western Ontario Shoulder Instability Index (WOSI) outcomes assessments.

Results

Six consecutive patients with an average age of 20 ± 3.7 years (4 males, 2 females) were included. All patients (100%) had undergone previous ipsilateral shoulder stabilization surgery (average 1.2 ± 0.4 procedures) at an average 2.9 ± 1.1 years prior to posterior DTA. At an average follow-up of 33 ± 11 months (range, 24-49), excellent clinical outcomes were achieved, including average ASES of 97 ± 4 , SANE of 87 ± 13 , SST of 11 ± 2 , VAS of 0.3 ± 0.4 , and WOSI of $73 \pm 8\%$. One patient who had undergone 2 prior arthroscopic stabilizations was considered a failure at 6 months following DTA after presenting with atraumatic posterior subluxations, with evidence of graft lysis on follow-up CT scan; this patient elected to undergo removal of hardware without revision stabilization. There were no other postoperative complications. Analysis of CT data at an average 29 ± 21 months postoperatively (available for 4 patients) demonstrated graft incorporation without evidence of arthritis in 3 patients, and graft lysis in the 1 previously described patient.

Conclusions

Posterior glenoid reconstruction with DTA is a viable alternative option for patients with recurrent posterior instability with posterior glenoid bone loss. Longer-term studies are needed to determine if these results are maintained over time.



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682 Variability In Estimation Of Anterior And Posterior Glenoid Bone Loss

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Aim

The purpose of this study was to investigate the differences between anterior and posterior glenoid bone shape.

Background

Glenoid bone loss contributes to failure of soft tissue shoulder stabilization procedures. A best-fit circle is commonly used to estimate glenoid bone loss, though differences between anterior and posterior glenoid morphology may result in inaccurate assessment of bone loss.

Methods

Three-dimensional CT reconstructions of 26 cadaveric glenoids (46% left) from 26 donors (53.5±7.1 years; 92% male) were analyzed. Three independent reviewers used ImageJ to place 11 points along the inferior half of the glenoid (one point at 6 o'clock, 5 points from 3-6 o'clock and 5 points from 6-9 o'clock). A best-fit circle for the whole glenoid was determined from all 11 points. The anterior 6 points were used to determine an anterior-based circle, as would be used to estimate posterior bone loss. The posterior 6 points were used to determine a posterior-based circle, as would be used to estimate anterior bone loss. The area and center points were recorded for each of the three potential circles. Individual intraclass correlations (ICC) were used to evaluate reliability. Paired t-tests were used to compare areas of the anterior and posterior circles relative to the best-fit glenoid circle.

Results

The area and center for the best-fit circles demonstrated excellent inter-rater reliability with an ICC of 0.93 for area, 0.98 for X-center, and 0.97 for Y-center. The area of the anteriorly-based circles was 91.2±16.5% of the best-fit glenoid circle (p=0.0018). The area of the posteriorly-based circle was 111.2±20.1% of the best-fit glenoid circle (p=0.020).

Conclusions

Estimation of glenoid bone loss based on the normal anterior or posterior glenoid rim may result in inaccurate determinations of true glenoid bone loss due to differences in the radius of curvature of the anterior and posterior glenoid rim.



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681 Establishing Maximal Medical Improvement Following Arthroscopic Rotator Cuff Repair

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Aim

The purpose of this study was to establish a time frame for maximal medical improvement following arthroscopic rotator cuff repair (RCR).

Background

Two-year follow-up has been a general requirement for reporting outcomes following RCR; however, this time requirement has not been established scientifically and is of increasing importance in the era of value-based health care.

Methods

A systematic review of the literature was conducted to identify all studies reporting sequential patient reported outcomes up to a minimum of two years following arthroscopic RCR. The primary clinical outcome was patient-reported outcomes at 3-month, 6-month, 1-year, and 2-year follow-up. Secondary clinical outcomes included range of motion (ROM), strength, retears, and complications. Clinically significant improvement was determined between various time intervals using the minimal clinically important difference (MCID).

Results

Overall, 19 studies including 1370 patients that underwent arthroscopic RCR were included. Clinically significant improvement in patient-reported outcomes was seen up to 1 year post arthroscopic RCR, but no clinical significance was noted from 1 year to 2 years post-surgery. The majority of improvement in strength and ROM was seen up to six months, but no clinically meaningful improvement was seen thereafter. All reported complications and the vast majority of retears occurred within six months following arthroscopic RCR.

Conclusions

Following arthroscopic RCR, a clinically significant improvement in patient-reported outcomes, ROM and strength was seen up to one-year post-surgery, but not beyond this. This information is not only important to establish appropriate patient expectations, but to establish time frame for outcome collection following surgery to better define value in orthopaedic care.



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621 Post-Operative Management Of Elbow Contracture Release: An International Survey Of Elbow Surgeons

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Aim

The purpose of this study is to present the perspective of elbow surgeons worldwide regarding post-operative management of elbow contracture release.

Background

Elbow contractures can be detrimental to upper extremity function. While there is a general agreement that operative intervention is warranted after failure of conservative treatment, there is limited agreement on how these cases should be managed post-operatively. This study presents the results of an international survey of elbow surgeons regarding post-operative management of elbow contracture release.

Methods

A 23-question survey evaluating post-operative protocols for elbow contracture release was distributed to 880 members of the American Shoulder and Elbow Surgeons, the Mayo Elbow Club and the Mayo Clinic Teach The Teachers Advanced Elbow Surgical Skills Course. The survey focused on continuous passive motion (CPM), physical therapy, bracing, nerve blocks, drain management, NSAIDs, and radiation administration in addition to surgeon experience and opinions on elbow contracture release.

Results

237 (27%) surgeons from over 30 countries responded to all or some of the questions. The majority (82%) surveyed felt that postoperative management affects outcomes of contracture release. 86% prescribe physical therapy regardless of whether or not they believe it makes a difference in the results. 40% use CPM and 32% use immobilization as part of the rehabilitation, although the immobilization protocols vary significantly. Nerve blocks are used by 69% and drains by 29% in their post-operative protocols. NSAIDs are prescribed by 79% of respondents while only 6% use radiation on a regular basis to prevent heterotopic ossification. Improvement in arc of motion, specifically full functional flexion, was the most important goal post-operatively.

Conclusions

This study highlights the variety of post-operative protocols in elbow contracture release. There is a need for well-designed studies to investigate post-operative care and its impact on overall cost and patient outcomes.



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630 Reverse Total Shoulder Arthroplasty Offers A Stable Limb-Salvage Option For Proximal Humerus Tumor Resection Independent Of Deltoid Involvement

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Aim

The purpose of this study is to assess the stability of a reverse total shoulder arthroplasty (RTSA) after proximal humerus resection with and without deltoid detachment.

Background

The proximal humerus is a relatively common location for oncologic bone pathology, both primary and metastatic. Preservation of the shoulder girdle can greatly affect quality of life for these patients. Shoulder arthroplasty, specifically reverse total shoulder arthroplasty (RTSA), can be a limb-salvage option for patients with such pathology but an intact deltoid muscle is usually required.

Methods

We retrospectively evaluated 21 patients at our institution that underwent proximal humerus resection for tumor followed by limb-sparing reconstruction with a RTSA. The endpoints measured included the rate of dislocation, post-operative range of motion (ROM), effect of allograft use and radiographic survival.

Results

Of the 21 patients, 5 had primary bone pathology and 16 metastatic disease at the proximal humerus. All were treated with a RTSA, 12 with a segmental revision system (SRS) implant and 9 with a standard RTSA. Five of the nine with a standard RTSA implant also had an allograft prosthetic composite (APC). 10 had an intact deltoid and 11 had a deltoid release and subsequent reconstruction intraoperatively. The only dislocation was in the RTSA with intact deltoid group. Post-op passive elevation ranged from 40-160 degrees with an average of 106 intact deltoid group and 68 for the deltoid reconstruction group. There was no difference in ROM with APC (90 vs 89, $p=0.49$) or radiation administration (93 vs 82, $p=0.27$). No evidence of radiographic loosening was seen in either group.

Conclusions

This study shows that RTSA with or without allograft is a stable, viable option for limb-sparing surgery in the patient with proximal humerus tumor burden involving the deltoid insertion.



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**623 Displaced Humeral Shaft Fractures:
Union And Complications Following Anterior Dual-Plate Fixation**

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Aim

The aim was to determine the union rate and complication rate associated with anterior dual-plate fixation of humeral shaft fractures.

Background

The humerus is subjected to rotational loads, but the standard internal fixation methods for displaced humeral shaft fractures do not sufficiently control rotation. The nonunion rate ranges from 3% to 12%. We performed a two-center retrospective study of anterior dual-plate fixation of these fractures.

Methods

Thirty-eight patients with a mean age of 53.7 years (range 15-97) were operated over a 9-year period at two hospitals. Internal fixation with two, 3.5-mm locking plates was performed through an anterolateral approach; six screws were placed on either side of the fracture line. Fracture union was evaluated by two independent surgeons and defined as the presence of three continuous cortices (out of four) on two orthogonal X-ray views.

Results

All the fractures were analyzed after at least 1 year of follow-up. There were three open fractures (8%) and the fracture was in the dominant arm in 21 cases (56.7%). There were 11 polytrauma patients (29%). The duration of surgery was 78 minutes (40-124). Radial palsy was present preoperatively in nine cases (25%) and postoperatively in one case (2.6%). The mean time to union for all the patients was 11 weeks (range 6-28, median 8) with no cases of brachialis osteoma. All the palsy cases resolved. One patient suffered an infection (5%). The Constant score was 84.6 (35-100), the SSV score was 80.7 (60-100), the QuickDASH was 13.5 (0-38.3) and the MEPS was 85 (55-100).

Conclusions

The simplicity of anterior dual-plate fixation and the relatively short surgery time may have contributed to the low infection rate reported here. This type of fixation has more screw positioning options and allows the radial nerve to be examined and released in cases of preoperative palsy.



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624 Shortening Osteotomy Of The Proximal Radius - Preliminary Results Of An Innovative Surgical Technique

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Aim

This study aimed to present preliminary results of proximal radial shortening for treatment of radiocapitellar osteoarthritis.

Background

Symptomatic osteoarthritis of the radial column represents a possible complication following radial head fractures. If conservative therapy fails, treatment options become limited - in particular for young and active patients. Possible "salvage procedures" are invasive and range from radial head resection over radial head arthroplasty to interposition arthroplasty. A recent biomechanical analysis showed that shortening osteotomy of the proximal radius of 2.5 mm can effectively decrease radiocapitellar contact pressures while preserving primary valgus stability.

Methods

We prospectively evaluated the first 4 cases of patients who underwent proximal radial shortening (osteotomy at the radial neck; 2.5 mm shortening; ORIF with a locking radial head buttress plate) for treatment of symptomatic osteoarthritis of the radial column. The mean age of patients was 41±13 years. The mean follow-up was 18±9 months. Initially, 2 patients suffered a Mason type II fracture, 1 patient sustained a Mason type I fracture and 1 patient had a terrible triad injury. The Mayo Elbow Performance Score (MEPS), the Quick-DASH, the range of motion (ROM) and the pain levels according to the visual analogue scale (VAS 0-10) were obtained.

Results

The mean MEPS increased from 61±10 pts preoperatively to 96±8 pts at the latest follow-up. The Quick-DASH improved from a mean of 31±13 pts to 5±5 pts. The ROM increased from an average 108° to 137°. The pain levels dropped from 6±2 pts to 1±1 pts. No complications were observed. One patient opted for implant removal 13 months postoperatively.

Conclusions

The promising biomechanical results of shortening osteotomy of the proximal radius are supported by the current case series. All of our patients showed clinical improvement. A longer follow-up is necessary, however, to evaluate whether long-term benefits can be observed following this procedure.



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618 Imaging Diagnosis Of Radial Head Fractures - Evaluation Of Plain Radiography Vs CT Scans

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Aim

This study aimed to compare x-ray estimations of fracture classification, percentage of articular fracture involvement and fragment sizes of radial head fractures with CT scan evaluations.

Background

Radial head fractures represent a common pathology, which can cause permanent disability if not treated correctly. Plain radiographs as well as CT scans represent important diagnostic measures. The specific differences of these two imaging modalities with regard to diagnosis of radial head fractures have not been evaluated thus far.

Methods

52 consecutive cases of radial head fractures with plain radiographs and CT scans were evaluated retrospectively. Two observers analyzed the fracture classification, the percentage of articular fracture involvement and the fragment sizes by means of CT. Three trauma surgeons estimated these parameters through plain radiographs. Intra- and inter-observer reliability were evaluated.

Results

The CT scan evaluations showed high intra- and inter-observer reliability without significant differences between the two observers. X-ray estimations of fracture classifications showed only slight or fair agreements. Moreover, the estimations of articular fracture involvement and fragment sizes differed significantly from the CT scan evaluations. While the fragment sizes were underrated, the articular involvement tended to be overrated.

Conclusions

This study shows that plain radiographs often provide insufficient information regarding classification, percentage of articular fracture involvement and fragment sizes of radial head fractures. When in doubt, an additional CT scan should be carried out to assess the injury in greater detail.



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632 Comparison Between xCELLigence Biosensor Technology And Conventional Cell Culture System For Real-Time Monitoring Human Tenocytes Proliferation And Drugs Cytotoxicity Screening

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Aim

To determine human tenocytes can successfully proliferate inside xCELLigence system and the result has high correlation with conventional cell culture methods in the same condition.

Background

Local injections of anesthetics, NSAIDs, and corticosteroids for tendinopathies are empirically used. They are believed to have some cytotoxicity toward tenocytes. The maximal efficacy dosages of local injections should be determined. A commercial 2D microfluidic xCELLigence system had been developed to detect real-time cellular proliferation and their responses to different stimuli and had been used in several biomedical applications.

Methods

First passage of human tenocytes was seeded in xCELLigence and conventional 24-well plates. Ketorolac tromethamine, bupivacaine, methylprednisolone and betamethasone with different concentrations (100%, 50% and 10% diluted of clinical usage) were exposed in both systems. Gene Expression of Type I collagen, type III collagen, Tenascin-C, Decorin, and Scleraxis were compared between two systems.

Results

Human tenocytes could proliferate both in xCELLigence and conventional cell culture systems. Cytotoxicity of each drug revealed dose-dependency when exposed to tenocytes in both systems. Significance was found between groups. Four drugs had comparable cytotoxicity in their 100% concentration. When 50% concentration was used, betamethasone had a relatively decreased cytotoxicity among them in xCELLigence but not in conventional culture. When 10% concentration was used, betamethasone had the least cytotoxicity. Strong and positive correlation was found between Cell Index of xCELLigence and result of WST-1 assay (Pearson's correlation $[r] = 0.914$). Positive correlation of gene expression between tenocytes in xCELLigence and conventional culture was also observed.

Conclusions

Human tenocytes could proliferate inside xCELLigence system. These responses varied when tenocytes were exposed to different concentrations of ketorolac tromethamine, bupivacaine, methylprednisolone and betamethasone. The result of cell proliferation and gene expression of tenocytes in both xCELLigence and conventional culture system is strongly correlated.



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752 Fractures Of The Proximal Humerus Treated With Locking Plate Fixation And Augmentation

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Aim

To present our early results from augmentation with allo- and autografts for 3- and 4-part fractures of the proximal humerus, stabilized with locking plates.

Background

The fractures of the proximal humerus still have high complication rates and unsatisfactory results with PHILOS.

Methods

For a period of 3 years 70 patients (51 female and 19 male) with mean age 69 years were operated with locking plates. According to the Hertel criteria, 40% of the patients were eligible for primary arthroplasty. Proximal humeral fractures were distributed as follows: 30 patients (12 with 3-part and 18 with 4-part fractures, 10 of them with varus dislocation and medial metadiaphyseal comminution) were stabilized with additional supplementation with 3-cortical autologous bone graft. Of the remaining 40 (18 with 3-part and 22 with 4-part fractures; 30 in varus and 18 with medial comminution), 20 were stabilized with additional supplementation with fibular cryoallografts, 20 – with lyophilized tibial strut allografts; 47 patients were operated with MIPO LTD approach, and 23 – with DP approach.

Results

64 fractures healed. Secondary varus deformation was found in 6 patients despite the augmentation, cut-out – in 2, screw penetration in 4, impingement in 8, malreduction in 5, fixation failure in 2 and infection in 1 patient. CS 80: 4 poor, 7 acceptable, 35 good and 24 excellent results..

Conclusions

The additional augmentation with auto- and allografts decreases the secondary varus dislocation, especially in patients with metadiaphyseal comminution. The filling of the metaphyseal defect also has beneficial effect and decreases the risk for secondary collapse.



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635 Prospective Study Of A Consecutive Series Of 40 Humeral Lateralized Reverse Prosthesis With 2 Year Of Follow Up

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Aim

To evaluate the 2 years results and complications of an humeral lateralized reverse prosthesis.

Background

To reduce scapular notching, improve passive external and internal rotation and reduce dislocation rate, several authors proposed a lateralization of the center of rotation of reverse prosthesis. In this study results of reverse shoulder prosthesis with a lateralized (145° neck-shaft angle) humeral stem are described.

Methods

40 patients operated with an humeral lateralized reverse shoulder prosthesis were prospectively followed up clinically and radiographically at 6 months, 1 and 2 year. Indication for surgery were: cuff tear arthropathy in 25 cases (63%), irreparable rotator cuff tears in 5 cases (12%), proximal humerus fracture in 8 cases (20%), anterior static luxation in 2 cases (5%).

In 33 (82%) and 7 patients (18%) the stem was implanted without and with cement, respectively. Preoperative and follow-up Constant score, scapular notching or spur, humeral cortical bone narrowing, periprosthetic radiolucency, arm lengthening, and any complication were registered.

Results

Constant score improved from 30 to 69 points. Active anterior elevation improved from 70° to 130°. Grade 1 scapular notching and bony scapular spur were observed in 3 patients (7,5%). No case of notching greater than 1 was observed. A lateral cortical bone narrowing in Gruen zone 2 was registered in 18 patients (45%). Other complications were observed in 4 cases (10%) and specifically: 1 infection (2,5%), 1 inferior heterotopic ossification (2,5%), 1 temporary ulnar nerve palsy (2,5%), 1 glenoid k wire breakage (2,5%).

Conclusions

Lateralized reverse prosthesis by means of a 10° reduction of neck-shaft angle considerably reduce scapular notching in confront to previous reported results. An isolated humeral zone 2 cortical bone narrowing was observed in 55% of uncemented stem. This stress shielding phenomenon was more frequent than previous report and its long term clinical meaning should be further evaluated.



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662 Prospective Comparative Study Of Conservative Treatment Versus Reverse Shoulder Prosthesis In Patients Older Than 70 Affected By Displaced 3-4 Part Proximal Humerus Fracture

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Aim

To evaluate clinical outcome of patients older than 70 treated conservatively or operated with a reverse shoulder prosthesis for a displaced proximal humerus fracture.

Background

Different studies debate the benefits of surgical treatment for proximal humerus fracture. However, reverse shoulder arthroplasty was considered by different authors a correct treatment for old patient with displaced 3-4 part fracture and poor bone quality. No prospective study comparing these treatments was performed before.

Methods

40 patients, older than 70 year, affected by a varus or valgus displaced, 3 or 4 part fracture were enrolled in this study. 20 patients, operated with a reverse shoulder prosthesis, were included in the study group, while 20 patients, who declined surgical treatment or who were conservatively treated in an another hospital, were included in the control group. Exclusion criteria were severe comorbidities with an asa score greater than 2, Alzheimer's disease or any other condition affecting adhesion to a rehabilitation program. Patients were followed up at 1, 6, 12 months from the trauma with Costant score (CS), subjective shoulder value (SSV) and plain x-rays.

Results

CS and SSV were significantly greater in study group compared to control group only at 12 months follow up. A wide variability for both CS and SSV was observed in control group, with no clear prognostic factor identified. Major orthopaedic complication rate was similar in both group, with no reoperation in the study group. General complication (a GI bleeding and an acute atrial fibrillation) were observed in 2 patients of the study group.

Conclusions

Surgical treatment with reverse shoulder prosthesis improve the one year clinical results of displaced proximal humerus fracture in patients older than 70. Conservative treatment should be indicated only in low demand patients, patients with a low life expectancy or with a difficult adhesion to a long rehabilitation program.



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636 Culture Positivity In Primary Total Shoulder Arthroplasty

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Aim

This study aims to determine the rate and characteristics of positive intraoperative cultures in a cohort of patients undergoing primary shoulder arthroplasty (SA).

Background

A high percentage of positive cultures have been reported in the revision shoulder surgery setting. However, in some series of primary shoulder arthroplasty surgeries similarly high rates of positive cultures have been reported. The high rate of positive cultures in the setting of primary surgery where infection is not suspected raises questions about the clinical significance of these positive cultures.

Methods

From February 2015 to March 2016, 94 patients, without prior surgery, underwent primary SA. Prior to surgery, all shoulders were prospectively enrolled and consented to obtain standardized intraoperative cultures. All patients received standard preoperative antibiotic prophylaxis. Four standardized fluid and tissue locations were sampled and sent for aerobic and anaerobic cultures held for 13 days. Patients and surgeon were blinded to the culture results.

Results

Average age at surgery was 70.5 (range: 46-91) years and 45 (47%) of them were male. At least one positive culture was found in 35 (37%) shoulders, with 17 (18%) having ≥ 2 positive cultures. *Propionibacterium acnes* was the most common organism (68%), followed by coagulase negative *Staphylococcus* (19%), *Staphylococcus aureus* (3%), and other (26%). The rate of positive culture was higher in males than females (males 51% vs. females 25%, $p = 0.01$). *P. acnes* was more common in male patients with positive cultures (91% vs. 17%, $p < 0.001$) and coagulase-negative *Staphylococcus* and *Staph epidermidis* was more common in female patients with positive cultures (42% vs. 9%, $p = 0.03$).

Conclusions

A high percentage of patients undergoing primary SA develop positive deep tissue cultures despite antibiotic prophylaxis. The long-term clinical implication of this finding requires further study especially with regard to the risk of late failures of shoulder arthroplasty.



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876 LATARJET PROCEDURE: EVOLUTION OF THE BONE BLOCK AND CORRESPONDENT CLINICAL RELEVANCE. A CLINICAL AND RADIOLOGICAL STUDY

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Aim

the aim of the study is to assess the relationship between the accuracy of the positioning of the coracoid graft, its integration, its reabsorption and the clinical results of patients operated on with the Latarjet procedure.

Background

this study provides information in regard to the evolution of the coracoid bone block.

Methods

twenty-four patients affected by recurrent anterior shoulder dislocation, operated on using the Latarjet procedure were enrolled in this study. At twelve months post-op, patients were evaluated with the following scales: ROWE, WOSI, Oxford Instability Score, UCLA, DASH, and Constant score. Patients underwent two post-operatives CT scans, immediately after surgery (T0) and at twelve months post-op (T1).

Results

at twelve months, none of the patients reported further episodes of dislocation. Clinically at the final follow-up we found excellent results in all the evaluation scales. Mean reduction of bone graft from T0 to T1 was 42% of the overall volume; similarly reduction of the overall surface was 29.3%; decrease of length, width, and depth was respectively 3.4mm, 2.2mm and 1.0mm; all these parameters decreased significantly ($p < 0.05$). No correlations were found between radiological parameters and clinical and functional outcomes.

Conclusions

the results confirm that a lack of integration or a significant reabsorption of the graft is regularly present in the Latarjet procedure, but they do not significantly affect the clinical and functional results.



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652 Allograft Interposition Arthroplasty In In Young Patients With Post-Traumatic Elbow Osteoarthritis

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Aim

To describe the outcomes of the allograft interposition arthroplasty (IPA) performed in young patients with post-traumatic elbow stiffness and osteoarthritis.

Background

Post-traumatic elbow osteoarthritis may cause pain, stiffness and loss of function. Restoring movement and stability is a challenging in these cases. Outcomes of partial arthroplasty and arthrolysis are not so encouraging. On the other side, total elbow arthroplasty has shown a short rate of survivorship in high demand patients. IPA may be considered as a treatment option in post-traumatic elbow stiffness, which may restore a functional range of motion while providing a painless joint, and preserving bony structures in case of a further total elbow arthroplasty.

Methods

6 cases of IPA in young male with painful elbow stiffness, secondary to post-traumatic osteoarthritis, during 2004 to 2015 were included. Mean age was of 42 year-old (29-52). Through a posterior approach, the ulnar nerve was identified and transposed. Distal triceps deinsertion, interposition arthroplasty (5 achilles tendons and 1 fascia lata) and reconstruction of capsuloligamentous structures were then performed. Clinical and radiological evaluation were performed at a mean follow-up of 39 months (12-96). Mayo Elbow Performance Score (MEPS) and Visual Analogue Scale (VAS) were used to evaluated clinical results.

Results

Preoperative MEPS and VAS mean scores were 42 (30-54) and 7.5 (7-8), respectively. Postoperative MEPS and VAS mean scores were 70 (60 - 90) and 0.8 (0-2). All six patients in the follow-up had a good range of motion, joint stability, and all patients were satisfied with the final outcome. Only one patient could return to his previous job occupation.

Conclusions

Allograft interposition arthroplasty may be a good alternative for the treatment of young active patients with post-traumatic elbow stiffness and osteoarthritis.



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672 Ejnisman's Superior Portal And Modified "chicken-Wing" Patient Position For Scapulothoracic Arthroscopy: A Technique Description

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Aim

The aim of the present study was to describe 25 cases of scapulothoracic arthroscopy using an alternative superomedial portal and modified chicken-wing position to improve access to the scapulothoracic.

Background

Scapulothoracic arthroscopy is performed for the treatment of scapulothoracic joint disorders, such as scapulothoracic bursitis, snapping scapula and osteochondroma of the anterior scapula surface, and in the extraction of firearm projectiles

Methods

A total of 25 scapulothoracic arthroscopies were performed to treat symptomatic snapping scapula in 23 patients, including one bilateral case and one relapse case. The surgical procedure was begun by placing the patient on ventral decubitus with the affected limb in maximum internal rotation (chicken-wing position), which was modified by placing a pad underneath the scapula (pad anterior to the affected scapula) and with lateral support of the shoulder in the medial direction, with consequent posteriorization of the scapula. The use of a portal at the level of the superomedial angle of the scapula, Ejnisman's portal, provides direct access for bursectomy and resection of the superomedial angle of the scapula of up to 2 cm, thus avoiding the need for levator scapulae muscle disinsertion.

Results

A total of 23 cases of snapping scapula exhibited significant improvement of pain as assessed using the VAS; the score decreased from 7.7 to 0.6 ($P < 0.001$). The UCLA scale score also improved, from 17.8 to 33.4. We considered that 18 arthroscopies exhibited excellent results, five good, one fair and one poor. Neurovascular injury or infection did not occur in any patient.

Conclusions

We conclude that Ejnisman's (superomedial) portal can be safely used, especially when the modified "chicken-wing" position is adopted, provided that the surgeon has mastery of the anatomy of the region targeted in the surgical procedure, as well as the surgical technique.



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673 Reverse Total Shoulder Arthroplasty For Treatment Of Three And Four Part Proximal Humeral Fractures

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Aim

Our aim is to analyse the cases of three and four part proximal humeral fractures treated by reverse shoulder arthroplasty, regarding functional results and complications.

Background

Osteosynthesis of complex proximal humeral fractures is associated with high rate of failure in the osteopenic bone of the elderly patient. While hemiarthroplasty has shown unpredictable outcomes, reverse shoulder arthroplasty achieved good results in older patients with poor potential for tuberosity healing.

Methods

From 2012 to 2016, 29 fractures in 27 patients (25 women) undergo reverse shoulder arthroplasty for complex proximal humeral fracture. The mean age was 73.8 years. Patients were evaluated according to demographic data and surgical complications. Functional outcomes were measured through the Quick Disabilities of the Arm, Shoulder and Hand (Quick-DASH) score. The Constant-Murley score was assessed in both arms for comparison. A radiographic analysis was performed in the cases reviewed.

Results

Two patients died (for reasons unrelated to surgery) and 8 were lost to follow-up, so that the series included 19 cases (17 patients) for analysis. The mean follow-up was 22.4 months (6-47). The mean Constant-Murley score for the operated shoulder was 64,3 and the mean difference between affected vs good side was 18,5. The mean Quick-DASH score was 20,5. The mean active anterior elevation was 120,5°, abduction 106,3° and external rotation 34,6°.

Regarding complications we report one case of periprosthetic fracture, 2 years after surgery, one case of dislocation with great tuberosity fracture, on the second postoperative week, and two infections. Radiographs revealed five cases of glenoid notching.

Conclusions

The results obtained are similar to those published in other series. So far, this procedure appears to be safe and effective in the treatment displaced three and four-part proximal humeral fractures in elderly patients; however studies with longer follow up are necessary to understand the evolution of shoulder function in the long term.



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676 A Point-Based Model To Predict Absolute Risk Of Revision In Shoulder Arthroplasty

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Aim

To construct a predictive model for risk of revision surgery after shoulder arthroplasty.

Background

Shoulder arthroplasty has demonstrated good long-term survivorship, however younger age and osteoarthritis have been associated with early implant failure.

Methods

All patients who underwent shoulder arthroplasty in Ontario, Canada, were identified using data housed at the Institute for Clinical Evaluative Sciences (ICES). Demographic variables included time to revision surgery (or death), age, sex, Charlson comorbidity index, income quintile, presence of rheumatoid or OA and surgeon experience/volume. Cumulative incidence function was used to account for competing risk of death. Fine and Gray's sub-distribution hazard model (time to event analysis) was used with death treated as a competing risk. Discrimination of the model was assessed using Wolber's concordance index for models with competing risk. Concordance indexes at time points were estimated using bootstrap cross validation with 1000 bootstrap samples. Loss of predictive accuracy of the age based points scoring system was examined by regressing the incidence of revision on subjects' score.

Results

During the study period, 8,006 patients underwent either HHR or TSA and 424 (5.3%) underwent revision. Patient age (hazard ratio 0.974 $p < 0.001$) and surgeon experience > 25 years (HR 0.758, p -value 0.04.3) were associated with revision risk. Osteoarthritis and the interaction term between osteoarthritis and patient age < 55 approached significance (osteoarthritis HR 0.815, $p = 0.058$), interaction term HR 1.484 ($p = 0.054$). A point-based risk score was developed using age, osteoarthritis, and surgeon experience. Predictive curves were generated to calculate risk of revision. Each additional point score has an increased risk of revision of 12% (confidence interval 1.09-1.14). Highest concordance index achieved at year 10 was 0.63.

Conclusions

A predictive model was constructed to calculate absolute risk of revision of shoulder arthroplasty. Validation studies that apply this model to other cohorts should be done to test its performance across distinct populations.



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702 Clinical Outcomes After Medialization Of The Attachment Site Of Rotator Cuff Tendon On Chronic Retracted Rotator Cuff Tears

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Aim

This study evaluated the clinical and radiological outcomes after medialization of the attachment site of rotator cuff tendon on chronic retracted rotator cuff tears.

Background

In a patient with chronic large to massive rotator cuff tears, restoration of anatomical footprint are difficult due to tendon retraction with muscle atrophy and inelasticity. For such cases, medialization of rotator cuff insertion site from the original footprint is considered to be the less invasive and easier procedure. Although there have been

Methods

We reviewed retrospectively the record of the 169 patients who underwent arthroscopic modified Mason-Allen repair for large size or more full-thickness rotator cuff tear. Among them, 60 patients included criteria were divided into two groups according to the with (Group A; N=24) or without medialization (restore anatomical foot print; Group B; N=36) and compared. MR imaging was performed for a minimum of 12 months (mean, 15.2 months; range, 12-24) postoperatively to assess the radiological integrity. Clinical evaluation was performed at least 1 year after operation (mean 18.9 months; range 12-30) using VAS, ASES, UCLA and Constant score.

Results

The mean length in medialization was 10.53mm (range, 6.5 - 15.6). The re-tear rate was 8.3% (N = 2) in group A and 30.6% (N = 11) in group B and the difference was statistically significant ($P < 0.05$). On the last follow-up, the mean VAS, ASES, UCLA and Constant score improved significantly to 1.8, 85.3, 31.8, and 90.2 respectively in Group A, 1.4, 88.6, 31.0, and 89.4 respectively in Group B ($P < .001$), although there was no significant difference between the groups ($P = 0.165, 0.653, 0.250, 0.113$, respectively).

Conclusions

Medialization of rotator cuff tendon can be a one of the considerable treatment option in repairing rotator cuff tears with chronic retracted tendon.



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698 Clinical Outcomes And Repair Integrity After Arthroscopic Full-Thickness Rotator Cuff Repair: Suture-Bridge Versus Double-Row Modified Mason-Allen Technique

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Aim

This prospective study compared the clinical and radiological outcomes of patients who underwent arthroscopic full-thickness rotator cuff repairs by suture-bridge and double-row modified Mason-Allen techniques.

Background

Controversies surround ideal arthroscopic rotator cuff repair and, to date, no construct has demonstrated clinical outcomes superior to other techniques.

Methods

80 consecutive full-thickness rotator cuff tears, 1 to 4 cm in anterior to posterior dimension, for which arthroscopic repair was performed were included. A conventional suture-bridge technique was used in the first 40 consecutive shoulders (group A), and a double-row modified Mason-Allen technique was used in the next 40 consecutive shoulders (group B). Seventy-six shoulders (95%) underwent MR imaging or ultrasonography postoperatively. Clinical outcomes were evaluated a minimum 1 years (mean, 20.2 months; range, 12-44 months) postoperatively using VAS, UCLA, ASES, and Constant scores. The mean age at the time of the operation was 58.1 years (range, 40-80 years) in group A and 60.6 years (range, 33-82 years) in group B. The postoperative cuff integrity was evaluated a mean of 17.7 months (range, 8-40 months) postoperatively.

Results

At the final follow-up, the average VAS, UCLA, ASES, and Constant scores improved significantly, to 1.7, 31.6, 85.2, and 88.6, respectively, in group A and to 1.5, 30.8, 88.4, and 89.8, respectively, in group B (all $P < .001$); however, there was no significant difference between the 2 groups at final follow-up ($P = .483, .113, .095, \text{ and } .459$, respectively). The retear rate was 21.1% in group A and 13.2% in group B; ($P = .361$).

Conclusions

The arthroscopic double-row modified Mason-Allen repair resulted in comparable or superior postoperative clinical outcomes compared to arthroscopic suture-bridge repair. In addition, the double-row modified Mason-Allen group had a lower retear rate than the suture-bridge group. However, the postoperative retear rate did not differ significantly between the 2 groups.



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933 Arthroscopic Rotator Cuff Reconstruction: Anchor-Based Vs Transosseous? A Comparative Cohort Study

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Aim

Does anchorless arthroscopic rotator cuff (RC) repair provide comparable outcomes like a well established anchor-based technique?

Background

Open transosseous RC repair is still regarded as the gold-standard. Transosseous repair can now be performed arthroscopically. Little information is available about the outcome as compared to techniques using suture anchors.

Methods

Since 12/2011, 85 patients were enrolled in a prospective study. Inclusion criteria: medium to large tears 2.5-4cm in width. Until 11/2013, 35 patients (group A) were operated with a « Speed-Bridge » technique (Arthrex); thereafter 50 patients (group B) received a transosseous « X-Box » repair with the Arthrotunneler (Tornier). Preoperatively and with a minimum 2y FU patients were evaluated using the Constant Score (CS), Visual Analog Scale (VAS) and Subjective Shoulder Value (SSV). At 2y FU 24 patients had an MRI so far; more patients will be called back for MRI.

Results

56 patients have completed clinical FU. The CS rose from 46 to 86 in group A and from 49 to 90 in B with no significant difference between the two groups ($p=0.54$). Pain reduction was VAS 5.8 to 0.4 in group A and VAS 6.9 to 0.7 in group B ($p=0.06$). When comparing MRI results, the 18 patients of group B showed a better integration of the tendon at footprint and zero retears as compared to 2 retears in 6 patients of group A.

Conclusions

Patients in group A and B did not show significant differences in clinical outcome scores. At a minimum of 2 years FU patient pain reduction and function were similar. The material costs are lower for the transosseous technique (770 vs 1170 CHF). Surprisingly the MRI scans performed until now showed a tendency for better tendon healing for the anchorless group.



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716 The Minimal Difference Of Elbow Arc Of Motion Needed For Statistical Significance In Clinical Studies Using Rounded Data.

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Aim

The purpose of this study was to explore the effect of rounding errors on the validity of statistical tests applied in testing the difference of ROM data rounded to the next 5° interval.

Background

Visually measured range of motion (ROM) data are usually rounded to the nearest 5° interval and then recorded. The elbow arc of motion is usually rounded on both sides: flexion and extension. These data transformations reduce the information content which potentially introduces errors in statistical analysis.

Methods

We performed with R Statistical Package numerical simulation of t-test application on two data sets, as typically reported for elbow flexion-extension arc of motion. The test was performed on exact data and then repeated on the same data rounded to the nearest 5° interval. Diverging results were counted in order to find the rate of failure.

Results

Depending on the difference of means, the standard deviation and the number of cases the failure rate of the t-test after rounding reached up to 40%. The minimal difference of means needed for reliable t-test application depended on sample size and standard deviation. By increasing the number of cases the transition zone between true significant and true non-significant results gets steeper and lower, but rounding still caused up to 20% failure of the t-test.

Conclusions

The accuracy of statistical tests on rounded ROM data is limited due to loss of information after quantization to the nearest 5° interval. This affects parametric and non-parametric tests, as well as paired and unpaired tests. Potentially false conclusions might be published and consequently incorporated in clinical practice if rounding error is not controlled. In the future, the authors should specify how ROM has been measured and recorded, explicitly addressing rounding. Furthermore, they should test our new quantization assumption before continuing with comparative statistics.



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927 Full Thickness Posttraumatic Tears Of Supra- And Infrapinatus Tendons: Reasons For Failure After Arthroscopic Reconstruction

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Aim

To assess the outcome and determine indicators for failure after arthroscopic reconstruction of full thickness supra- and infrapinatus tendons tears with or without pseudoparalysis.

Background

Retears after reconstruction of two or more rotator cuff tendons may occur frequently and are associated with degeneration of the rotator cuff muscles. Tears of the infrapinatus tendon may rapidly cause irreversible fatty degeneration with poor clinical outcome.

Methods

Between January 2010 and December 2014, 31 full thickness posttraumatic ruptures of supra- and infrapinatus tendons have been reconstructed arthroscopically. All cases presented preoperatively with external rotational deficit and 12 of them with pseudoparalysis. A prospective case-series study was conducted. All patients were assessed clinically preoperatively and for follow-up controls at 3, 6, 12 months and every year after index surgery and by Scores (Constant Score, Simple shoulder test). An MR-arthrography was done prior to surgery and at two year follow-up. The data were correlated by regression analysis.

Results

A total of 27 patients (87,1%) out of 31 could be included in the study. The average follow-up was 45 months (Range : 26-61). The Constant Scores improved from an average of 47,6 preoperatively to 85,8 ($p < 0,001$) postoperatively. The mean external rotation of the operated shoulder was significantly lower compared to the opposite shoulder ($p < 0,05$) in ER1 24° (SD $\pm 28^\circ$) and in ER2 78° (SD $\pm 17^\circ$). Retears occurred in 13 cases (48,1%) with loss of external rotation in 5 cases. Muscle atrophy of infrapinatus could not be reversed even in patients with structurally successful repairs.

Conclusions

Patients with successful repair of supra- and infrapinatus tendons had an excellent outcome despite an external rotational deficit. Preoperative pseudoparalysis is not an indicator for poor outcome. The presence of a frozen shoulder with need for capsulotomy together with tendon reconstruction is associated with poorer clinical outcome and a higher retear rate.



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900 A Setback In Biologic Augmentation Of Rotator Cuff Reconstruction: Results Of A Pilot Study Using Cancellous Demineralized Bone Matrix As An Interpositional Augmentation For Enhanced Tendon-To-Bone Healing.

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Aim

The goal of this study was to evaluate tendon integrity and clinical outcome of arthroscopic rotator cuff reconstruction with DBM interpositional augmentation.

Background

Retear rates after rotator cuff reconstruction are currently around 20% increasing with worse tissue quality and in revision surgery. The problem is that the tendon heals to the bone in a scar tissue formation with diminished biological and biomechanical properties. Demineralized bone matrix (DBM) has proven to potentially recreate a more physiologic enthesis in animal models. Clinical results with augmentation of DBM are not yet reported.

Methods

15 patients with a posterosuperior rotator cuff tear (2,3-3,5 cm) were enrolled in this pilot study. A repairable subscapularis tendon rupture < Lafosse 3° was accepted. The tendon integrity was evaluated by magnetic resonance tomography (MRI) and classified according to Sugaya. Furthermore, the Constant Score (CS) as well as postoperative satisfaction with the procedure were assessed. In case of revision surgery biopsies were taken.

Results

Of the 15 patients 6 had a MRI confirmed re-tear of the rotator cuff and 4 needed revision surgery so far. The average preoperative Constant Score was 46, the postoperative Constant Score 71 ($p < 0.05$). Only 64% of the patients were satisfied with the surgery. Follow up investigation is still going on.

Conclusions

The results suggest that cancellous DBM because of its low osteoinductive potential is not adequate to promote tendon-to-bone healing in human beings. Generally, the value of animal models in biologic augmentation of tendon-to-bone healing and its transfer into the clinical setting needs to be considered with caution.



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862 A Randomized Clinical Trial Comparing Arthroscopic Double-Versus Single-Layer Reconstruction Of The Rotator Cuff: Short-Term Clinical And Radiological Results.

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Aim

To compare double-layer (DL-group, lasso-loop suture-bridge repair) versus single-layer (SL-group, common suture-bridge repair) arthroscopic rotator cuff reconstructions in a patient-blinded randomized controlled trial. The hypothesis was that the double- compared to the single-layer reconstruction has a lower risk of re-rupture and better clinical outcome in the short-term.

Background

The debate whether to reconstruct only the superficial tendinous part or also the deeper capsuloligamentous part of the rotator cuff is ongoing.

Methods

A total of 70 patients (Ø64years, 41m/29w) with a posterosuperior tear of the rotator cuff not extending 2.0-3.5cm (complete rupture of supraspinatus with partial rupture of infraspinatus tendon). A subscapularis tendon rupture Lafosse >3°, fatty muscular infiltration >2° was an exclusion criterion. The tendon integrity was evaluated by magnetic resonance tomography (MRI) and classified according to Sugaya. Furthermore, the Constant Score (CS) and the American Shoulder and Elbow Surgeon's Score (ASES) as well as postoperative satisfaction with the procedure were assessed pre- and postoperatively.

Results

Tendon integrity in the DL-group (5.7%) was significantly lower than in the SL-group (20.6%, $p=0.040$) approximately 18 months after the procedure. Two patients in the SL-group had to be revised (one after 6 weeks due to infection and one due to a return tendon). In both groups, scores significantly improved from pre- (CS-DL: 46.2 ± 16.8 , CS-SL: 44.2 ± 8.7 , ASES-DL: 42.0 ± 17.8 , ASES-SL: 50.2 ± 8.3) to postoperative (CS-DL: 74.3 ± 13.0 , $p<0.001$, ASES-SL: 78.2 ± 13.6 , $p<0.001$). However, a group comparison of postoperative outcome showed no significant differences. The majority of patients (91.4%) were very satisfied or satisfied with the arthroscopic procedure.

Conclusions

The results of this randomized controlled study demonstrated advantages of the double-layer technique versus a single-layered seam with respect to tendon integrity. Shoulder function was not significantly different in the short-term outcome.



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717 Three-Dimensional Morphometric Assessment Of Normal Shoulder With Automatic Software: Humeral Head Direction Is Correlated With Glenoid Orientation.

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Aim

To determine the morphometry of the normal glenohumeral joint (NGHJ) with a fully automatic software. We hypothesized that humeral head direction (HHD) was correlated with glenoid orientation.

Background

3D assessment of pathologic shoulder is currently described in the litterature. NGHJ 3D morphometry has never been described and normal gleno-humeral relation is poorly documented.

Methods

124 NGHJ were needed to perform a 3D description with an error of 2°. Inclusion criteria were undisplaced fractures, intraosseous tumors, acromioclavicular joint dislocation contralateral shoulder of a post-traumatic pathology. CT-scan was achieved for each shoulder. 3D segmentation and morphometric measurements were then performed by a fully automatic software (Glenosys, Imascap): glenoid version, inclination, area, radius of curvature, orientation and humeral head subluxation and HHD. HHD was the angle, projected in an orthogonal plane to the transverse axis, between the posterior axis and the line connecting humeral best-fit sphere center and the glenoid face center point. Statistical correlation was sought between glenoid orientation and HHD (Pearson correlation).

Results

40 males and 84 females with NGHJ were included (64yo±15, 65 right / 59 left). Glenoid area was 915mm²±163 on average, glenoid radius: 32mm±4, version: -6°±5, inclination: 8°±5. Humeral head subluxation was 59%±9 posterior to the scapular body plane. It was significantly and linearly correlated with glenoid version (p<<0.001). Glenoid orientation was meanly centered (39%), posterosuperior (39%) and superior (16%). HHD was mainly posterosuperior (46%), superior 20(%) and centered (25%). There was a highly significant linear correlation between three-dimensional glenoid orientation and HHD (p<<0.001).

Conclusions

It is the first 3D morphometric description of the normal glenoid. It can help to detect abnormal premorbid glenoid. In near 60% of cases, glenoid is not aligned with scapular body plane. HHD is correlated to glenoid orientation in normal cases and its abnormal variations could be related to soft tissue imbalance.



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768 The Benefit Of Glenoid Lateralization On Range Of Motion Of Reverse Shoulder Prosthesis: A Computer Motion Analysis.

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Aim

To compare the virtual ROM in RSA with and without lateralization of the glenoid and with INLAY and ONLAY humeral implants in CTA with software estimated motion assessment.

Background

Reverse shoulder arthroplasty (RSA) is commonly used in cuff tear arthritis (CTA). Early glenohumeral impingement is associated with decreased range of motion (ROM) and scapular notching.

Methods

Using CT-scans and 3D software (Imascap), we made preoperative virtual RSA planning and computer motion analysis in ten patients (5 men, 5 women, 80 ±6yo) with cuff-deficient arthritic shoulders. To avoid cofounding bias, only patients with E1 Favard glenoid (retroversion= 0 to-10°) were chosen. Humeral and glenoid prostheses were virtually implanted and 3D-ROM was analyzed. For glenoid lateralization and correction of superior inclination, we used a 12mm asymmetric graft (Angled BIO-RSA) with slight inferior reaming. Inclination-target was 0°, version-target was the native glenoid version. Two humeral components were tested: INLAY (155° inclined) and ONLAY (145° inclined). Four configurations were tested for each shoulder: (1) Non Lateralized Glenoid-Inlay Humerus, (2) Lateralized Glenoid (BIO-RSA)-Inlay Humerus, (3) Non Lateralized Glenoid-Onlay Humerus, (4) Lateralized (BIO-RSA)-Glenoid-onlay Humerus.

Results

Native glenoid data were: version=-7±4°, inclination=11±3°, humeral head subluxation=63±11%. Mean inferior reaming was 6±2mm. Flexion, extension, external and internal rotations, abduction, adduction were respectively 80±18°, 20±49°, 9±21°, 8±20°, 79±16°, 0±0° on average for Inlay groups; 87±62°, 25±47°, 9±10°, 52±41°, 76±11°, 4±4° for Onlay groups; 134±20°, 20±16°, 31±19°, 74±16°, 100±12°, 13±8° for BIO-Inlay group; 127±13°, 83±43°, 55±9°, 88±5°, 88±21°, 29±8° for BIO-Onlay group. BIO-Onlay and BIO-Inlay groups present a significantly better result in all tested motion (p<0.001 for all test). BIO-Onlay allowed a significantly better external rotation, extension and adduction than BIO-Inlay. No other difference was found between those two groups.

Conclusions

Glenoid lateralization leads to better ROM, due to delayed glenohumeral conflicts. Humeral ONLAY design further improves shoulder rotation in RSA.



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730 Comparison Between Arthroscopic Patch Graft And Superior Capsular Reconstruction For Irreparable Rotator Cuff Tears

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Aim

The purpose of this study is to compare the clinical results of arthroscopic patch graft and arthroscopic superior capsular reconstruction for symptomatic irreparable rotator cuff tears.

Background

Arthroscopic surgery for irreparable rotator cuff tears is challenging.

Methods

Thirty-two patients who received arthroscopic patch graft reconstruction (APGR) and 28 patients who received arthroscopic superior capsular reconstruction (ASCR) were enrolled in this study. We obtained the graft from a tensor fascia latae of affected side in all cases. Minimal follow-up period was 12 months after the surgery. The mean age of the patients at the time of the surgery was 66.3 years in APGR group and 68.4 years in ASCR group. In APGR group, the graft was attached medially to the stump of torn rotator cuff with strong sutures and laterally to the greater tuberosity with suture anchors. In ASCR group, the graft was attached medially to the glenoid superior tubercle and laterally to the greater tuberosity with suture anchors. We evaluated clinical results with Japanese Orthopaedic Association (JOA) score and repair integrity with postoperative MRI. We also evaluated relationship of preoperative fatty degeneration of torn rotator cuff and postoperative re-tear rate. We classified the fatty degeneration of rotator cuff according to Goutallier's classification.

Results

The JOA score was significantly improved in both groups at one year after the surgery. The re-tear rate, which was evaluated with MRI at one year after the surgery, in APGR and ASCR groups were 36% and 27% respectively. There were little relationships between preoperative fatty degeneration of torn rotator cuff and postoperative re-tear rate.

Conclusions

The re-tear rate had higher in APGR group, however postoperative clinical results was almost similar in both groups.



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942 Biomechanical Evaluation In Cyclic Loading After Total Shoulder Arthroplasty

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Aim

In this study, a novel test setup was used to quantify glenohumeral pressures for different motion patterns after total shoulder arthroplasty (TSA).

Background

While TSA is a generally successful procedure, glenoid loosening remains a common complication. Though the occurrence of loosening was related to patient-specific factors, biomechanical factors related to implant features may also affect the fixation of the glenoid component, in particular increased glenohumeral mismatch that could result in eccentric loads and translations.

Methods

Six cadaveric human shoulders were implanted with total shoulder replacements (Exactech, Inc., USA) and subjected to cyclic internal-external, flexion-extension and abduction-adduction rotations in a passive motion testing apparatus. The system was coupled to a pressure sensor system (Tekscan, Inc., USA) to acquire joint loads and to a Zebris system (Zebris Medical, GmbH, Germany) to measure joint kinematics. The specimens were subjected to a total of 2160 cycles and peak pressures were compared for each motion pattern.

Results

It was shown that during abduction the contact area between the humeral head and the glenoid component shifts from a posterior to an anterior position, while also moving inferiorly. For internal-external rotation a mean peak pressure of 8.37 ± 0.22 MPa was registered, while for flexion-extension a pressure of 9.37 ± 0.38 MPa and for abduction-adduction a pressure of 9.88 ± 0.07 MPa were obtained.

Conclusions

This study showed how glenohumeral pressures after TSA vary during simulated internal-external, flexion-extension and abduction-adduction rotations in a cyclic testing setup. It showed that peak loads are mainly obtained in abduction, and that these occurred mainly near the anterior part of the glenoid. Future steps involve implantation of other type of anatomical glenoid components to obtain different levels of glenohumeral mismatch and relating the 3D measurements of motion patterns to contact pressures.



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731 Scapula-Spine Distance, An Easy Way To Predict The Recovery Of The Shoulder Function After Accessory Nerve Palsy

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Aim

The aim of this study was to evaluate if the combination of scapula-spine distance (SSD) at 0 and 90 degrees abduction would be a predictor for the better recovery of the shoulder function after accessory nerve palsy. SSD was defined as the distance between the medial border of spine of scapula and spinous process of the same height.

Background

Accessory nerve palsy can occur following neck dissection surgery including cervical lymph nodes resection for the treatment of neck cancer, which results in loss of shoulder motion. Rehabilitation is essential for the recovery of shoulder motion, but an easy way to predict the recovery during the rehabilitation has not been established.

Methods

Thirty-eight shoulders in 30 patients (26 males, 4 females, mean age of 60.4 year) with accessory nerve palsy following neck dissection surgery were enrolled in this study. All patients underwent postoperative rehabilitation. SSD at 0 degree abduction (SSD0), SSD at 90 degree abduction (SSD90), and the active range of motion (ROM) in shoulder abduction in each time points (before operation, 1 week, 1 month, 3 month, 6 month, and 12 months after surgery) were measured. When the shoulder ROM were less than 80% of the preoperative ROM, shoulders were divided into group A ($SSD0 \geq SSD90$) and B ($SSD0 < SSD90$) according to the result of SSD measurement. The ROM gains at next time point were compared between two groups. Mann-Whitney U test was used for statistical analysis.

Results

Group A gained 25.5 ± 17.3 degrees while group B gained 16.4 ± 26.6 degrees at next time points. The gain of ROM was significantly greater in group A than in group B ($p=0.016$).

Conclusions

The combination of SSD at 0 and 90 degree abduction could be an easy and useful predictor for the better recovery of shoulder abduction function following accessory nerve palsy.



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920 Triceps Tear: A Magnetic Resonance Imaging Study Correlated With Operative Findings

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Aim

The objectives of our study were to determine the accuracy of MRI in evaluation triceps tendon tear.

Background

Distal triceps tendon tear is very rare injury accounting for less than 1% of all tendon tear. High suspicion & attention to clinical exam is crucial not to miss such injury thus avoiding significant disability that might happen from late diagnosis. Radiological evaluation play a major role in diagnosis and decision making whether to treat surgical for complete tear versus nonoperative for partial tear.

Methods

A retrospective chart review of patients diagnosed to have triceps tear at tertiary hospital between 2011-2015 yielded 13 patients with 15 triceps tear. Inclusion criteria was patient diagnosed with triceps tear and underwent surgical repair. Patients whom treated nonoperative or did not has preoperative MRI were excluded from the study. Total of 8 patients with 9 triceps tear were enrolled in the study. MRI of those patients were retrospectively reviewed by MSK radiologist and detailed description regarding type of tear (complete full thickness vs. incomplete partial) , location of the tear and retraction was described then correlated with our surgical finding.

Results

MRI findings of triceps tear yielded a sensitivity of 100% (9/9) in detecting tear. However MRI fail to differentiate type of the tear in cases out of 9 yielding specificity of 77.7%. MRI was accurate 100% in determining location of tear and amount of tendon retraction.

Conclusions

MRI is accurate tool in diagnosis of triceps tear, determining the location and the amount of retraction. However, MRI yield only 77.7% specificity in differentiating partial from complete tear. Combined clinical and radiological is paramount in decision making especially for partial tear.



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746 A Rare Combination Of Elbow Dislocation With Forearm Fractures - A Series Of 6 Cases

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Aim

To develop institutional recommendations for the treatment of this combined injury of the elbow and forearm.

Background

The association of a forearm fracture with elbow dislocation is a rare injury and only small series have been reported. Both simple and complex elbow dislocations have been described, as well as disruptions of the proximal radio-ulnar joint, with Wong-Chung proposing the addition of a fifth group to the Bado classification of the Monteggia fracture-dislocation - fractures of the radius associated with dislocations of the proximal radio-ulnar and/or elbow joints.

Methods

For a period of 1,5 years we have treated 6 patients with a combination of elbow dislocation and forearm fracture. Two had diaphyseal forearm fractures, 2 had diaphyseal fractures of the radius and 2 had distal forearm fractures. Three had posterior elbow dislocations (1 transolecranon fracture-dislocation, 1 terrible triad of the elbow and 1 elbow dislocation with radial head fracture) and 3 had posterior elbow dislocations with disruptions of the proximal radio-ulnar joint. All were treated operatively. X-rays and MEPS were obtained at 1, 3 and 6 months.

Results

At 6 months the average flexion-extension arc was 120 degrees, the average pronosupination was 110 degrees and the average MEPS was 86.8 (good). In 1 patient the radial fracture was malreduced, which lead to anterior dislocation of the radial head. All fractures healed and no major complications occurred.

Conclusions

In our series the stabilization of the forearm fracture inevitably lead to stabilization of the elbow joint, which shows that in such cases, contrary to the established order, the injuries should be addressed from distal to proximal. Also, the failure to restore the radius and/or the ulna leads to the development of a difficult to manage elbow instability.



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853 Clinical Outcomes And Complications Of Acute Distal Biceps Repair With Cortical Buttons

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Aim

The purpose of the present study was to systematically review the clinical outcomes and complications of the cortical button distal biceps fixation method.

Background

The button technique of distal biceps tendon repair provides strong biomechanical fixation thus allowing for early postoperative rehabilitation especially in high demand patients-

Methods

All methods followed the PRISMA guidelines. Included studies had to describe clinical outcomes and complications after acute distal biceps repair with cortical button fixation. Eligibility criteria also included English language, more than 5 cases with minimum follow-up of 6 months, and preferably usage of at least one relevant clinical score (MEPS, ASES, and/or DASH) for final outcome. A loss of at least 30° in motion—flexion, extension, pronation, or supination—and a loss of at least 30% of strength were considered an unsatisfactory result.

Results

The review identified 7 articles including 105 patients (mean age 43.6 years) with 106 acute ruptures. Mean follow-up was 26.3 months. Functional outcome of ROM regarding flexion/extension and pronation/supination was satisfactory in 94 (89.5%) and 86 (82%) patients in respect. Averaged flexion and supination strength had been reported in 6/7 studies (97 patients) and were satisfactory in 82.4% of them. The most common complication was transient nerve palsy (14.2%). The overall reoperation rate was 4.8% (5/105 cases).

Conclusions

Full restoration of ROM and strength after cortical button fixation may not be finally obtained as almost 18% of the patients in this review showed an unsatisfactory result. Clinical superiority of cortical button fixation has not yet been confirmed in the literature.

**BERLIN 2017 • GERMANY • SEPTEMBER 13-16****765 Coracoclavicular Cerclage With Heavy Sutures For Acute (Type III-V), AC Joint Disruption: Long Term Follow Up In 62 Patients.**

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Aim

To present the long term functional outcome of a simple coracoclavicular (CC) functional stabilization technique with the intention to restore both the anteroposterior and superior displacement of the clavicle.

Background

The optimal surgical treatment for acute acromioclavicular (AC) joint disruption remains controversial.

Methods

During 2007-2014, sixty-seven patients with an acute, complete, AC joint separation (62 male; 5 female; average age 35.8 years-old) underwent surgical reconstruction with a simple coracoclavicular (CC) stabilization technique in two centers. With this technique, both the superior and anteroposterior displacement of the clavicle can be easily controlled using two pair of non-absorbable sutures, one passed in front and one behind the clavicle, through a central drill hole, 2 cm from its lateral end, directly above the base of the coracoid. Passive shoulder motion was encouraged by the 2nd postoperative day. Functional and radiological outcome were assessed with the Constant and ACJI scores.

Results

Sixty-two patients were available for the last clinical and radiological evaluation. At an average follow up period of 3.8 years (range, 12 to 84 months), the mean Constant and ACJIS scores were 92.5 and 90 points in respect. Complications included 4 cases with slight loss of reduction, one recurrence of dislocation, one superficial infection, one fracture of the lateral end of the clavicle and two patients with persistence tenderness in the AC joint. The incidence of periarticular ossification was 19.6% and didn't affect the final outcome.

Conclusions

This technique may be an attractive alternative to the management of acute AC joint separations.



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750 Short Term Results For Custom Made Glenoid In Patients With Walch Type B2/C Glenoid Defects.Mohamed S. Galhoum¹, Simon P. Frostick², Amanda Wood³

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Aim

Aim of the study is to prospectively report the short term outcomes of Walch type B2/C glenoid deficiency reconstruction using custom made glenoid implants.

Background

Reconstruction of massive glenoid deficiency (walch type B2/C) is challenging. Numerous techniques have been described to address glenoid loss, however, the outcomes were unsatisfactory. Large glenoid defects (scapular vault) with excessive retroversion may cause inaccurate placement of baseplate which leads to early failure, dislocation, scapular notching and further loss of glenoid bone stock. Few recent studies have reviewed the outcomes of custom made glenoid prosthesis.

Methods

19 shoulders for 18 patients were operated in one centre by a single surgeon with a mean glenoid retroversion angle of 28.5 ± 9 and average of scapular vault length was 17 ± 3.3 mm. Patients divided into Group A: 4 patients received a custom glenoid combined with massive endo-prosthetic reconstruction Group B: 15 patients; 13 patients received a cementless baseplate with reversed total shoulder arthroplasty and two had cemented, all polyethylene, custom glenoid with anatomic shoulder. Implants were evaluated radiologically. Patient's pain, limitation and satisfaction were scored every 6 months. Group B were also assessed using the Oxford Shoulder and Constant scores.

Results

The mean follow-up was 24 months (range: 6-48 months). In groups A and B combined, pain intensity fell from 7 ± 2.7 to 2.7 ± 3 . Mean limitation improved from 8 to 6 ± 1.3 and postoperative patient satisfaction was 8 ± 2.6 . For group B, Oxford score rises from 17 preoperative to 30 ± 10 throughout follow-up period. Constant score increases from 33 preoperatively to reach 75.3 ± 20 in postoperative visits. No radiological loosening or glenoid displacement addressed throughout follow-up period except for one patient who sustained a trauma in early follow-up and the decision was made to revise it into hemiarthroplasty.

Conclusions

Custom made glenoid resulted in improving function, satisfaction and reducing pain in Walch type B2/C glenoid defects. Long-term results are required.



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941 Retrospective Evaluation Of The Clinical Outcome After Arthroscopic And Open Procedures In Osteochondritis Dissecans Of The Elbow - A Multicentre Study.

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Aim

The aim of this study is the retrospective evaluation of the clinical outcomes after surgical treatment of Osteochondrosis dissecans (OD) at the elbow joint.

Background

The hypothesis claims a significantly better outcome after operative treatment of lesions with fragment dislocation with osteochondral transfers than with microfracturing therapy.

Methods

The study participants were determined retrospectively in 5 operative centres between 2000 and 2015 with MRI-confirmed diagnosis of OD. A re-MRI, physical examination as well as the assessment of functional scores were performed for the postoperative evaluation.

Results

In the study, 124 patients were included. Patients had an average age of 15 years (11-23 years) with a preference for the male sex (67%). Eleven percent of the patients still showed a fixed osteochondral fragment (grade III), whereas a loose, but not dislocated fragment (stage IV) was seen in 50% and a dislocated fragment (stage V) in 32%. Microfracturing was chosen as the most frequent treatment method (62%), especially in stage IV (83%) and V (26%). In 13% of the cases, a therapy failure with complaint persistence was diagnosed, of which 7.4% were found in stage IV alone. A reconstructive method (OATS or Trufit) was then selected for a second intervention. Overall, the functional scores reflect a very good outcome after operative intervention (MEPS 84 pct +/- 19, Oxford score 54 pct +/- 25, DASH score 4.8 pts +/- 7, SEV 95% +/- 9). There is no significant difference in stage IV and V with respect to microfracturing or osteochondral transfer.

Conclusions

In literature the treatment of unstable chondral lesions in elbow joints is discussed controversially above all. Our results show very good results from higher-grade lesions (stage IV and V) even treated by microfracturing. In case of therapy failure, a procedure change with the choice of an osteochondral transfer should be considered.



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771 Arthroscopically Assisted Muscle Advancement Procedure For Irreparable Rotator Cuff Tear.

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Aim

The aim of this study was to describe a less invasive technique for arthroscopically assisted muscle advancement for irreparable rotator cuff tear and to investigate the clinical results.

Background

Muscle advancement procedure is the surgical technique for large and massive retracted rotator cuff. In this procedure, the supraspinatus and infraspinatus muscle are disinserted from the scapula and advanced laterally by keeping fascial continuity with rhomboid muscle. This procedure has been reported as open surgery, but we modified this technique to lessen invasiveness by utilizing arthroscopy.

Methods

Thirteen patients underwent this novel arthroscopically assisted muscle advancement for irreparable rotator cuff tears. Nine males and four females with an average age of 66.6 years old were followed for 31.0 months on average. The disinsertion of the supraspinatus and infraspinatus muscle were performed by using arthroscopy as an endoscopy and radiofrequency device. Working portal was placed at the medial border of the scapular spine and viewing portal was placed at the middle of the scapular spine. Clinical results were evaluated using the rating scale of the University of California Los Angeles (UCLA) scores, and repair integrity was investigated by Sugaya's classification on MRI.

Results

The mean UCLA scores improved from 12.2 points preoperatively to 31.7 points postoperatively. Postoperative MRI classification revealed 7 type I, 2 type II, 1 type III, 1 type IV, and 2 type V. The rate of recurrent tear (types IV and V) was 23.1%.

Conclusions

Our novel arthroscopically assisted technique for the muscle advancement procedure was useful method to improve clinical outcome for irreparable rotator cuff tears.



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835 Reverse Shoulder Arthroplasty For Glenohumeral Osteoarthritis With B2 Glenoid: Why Not A Superior Approach?

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Aim

To report short-term outcomes of BIO-RSA through a superior approach and supraspinatus suture, in glenohumeral osteoarthritis with B2 glenoid.

Background

It has been recently demonstrated that Reverse Total Shoulder Arthroplasty (RSA) could be a good treatment option for primary glenohumeral osteoarthritis with B2 glenoid and intact rotator cuff, because it allows posterior bone defect reconstruction and thus decreases the risk for glenoid loosening, known to be high with TSA. In this indication, it has been recommended to perform RSA through a deltopectoral approach, to preserve the intact superior cuff. However, subscapular healing is known to be involved in clinical outcomes and stability. We propose a subscapularis sparing superior approach in a series of RSA with primary glenohumeral osteoarthritis and B2 glenoid, with suture of the supraspinatus.

Methods

We retrospectively reviewed 8 shoulders (6 patients), mean age 66 years [57-81], with an implanted RSA for primary glenohumeral osteoarthritis, CT-diagnosed B2 glenoid and intact rotator cuff, operated between April 2015 and April 2016 with a BIO-RSA. Mean preoperative Constant Score was 26 [11-38]. Mean preoperative glenoid retroversion was 32° +/- 8,5 [18-47] and mean humeral head subluxation was 92% +/- 5 [82-98]. All patients had a bone graft reconstruction of the posterior glenoid defect (BIO-RSA), and suture of the supraspinatus. Clinical evaluation and X-Rays were available at a mean 13,5 months [7-26] follow-up.

Results

All patients had an increased Constant score (mean 69 [55-80]; $p < 0,015$) at last follow-up. All glenoid components had an inferior tilt, with a mean Levigne angle of 77° [69°-84°]. No glenoid implant was judged in high position, 1 was flush to the glenoid inferior rim, and 7 were low-positioned. No intra-operative or post-operative complication was reported.

Conclusions

RSA through a superior approach for B2 glenoid allowed easy glenoid exposure, preservation of the subscapularis and suture of the supraspinatus, with good short-term clinical and radiographical results.



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943 Biomechanical Analysis Of Different Cerclage Techniques And Additional „Internal Bracing“ For Stabilization Of Anterior Sternoclavicular Joint Instability.

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Aim

To biomechanically analyze two different cerclage techniques and an additional "internal bracing" for sternoclavicular joint (SCJ) stabilization.

Background

Different techniques are described for SCJ stabilization. Figure of eight graft augmentation has become somewhat a golden standard. However, tunnel placement in anterior-posterior (ap) direction is crucial carrying the inherent risk of injuries to vital retrosternal structures. Therefore, a technique with oblique drill holes has been described in order to minimize the risk of intraoperative complications.

Methods

A standardized sawbone model was used for testing. According to the described techniques the tunnels were placed in ap direction (Group 1) or oblique towards the posterior third of the joint line (Group 2). Tendon allografts were used for figure of eight reconstruction. Furthermore, the effect of an additional "internal bracing" with a tape-like suture has been investigated. N=6 models were used for testing on a hydraulic mechanical testing machine. Cyclic testing was performed to evaluate anterior stability (1 Hz, 0,25mm/sec; 200 cycles each, 50N to 550N, increased by 50N) followed by load to failure testing.

Results

Group 1 showed a significantly higher load to failure (936.9 ± 136.9 N) than group 2 ($434.5 \pm 20,2$ N) ($P < .0001$). During cyclic testing, all specimens of group 1 survived the 5-550 N phase while all specimens of group 2 failed during 5-450 N phase. Analyzing the additional tape augmentation, load to failure revealed 556.6 ± 190.9 N for tendon augmentation alone and 767.0 ± 123.7 N the „internal bracing“ group with additional tape augmentation ($P = 0,089$). The stiffness of the construct with tape augmentation was significantly lower than for tape augmentation alone and significantly higher than for graft augmentation alone.

Conclusions

Reduction of intraoperative risk by oblique tunnel placement during SCJ augmentation results in reduced primary stability. Additional "internal bracing" leads to enhanced stability and optimizes stiffness of the construct.



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**795 Surgical Management Of Infection After Shoulder Arthroplasty :
A Retrospective Analysis Of 23 Cases And Therapeutic Algorithm
Proposition.**

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Aim

The purpose of this study was to determine a standardized decisional algorithm by comparing retrospectively clinical, biological et radiographic outcome of different therapeutic procedures for infection after shoulder arthroplasty.

Background

There is no consensus regarding treatment of periprosthetic shoulder infections. In our unit, each case is discussed and a specific treatment is decided.

Methods

Between 2004 and 2014, 28 shoulders with a deep infection after shoulder arthroplasty were operated in our unit. Were included all patients who suffered from infection after shoulder arthroplasties, according to the Musculoskeletal Infection Society criteria. The minimum required follow-up was 2 year postoperatively. Management strategies for infected shoulder arthroplasties included debridement and intravenous antibiotic therapy, two- or single-stage revision surgery, prolonged spacer implantation and resection arthroplasty. Patients were assessed clinically and radiologically, and standard laboratory tests were carried out.

Results

We indentified 23 patients with a minimum follow up time of 24 months. The mean follow up period was 30 months. Eleven patients were treated by two-stage revision arthroplasty, 6 patients by a one-stage revision, 4 by resection arthroplasty without spacer and 3 by debridement. The most common organisms were Propionibacterium acnes (7/24) and Coagulase negative staphylococcus (CNS) (5/24). The Constant score was 27.8 for the resection arthroplasty group, 22.7 for the two-stage revision group and 30.6 for the one-stage revision group. Two patients received chronic antibiotic suppression. Complications included two prosthesis dislocations and one humeral fracture.

Conclusions

One-stage revision is an attractive therapeutic procedure in selected cases. Based on our series a therapeutic algorithm for infected shoulder arthroplasty can be proposed.



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836 A Biomechanical Comparison Of Different Suture Materials Commonly Used For Rotator Cuff Repair

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Aim

Evaluate the viscoelastic properties of 6 suture materials, commonly used in arthroscopic rotator cuff repairs, when subjected to physiological loads.

Background

Although many other factors affect the success of rotator cuff repairs, the viscoelastic properties of sutures may be a useful predictor of suture performance.

Methods

We evaluated 6 commercially available No. 2 sutures undergoing creep (n=7, 60N, 10min) testing to determine specimen stiffness, initial extension at 60-N load, total static creep (during 10 minutes loading), and relaxed elongation (material recovery 3 minutes after removal of load). Furthermore, cyclic (n=7, 10-45N, 0.5Hz, 500cycles) testing was carried on to determine dynamic creep, peak-to-peak displacement (displacement between peak and trough of loading cycle) and relaxed elongation. Mechanical testing was conducted on a material testing machine (Instron, Nordwood, MA) in phosphate-buffered saline solution (PBS) maintained at 37° C. The selected sutures were Ethibond (Ethicon, Somerville, NJ), FiberWire/FiberTape (Arthrex, Naples, FL), Orthocord (DePuy, Warsaw, IN) and Ultrabraid/Ultratape (Smith & Nephew, Memphis, TN).

Results

Regarding creep testing, FiberTape showed the greatest stiffness (23.9 ± 3.2 N/mm, $P < 0.001$), and the smallest amount of static creep (0.38 ± 0.10 mm, $P < 0.001$). FiberTape and FiberWire showed the smallest initial extension (1.17 ± 0.17 mm and 1.63 ± 0.25 mm respectively, $P < 0.001$). Ultrabraid showed the largest relaxed elongation (4.73 ± 0.73 mm, $P < 0.001$). Regarding cyclic testing, FibreTape exhibited the smallest dynamic creep (0.16 ± 0.09 mm, $P < 0.003$), and the smallest peak-to-peak displacement (0.20 ± 0.02 mm, $P < 0.001$). Ultrabraid showed the largest relaxed elongation (4.18 ± 0.83 mm, $P < 0.002$).

Conclusions

FiberTape consistently displayed smaller creep properties, greater stiffness and less extensibility than the other suture types studied. Ultrabraid showed the largest amount of relaxed elongation in both creep and cyclic testing. The contribution of suture properties, such as creep, to the cuff repair construct is yet to be investigated.



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886 The Loss Of The Sclerotic Line On The Anteroposterior Radiograph: Not Always A Prediction Of Osseous Lesions And No Correlation Between Bony Defect Size In The CTChristina - Garving¹, Felix Strangmüller², Nael - Hawi³, Peter Habermeyer⁴, Mark Tauber⁴

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Aim

The aim of this diagnostic study was to investigate if LGSL is a reliable sign to quantify glenoid bone loss.

Background

Computed tomography (CT) is the gold standard to describe the osseous lesions after anterior shoulder instability. The loss of glenoidal sclerotic line (LGSL) in the anteroposterior (ap) radiograph is considered as a reliable parameter to detect bony defects of the glenoid. Interobserver reproducibility of the LSGL and CT measurements were assessed and correlation between LGSL and the bony defect size measured in three different 3-dimensional (3D) CT methods was analyzed.

Methods

28 patients with recurrent anterior shoulder instability were included retrospectively. AP radiographs and 3D-CT images of the glenoid surface were obtained pre-operatively. Three independent observers evaluated these images and compared the LSGL in the plain radiograph with the 3D CT using the Pico, Ratio, and Glenoidindex methods. A LSGL was described in an absence of more than 5 mm from inferior glenoid edge. The exact defect in the radiograph was measured for each patient. Validity and reliability of the LSGL were assessed with Spearman correlation coefficients (r) and intraclass correlation coefficients (ICC).

Results

On CT scans, 24 of 28 shoulders (86%) with anterior instabilities showed a defect of the anterior glenoid rim. LSGL correctly predicted an anterior glenoid rim lesion in 10 cases (sensitivity, 42%), without any false-positive diagnosis (specificity, 100%). Comparing the defect sizes in the different measurement methods in the 3D CT there was no correlation with the LSGL.

Conclusions

Our findings suggest that the LSGL does not really predict a glenoid bone loss compared with CT and call into question its validity as a method of measurement. It only serves as a screening marker, additional imaging modalities like the CT scan are still necessary to detect relevant anterior glenoid rim lesions.



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898 Complications After Plate Fixation Of Acute Midshaft Clavicle Fractures Vs. Nonunions

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Aim

The aim of this study is to compare complications and re-operations after open reduction and Acumed plate fixation for acute midshaft clavicle fractures vs. nonunions.

Background

The role of operative treatment of midshaft clavicle fractures in reducing nonunion is well-established. However, there is a significant complication and re-operation rate. An important consideration when counseling patients is whether operative treatment of nonunion, if it develops after non-operative treatment, is associated with higher complication rate than acute fracture fixation

Methods

The study was retrospective. There were 90 patients in the acute fixation (AF) group and 20 patients in the non-union group. The mean follow-up was 8 and 15 months, respectively. Logistic regression analysis was used to assess if 'nonunion surgery' was a predictor of complications or re-operations.

Results

23/90 patients had complications in AF group. 7/20 developed 8 complications in the non-union group ($p = 0.4$). 12/90 required re-operations in the AF group compared to 5/20 in the nonunion group ($p=0.19$). When any complication or re-operation was considered, 'nonunion surgery' was not significant predictor for complications ($p=0.3$) or re-operations ($p=0.17$). When prominent metal work and its removal were excluded, surgery for nonunion became a significant predictor of re-operations ($p=0.04$) but not for complications ($p=0.07$). However, when delayed and non-union and their re-operations were excluded, 'surgery for nonunion' was not a significant predictor of complications ($p=0.3$) or re-operations ($p=0.59$).

Conclusions

The complication and re-operation rates were not higher after non-union surgery compared to acute fracture fixation and were mostly related to persistent delayed- or nonunion, rather than operative complications. When those complications and reoperations were excluded, 'nonunion surgery' was not a significant predictor of complications or re-operations. When counseling patients about treatment of midshaft clavicle fractures, a "higher complication rate after surgery for non-union, should it happen" should not be an argument against non-operative treatment.



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888 Systematic Review Of Current Evidence For Repair Of Degenerate Rotator Cuff Tears

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Aim

The aim of this study is review the current evidence for repair of degenerate rotator cuff tears (RCT).

Background

The prevalence of is RCT estimated at 22% with increasing prevalence in older population. This is relevant as the population is ageing and two-thirds of RCT in patients above age of 60 are symptomatic. The volume of RCT repair surgery has increased by 238% between 1995-2009. The proportion of patients with symptomatic RCT treated with physiotherapy initially dropped from 30% to 13% between 2005-2012.

Methods

We searched Pubmed database for studies comparing RCT repair vs. nonoperative treatment or surgical treatment but without cuff repair. There were 6 randomised controlled trials published between 2013 and 2016 and one cohort study (1993). Two studies compared RCT repair vs. physiotherapy +/- injections, four compared repair vs. arthroscopic debridement or subacromial decompression +/- other procedures and one study contained three arms. The age of patients, tendons involved, size of tears and repair techniques were variable. Six studies used Constant outcome score, amongst others, as primary outcome measure. Five studies assessed cuff integrity radiologically at follow-up.

Results

Two randomised trials showed statistically better outcome scores in the repair group but the proportion of patients with improved scores above the minimal clinical important difference (MCID) was not reported. One trial found small differences (below MCID) in outcome scores between repair vs physiotherapy in favour of repair. However, there were significant number of patients with traumatic tears. Three trials showed no difference in outcome between repair groups vs no repair or nonoperative treatment. One nonrandomised study showed better UCLA scores after repair. The re-tear rate ranged between 30-75%. Three studies showed better outcome in intact repairs but two trials found no difference.

Conclusions

Despite the large increase in volume of RCT repair surgery, the available evidence supporting this trend is weak.



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841 Biodegradation Of Biocomposite Suture Anchor Implants 2,2 Years After Rotator Cuff Repair**Mirco Sgroi**, Theresa Friesz, Michael Schocke, Heiko Reichel, Thomas Kappe

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Aim

The aim of the present study was to investigate the biodegradation of biocomposites suture anchor implants 2 years after rotator cuff repair.

Background

Arthroscopic rotator cuff repair is one of the most frequently performed operations in orthopaedic surgery. Resorbable PLLA or PGA implants have been reported to be associated with osteolysis. Biocomposite implants, composed of PLLA and/or PGA and ceramics, have gained popularity due to their biocompatibility and lack of osteolysis.

Methods

Twenty-five consecutive patients (84 implants) with arthroscopically repaired rotator cuff tears using biocomposite implants with a 5.5 mm diameter and a minimum of 2 years (range, 16 to 32 months) follow-up were included into the present study. To analyse the biodegradation process of the suture anchors, an MRI of the operated shoulder was performed. The peri-implant fluid, the degradation of the suture anchors and the widening of the bone beds were assessed.

Results

At a mean 2.2-year follow-up, the structure of the suture anchor implants was clearly visible in 23.8%, visible in 42.9%, partially visible in 23.8%, and not visible in 9.5%. No peri-implant fluid was observed in 26,2%. Slight peri-implant fluid was seen in 34,5%, a continuous fringe of fluid at least 1 mm thick in 23,8% and more than 1 mm thick in 13,1%. The mean width of the bone beds was 4.4 1,3 mm at the apex, 5,4 1,1 mm in the middle, and 5.9 1,4 mm at the basis of the implant. No significant difference was found between implants in the lateral or medial row or between knotted and knotless implants. No case of gross osteolysis was observed.

Conclusions

The results of the present study show that biocomposite suture anchors are frequently still visible on MRI 2.2 years after rotator cuff repair. No gross osteolysis was observed in the present study, indicating good biocompatibility of the implants.



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847 Association Of The Coracoid Anatomy And A Full-Thickness Supraspinatus Tear With The Subcoracoid Impingement Syndrome – An MRI Analysis

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Aim

To analyze anatomic parameters with relation to the subcoracoid impingement syndrome.

Background

There are two main theories to explain the onset of subcoracoid impingement syndrome: (1) it results from an anatomically narrowed coracohumeral interval (CHI), and (2) the presence of a full-thickness supraspinatus tear causes a narrowed CHI with subsequent development of subcoracoid impingement. To date, it remains unclear if and how anatomical parameters vary among patients with subcoracoid impingement with and without supraspinatus tear and compared to patients without such pathology.

Methods

The CHI, 'dynamic' CHI, the coracoid index and the position of the coracoid in the sagittal plane were measured on shoulder MRIs of 108 patients (mean age 55.7±9.9 years) with subcoracoid impingement syndrome with (n=49) or without (n=59) concomitant supraspinatus tear. The results were compared with the measurements of 23 patients (mean age 52.5±14.7 years) with full-thickness supraspinatus tear without subcoracoid impingement and with measurements of 49 patients (mean age 39.2±14.0 years) without any impingement syndrome or rotator cuff tear (normal cohort). Only patients without instability and with centered humeral head on MRI were included in this study. Intra- and interrater reliability were assessed to validate the measurements. Group comparisons utilized ANOVA with Tukey post-hoc.

Results

Measurement reliability was good. The CHI ($p > 0.001$) and the dynamic CHI ($p = 0.036$) were significantly shorter, the coracoid index was higher ($p < 0.001$) and the coracoid tip was more inferior ($p = 0.016$) in patients with subcoracoid impingement compared to the normal cohort. A full-thickness tear of the supraspinatus tendon did not significantly affect any of the MRI measurements.

Conclusions

The subcoracoid impingement syndrome was associated with a narrow coracohumeral distance as well as a lateral and inferior position of the coracoid tip. A full-thickness supraspinatus tendon tear did not affect the coracohumeral distance and is therefore unlikely associated with the occurrence of the subcoracoid impingement syndrome.



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881 Impact Of Anatomical Parameters On Outcomes After Arthroscopic Coracoplasty For Subcoracoid Impingement Syndrome

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Aim

To evaluate if preoperative MRI measurements associated with subcoracoid impingement syndrome (SCIS) are predictive of postoperative outcomes of arthroscopic subcoracoid decompression (SCD) with coracoplasty.

Background

The SCIS is associated with a narrow coracohumeral interval (CHI) as well as a lateral and inferior position of the coracoid tip. Results of case series with <30 patients with SCD and coracoplasty for SCIS have been published. It remains unclear if the preoperative measurement of the CHI and of the position of the coracoid tip are predictive of postoperative outcomes.

Methods

Patients with minimum 2-years outcome scores after SCD and coracoplasty for SCIS were included. The CHI, dynamic CHI, coracoid index and the position of the coracoid tip in the sagittal plane were assessed retrospectively on preoperative MRIs. Outcome scores included were ASES, Quick-DASH, SF 12 PCS and several VAS pain scores. Spearman's correlation was used to identify possible predictors of outcomes.

Results

90 patients (n=68 men, n=22 women; mean age 56 years, range, 27-74) with a mean outcome scores follow-up of 3.7 years (range, 2-8) were included. The mean postoperative ASES score was 90.5±SD13.2 and activities of daily living pain was none (scale: none, mild, moderate, severe). The width of the preoperative CHI correlated with the postoperative ASES and Quick-DASH scores as well as pain with activities of daily living (p<0.05). No correlation was found with the SF-12 PCS score (p=0.083). The dynamic CHI was found to correlate only with the postoperative ASES score (p=0.013). The coracoid index and the position of the coracoid in the sagittal plane were not found to be predictive of postoperative outcomes.

Conclusions

The preoperative CHI was identified as predictor of postoperative outcomes after coracoplasty for SCIS. The wider the preoperative CHI, the higher the expected ASES score and the lower the expected Quick-DASH and pain scores with activities of daily living.



855 Epidemiology Of Elbow Joint Infections.

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Aim

Aim of this study was to gather information about etiology, comorbidities, bacterial spectrum and therapy in patients with infections of the elbow.

Background

Septic arthritis remains a rare condition at the elbow joint. Epidemiological data of infections of the elbow joint remain missing.

Methods

Patients were selected through retrospective chart review. Included were all patients with an empyema of the elbow joint. A total of 49 patients between 9 and 82 years (median: 49 years) was included. Eleven patients (22%) were female, 38 patients (78%) were male.

Results

In 29 patients (53%), cultures of aspiration / intraoperative swabs were positive for *Staphylococcus aureus*, 7 were methicillin-resistant. 9 patients (18%) had positive cultures for *Staphylococcus epidermidis*, in 9 patients (18%) no bacteria could be cultured. 22 (45%) patients had a history of trauma, eleven patients (22%) reported of an olecranon bursitis. Seven patients (14%) had prior elective surgeries at their elbow. Between one and 25 surgeries (median: 4) was necessary for the treatment. In 21 patients, debridement and synovectomy were sufficient, 14 patients (29%) received a resection of the elbow joint. Three patients (6%) received a fistula as a treatment of the chronic infection. One patient could be treated with antibiotics and resting of the arm. Four patients had a prior septic condition (subdural empyema, pleural empyema, septic arthritis of other joints) 13 patients had a rheumatic disease.

Conclusions

Empyema of the elbow are severe complications of diseases or injuries of the elbow. Early calculated antibiotic therapy and surgical intervention might prevent manifestation at the joint and following radical operative treatment. Antibiotic therapy focuses on *Staphylococcus*; broader antibiotic therapy should be considered if patients suffer from immunodeficiency. Patients with rheumatic diseases are at higher risk to suffer from elbow joint infection. If treated early and radical, empyema of the elbow joint can be treated successful.



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904 Can We Increase The Massive Rotator Cuff Healing Rates By Enhancing The Biology And The Biomechanical Properties ? Preliminary Results

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Aim

The hypothesis was that the biomechanical augmentation (Speed Bridge technique Arthrex) and the parallel application of an absorbable patch (Biofiber-Tornier) in massive lesions, would improve the re-tear rates and the final clinical outcomes.

Background

The incidence of recurrent tears after massive rotator cuff (RC) repair remains high

Methods

Between 2014-2015 all patients with massive postero-superior RC tears (Cofield IV, Patte II-III) were operated using the Speed Bridge technique with Biofiber reinforcement (Group I). In Group I 28 patients were enrolled with mean age 57±7 years; ASES 48; SSV 43%; SST 4 and Constant Score 56.

As control group we retrospectively included the patients with same tear pattern characteristics that were operated between 2007-2011 by using only a double row technique (Group II). Group II included 28 patients with mean age 62±8 years and mean scores ASES 47; SSV 40%, SST 4 and Constant score 51.

All the patients underwent clinical and ultrasound evaluation according to Sugaya classification.

Results

No differences regarding the type of lesions, the fatty infiltration, the tear chronicity, the age and the clinical evaluation was found between the studied groups (p=0.9)

In Group I the mean postoperative scores were significantly improved as follows: ASES 83; SSV; 87% and SST 9 (p<0.001). The initial 6 months (23pts) and 12 months (5pts) ultrasound evaluation showed 29% re-tear rates (8/28pts).

In Group II after 2 years follow up the mean scores were ASES 84; SSV 82; SST 9 and Constant 80 (p<0.001). However, the re-tear rates were 40% and statistically significant higher than Group I (p=0.047)

Despite the better healing rates no differences were found regarding the clinical outcomes between the two study populations (p=0.25).

Conclusions

Our preliminary results showed that the combination of a trans-osseous technique with an immune tolerant biological augmentation is a promising surgical solution for massive RC lesions.



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891 A Prospective Multicentric Study Of Subscapularis Tears And Outcome After Arthroscopic Repair

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Aim

The aim of the study is a comparison of the significance of the clinical examination and imaging methods (sonography) for the diagnosis of subscapularis tears, and the evaluation of the outcome after arthroscopic repair.

Background

Subscapular lesions (SCP) are often underdiagnosed, in particular partial lesions, although these significantly affect the shoulder function. Early detection and therapy are the basis for long-term preservation of the functionality.

Methods

In a prospective multicentric study, 31 patients were included from 04/2013 to 01/2015 (Ø 60.5 years, 18 men, 15 traumatic lesions, 16 degenerative, 14 isolated SCP lesions (Fox 1: 5, Fox 2: 9, Fox 3: 10, Fox 4: 7)).

Inclusion criteria: "informed consent", arthroscopic detection of an SCP lesion. Excluded: Patients with preoperations of the same shoulder. The patients were examined according to a standardized examination curve. Additional force measurements (Iso Force Control EVO 2) in different positions as well as a sonographic examination, performed preoperatively and 52 weeks postoperatively. Arthroscopic SCP reconstruction with suture anchors. Accompanying lesions of the long biceps tendon and the supra- / infraspinatus tendon were also provided.

Results

In the preoperative diagnosis Belly press showed 69% positive, lift off 80% positive. The follow-up of 52 weeks showed an improvement in the constant score from 36.7 to 70.2 points.

The force of the subscapularis (internal rotation in neutral position) showed preoperatively 68.5% and 52 weeks postoperatively 92.5% compared to the non operated side, 60.3% to 106.7% in high internal rotation, respectively.

Sonographically, an increase in the average tendon diameter near the footprint could be measured from 2.1 to 4.5 mm.

Conclusions

A standardized examination procedure can reliably diagnose SCP tears. The force measurement can be helpful.

Arthroscopic treatment of SCP lesions resulted in a significant clinical improvement in pain, mobility and strength. A very good integrity of tendon reconstruction could be established over a period of 1 year.



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875 Results Of Ultrasound Assessment Of The Lateral Ulnar Collateral Ligament

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Aim

To determine the ability of ultrasound for the evaluation of the morphology and characterization of LUCL in cadaveric specimens.

Background

Lateral collateral ligament complex plays a key role in the stability of this joint. It has three components, among them, lateral ulnar collateral ligament (LUCL) has been assigned as the main role, although this role is still controversial in the literature.

Methods

Twelve cadaveric elbow specimens were imaged with high-resolution ultrasound transducer. The LUCL identification was possible in all specimens and we performed different visualizations to identify the whole fascicle in the same vision to study its morphology.

Results

The distal attachment of LUCL could be visualized as a hypoechoic structure in 90% of specimens, but the proximal attachment is hyperechoic in all of them. The proximal attachment was well visualized in 90% of elbows, and the mean thickness at that level was 1.4mm. The distal attachment was recognized in 100% of elbows with a mean thickness of 1.1mm and we can distinguish between bilobar and unilobar insertion in 90% of elbows.

Conclusions

High-resolution ultrasound is a technique able to assess LUCL. It allows to determine its structure and provides anthropometric measurements. For this reason we consider ultrasound a useful tool to determine ligamentous injuries in cases of postero-lateral instability.



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883 REVERSE TOTAL SHOULDER ARTHROPLASTY ASSOCIATED TO LATISSIMUS DORSI AND TERES MAJOR TENDON TRANSFER. BIOMECHANICAL EVALUATION OF EXTERNAL ROTATION IN PATIENTS OVER 70 YEARS.

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Aim

The aim of this study is to biomechanically analyze external rotación in patients over 70 years.

Background

Design of reverse shoulder arthroplasty allows to redirect anterior elevation and abduction in irreparable rotator cuff tears, but has no effect on external rotation. It has been described the combination of a latissimus dorsi and teres major tendon transfer with reverse total shoulder arthroplasty for the treatment of patients with external rotation deficit. Actually there is no indication related to age.

Methods

16 patients were operated between october 2007 and november 2014, with a 67 months follow up (24-110) and a median age of 75 years (70-88).

We report 6 loss of follow-up (37.5%): 1 luxation of the reverse arthroplasty, 1 aseptic loosening, 1 change of adress, 1 traumatic complication, 2 medical complications.

The remaining 10 patients (62.5%) could complete the biomechanical analysis. It was performed with a Biodex System3 isokinetic dinamometer. We performed two protocols, one for ER with arm at the side (ER1) and one for ER and 45° abduction (ER2).

The statistical study was performed using non-parametric analysis of the data with Wilcoxon test for quantitaive variables.

Results

The ER1 in the control shoulder obtained an average of 9.76 N / M (4.2-28.6) compared to 7.99 N / M (2.1-17.8) in the operated shoulder. The ER2 in the control shoulder obtained an average of 13.53 N / M (7.4 - 31.0) compared to 13.20 N / M (5.8 - 32.2) of the operated shoulder. group.

No statistically significant differences were obtained when comparing ER1 and ER2 of the operated and contralateral shoulder in studied patients.

Conclusions

Therefore, despite the loss of follow-up of the series studied, it seems that reverse shoulder arthroplasty associated with latissimus dorsi and teres major tendon transfer is a technique that restores external rotation in patients older than 70 years.



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896 Restoration Of Capsulolabral Anatomy With The Labral Bridge Repair In Comparison To Native And Standard Techniques

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Aim

Evaluate the labral height and native labral footprint coverage following a Labral Bridge repair (LB) when compared to a traditional knotted suture anchor repair (TT).

Background

Traditional open Bankart repairs still have significantly lower redislocation rates when compared to arthroscopic techniques.

Methods

9 matched pairs of fresh-frozen human cadaveric shoulders were used for this study. Native labral height was measured at the clock positions using an electronic caliper in six pairs. Then, Bankart lesions were created from the 2 to 6 o'clock and the 6 to 10 o'clock positions and repaired with either the Labral Bridge technique (group LB) or a traditional technique using three knotted suture anchors with simple horizontal stitches (group TT). Following the repair, the restored labral height was measured again. In further 3 pairs the labral tissue was carefully dissected from the 2 to 6 o'clock and from the 6 to 10 o'clock positions and the native labral footprint was colored. A standardized photograph was then taken from the colored footprint and the colored area was analyzed with imaging software (ImageJ). After repairing the lesions according to group LB or TT another photograph was taken and the remaining uncovered colored area was analyzed.

Results

The mean native labral height in group LB was 5,2mm and 5,1mm in group TT, respectively. Following the repair, the mean labral height was 6,6mm in group LB compared to 5,6mm in group TT ($p=0.01$). The mean native labral footprint before the repair was 71 mm² in group LB and 78.5 mm² in group TT. After the repair the remaining uncovered area of the native footprint was 16.5 mm² in group LB and 52.6 mm² in group TT ($p=0.002$).

Conclusions

The Labral Bridge technique creates a significant higher capsulolabral bump and provides a significant better coverage of the native labral footprint than a traditional technique.



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910 Luxatio Erecta Associated Injuries

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Aim

Since fewer than 150 cases of luxatio humeri erecta have been reported in the literature, we wanted to discuss our case series of 17 inferior shoulder dislocations.

Background

Traumatic inferior shoulder dislocation is a rare kind of shoulder dislocation, usually caused by hyperabduction, involving approximately 0.5 percent of all glenohumeral dislocations. Published cases of luxatio erecta show fractures of the greater tuberosity or injuries to the rotator cuff in 80% of cases and some degree of neural injuries in 60% of cases.

Methods

From 1992 to 2012 all patients with inferior shoulder dislocation treated at our institution were included in this study. Demographic data, injury mechanism, type of reduction, duration of initial immobilization and associated injuries were retrospectively entered into a database for evaluation.

Results

Within the study period 17 patients (6 females/11 males) with luxatio erecta were treated at our institution. The mean age was 52 years. The most common injury mechanism was a fall on the abducted arm, leading to hyperabduction. Initial immobilization with a shoulder sling averaged 3 weeks (range 2-4 weeks).

In patients younger than 35 years (7 patients) we found concurrent fractures about the shoulder in 3 cases, neurologic compromise in 2 cases and a supraspinatus tendon tear in one case.

Patients older than 35 years (10 patients) suffering an inferior shoulder dislocation, additionally sustained a concurrent fracture about the shoulder in 6 cases, neurologic compromise in 3 cases and a rotator cuff injury in one case.

However, all neurologic deficits recovered spontaneously within the first 4 weeks.

Conclusions

The most common injuries associated with luxatio erecta are concurrent fractures about the shoulder, neurologic compromise and injuries to the rotator cuff. As far as one can tell from such a small case series, there seem to be no age related differences regarding associated injuries with inferior shoulder dislocation.



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903 Primary Radial Nerve Palsy Associated With Traumatic Humeral Shaft Fractures – Does The Type Of Treatment Influence Recovery?Roman Christian Ostermann¹, Marcus Hofbauer², Nikolaus Lang²

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Aim

The purpose of this study was to assess the influence surgical treatment on recovery in patients with primary radial nerve palsy following traumatic humeral shaft fractures.

Background

Adult humeral shaft fractures occur with an incidence of 3% of all long-bone fractures. They are associated with primary radial nerve palsy in 2%-18%. Both, ORIF or intramedullary nailing are well-established treatment methods. However in case of primary radial nerve palsy, a decision whether or not an additional early exploration is indicated has to be made.

Methods

A retrospective analysis of prospectively collected data for all patients treated with humeral shaft fracture and accompanying primary radial nerve palsy at our level-I trauma center was performed. Trauma mechanism, fracture type, type of treatment as well as time of onset of recovery and time to full recovery were evaluated.

Results

A total of 35 patients were treated with ORIF using dynamic compression plate- or angular stable plate-fixation. Twenty patients underwent treatment with closed reduction and interlocking intramedullary nails.

In the ORIF and intramedullary group mean time of onset of recovery was 10.5 weeks, whereas the time of full recovery or significant improvement was 27.5 weeks and 24.5 weeks respectively.

There was no significant difference in time to onset of recovery or full recovery between patients treated with ORIF or IN ($p < 0.7118$; $p < 0.2009$).

Conclusions

Type of treatment, ORIF or intramedullary nailing, had no significant influence neither on time to onset of recovery nor time to total recovery or significant improvement in humeral shaft fractures with primary radial nerve palsy.



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923 Long-Term Results Of Reversed Shoulder Arthroplasty: A Minimum 5 Year Follow-Up

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Aim

Aim of the study was to evaluate the long-term outcome after reversed shoulder arthroplasty with regards to revision rate, clinical function and shoulder scores.

Background

An intact rotator cuff is required for the use of a standard anatomical shoulder replacement. In combination with rotator cuff deficiency, anatomical shoulder prostheses have shown high failure rates. Therefore the concept of a semiconstrained, reversed shoulder prosthesis was introduced.

Methods

Between the years 2000-2007, 108 patients were treated with a reversed shoulder arthroplasty type Delta III and Delta Xtend (DePuy, Warsaw, USA). We evaluated the clinical outcome by means of a clinical exam and Constant-Score. Patients completed the DASH-Score, SF-36 and UCLA- shoulder rating scale. Radiographic analysis included X-rays in a.p. view, axial view, Outlet view, Rockwood view as well as X-rays focused on the glenoid component. Statistical analysis was conducted with use of the T-test (95% CI) and survivorship was determined with Kaplan-Meier analysis.

Results

We found a significant improvement in abduction and flexion at the mean follow-up. No improvement in external or internal rotation could be documented. At a mean of 7,2 years postoperatively, 92% were satisfied with the outcome and would undergo the procedure again. Radiographically, we documented a high rate of 94,9 % notching. The revision rate was 19,6% at a mean follow-up of 7,2 years (range 60-132 months).

Conclusions

Reversed shoulder arthroplasty adequately restored shoulder function. We found a low revision rate. The high incidence of notching, especially severe notching grade IV according to Sirveaux however, did not seem to negatively influence the revision rate. Therefore we conclude that the reversed shoulder arthroplasty with the use of the DELTA or DELTA-Xtend prosthesis is a reliable method in the treatment of rotator cuff deficient arthritis in patients >70 years.



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930 Secondary Pectoralis Major Reconstruction With Auto- Or Allograft

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Aim

Can results of secondary pectoralis major reconstruction be improved by the additional use of auto- or allografts?

Background

Pectoralis major ruptures are rare injuries. Compared to primary surgical therapy secondary reconstruction leads to poorer results.

Methods

300 Pectoralis major ruptures were evaluated prospektivly. Surgical treatment was performed in 220 cases.

In this group secondary reconstruction with an auto or allograft was carried out in 25 patients with a chronic defect type rupture. 21 patients were active strength athletes. The ø age was 36. 3 years, average height at 182 cm with an average body weight of 98 kg. In addition to the clinical diagnostics a sonography and a x-ray diagnosis were performed. For the reconstruction 18 allografts (13 Semitendinosus, 4 Gracilis, 1 Fascia lata) and 7 autografts (6 Semitendinosus, 1 Gracilis) were used. For refixation to the Humerus 2-4 2,9 Juggerknots™ (Zimmer-Biomet) anchors were used in all cases. The follow up was at least 12 months.

Results

Complete ruptures were found 3 cases, the pars sternocostalis together with the pars abdominalis was torn in 18 cases, the pars sternocostalis was isolated once and the pars abdominalis was affected in isolation 3 times. The tear concerned the myotendinous crossing 21 times, once the muscle and 3 times there was an avulsion of the tendon. The most common reason was bench pressing(13x), fall(7x) and wrestling(3x). According to the classification of Bak 23 patients (92%) achieved good and very good results. In only 2 cases there was a moderate result without relevant improvement compared to the pre-operative state.

Conclusions

The results of this study show better clinical outcome compared to the literature for chronic ruptures without use of grafts. The use of grafts in the surgical therapy of chronic defect type pectoralis major rupture is therefore recommended on the basis of our findings.



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924 Latarjet Procedure: A Retrospective Study Of Risk Factors On Revision SurgeryDominique Rouleau, **Qin Du**, Meng Yang Li

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Aim

Evaluate the intrinsic patient factors, extrinsic operator factor and implant factors on the rate of revision surgery post Latarjet procedure

Background

The Latarjet procedure is a surgical option for the treatment of recurrent anterior shoulder instability. Despite excellent functional results, the complication rate is reported to be up to 30%, namely infection and non-union of the bone block and glenoid which lead to residual instability and revision surgery.

Methods

We retrospectively reviewed a prospective database for shoulder instability in a tertiary referral center. We included all patients who underwent a Latarjet procedure either as a primary or as a revision procedure. Patient information such as gender, weight, height, smoker status, and side of operation were recorded. Operative reports and charts were reviewed for implant type and complications. We measured the size of glenoid defect as well as coracoid and glenoid bone mineral density (BMD) on the pre-op CT scan

Results

32 shoulders in 30 patients were included in the study. There were 27 primary and 5 revision procedures. In our study, 5 patients were re-operated for complications: 2 for infection, 2 for non-union, and 1 for subscapular insufficiency. Statistically significant risk factors included smoker status ($p=.033$) and prior shoulder surgery ($p=.003$). There was a strong correlation with higher body mass index ($p=.008$). Age, gender, implant type, size of defect, and BMD were not significant risk factors.

Conclusions

Our study shows that risk factors for re-operations after Latarjet procedure include smoking, prior shoulder surgery and higher BMI.



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683 Does Coracoid Anatomy Influence The Position Of Bony Bankart Lesions In Anterior Shoulder Instability?Mengyang Mike Li¹, Dominique M Rouleau², Qin Du¹

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Aim

To see if coracoid anatomy is correlated with location of bony Bankart lesions in recurrent shoulder dislocations.

Background

Recurrent anterior glenohumeral instability is associated with bony Bankart lesions in more than half of cases. Correctly recognizing and addressing these lesions is key to successful surgical management. No studies thus far have studied the anatomic relationship between the coracoid and the relative location of glenoid defects, which can lead to better understanding of biomechanics of shoulder instability and thus guide treatment.

Methods

We analyzed CT-scans of 51 shoulders in 48 patients from a prospective shoulder instability database, who all had bony Bankart lesions. Using institutional PACS software, we created 3-D reconstructions of the glenoid with humeral head subtraction. We analyzed the position of bony Bankart lesions using the clock method, identifying the beginning and end time, and measured the size of anterior-posterior bony glenoid defect using the glenoid ratio method. We then measured the location of the tip of the coracoid in three planes.

Results

Analysis includes 25 right shoulders and 26 left shoulders in 7 females and 41 males. Average patient age is 27 years. The vertical position of the coracoid tip relative to the top of the glenoid is highly correlated to the location of the glenoid defect on the profile view ($r = -.625$, $p < .001$); thus, higher coracoids are associated with more anterior Bankart lesions while lower coracoids are associated with anterior-inferior Bankart lesions. A more laterally prominent coracoid is also highly correlated with more inferior Bankart lesions ($r = .433$, $p = .002$).

Conclusions

Coracoid anatomy has an influence on the location of bony Bankart lesions in anterior shoulder instability. Lower coracoids are associated with more inferior Bankart lesions. This new concept can be further explored in biomechanical studies and should be considered when performing coracoid transfer procedures such as Latarjet.



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939 Calcific Tendinitis – Classification And Relation To Oxford Shoulder Score – A Reliability Study Within The ShoulderInterventionProject

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Aim

Are the most commonly used classifications of calcific tendinitis reliable, and do they relate to the Oxford Shoulder Score among patients seen under suspicion of Subacromial Impingement Syndrome?

Background

The four most commonly used classification of calcific tendinitis: Gärtner, De Palma, Patte, and Molé, classify calcifications according to two to four characteristics. Insufficient reliabilities of these classifications have been reported. Relation to Oxford Shoulder Score has not been reported.

Methods

848 consecutive shoulder radiographs of patients referred under suspicion of Subacromial Impingement Syndrome were evaluated. Inclusion criteria were: age 18-63 years, at least one visit to the department, response to a questionnaire, and an available anterior-posterior projection radiograph performed prior to any surgery. Two doctors at residential orthopedic level examined all radiographs without clinical information, apart from name and age, available. A random sample of 100 radiographs was re-evaluated for reliability analysis. Kappa statistics of agreement were performed and evaluated according to Landis & Koch. Logistic regression was used for analysing relation to Oxford Shoulder Score.

Results

Average Oxford Shoulder Score (OSS) was 27.6 points. Calcific deposits were seen among 24.4% of the patients.

Reliability kappa values inter-/intrarater:

Presence of a calcification: almost perfect agreement 0.85/0.89.

Calcification characteristics reached fair to moderate agreement: density 0.57/0.61, homogeneity 0.38/0.44, circumscription 0.42/0.29, tendon insertion zone 0.12/0.56

Calcification classifications: Gärtner reached fair to moderate agreement 0.46/0.30. Poor to moderate agreement was found in Patte -0.13/0.08, De Palma -0.05/0.14, and Molé 0.07/0.43.

Presence of a calcification, its characteristics and classification, did not show any statistic significant association with the Oxford Shoulder Score.

Conclusions

Presence of calcifications, characteristics and the classification of calcifications, do not relate

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to the self-reported clinical state of the patient as measured by Oxford Shoulder Score. The reliability of radiographic evaluation and classification of calcifications on standard shoulder radiographs is questionable.



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952 A Systematic Comparison Of The Closed Shoulder Reduction Techniques.

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Aim

To identify the optimal technique for closed reduction for shoulder instability, based on success rates, reduction time, complication risks and pain level.

Background

When glenohumeral instability occurs, the shoulder can be reduced using a variety of closed reduction techniques of which the main reduction movements include traction, leverage, scapular manipulation or combined maneuvers. There is no consensus which reduction technique is superior with regard to successful reduction rates and risk of complications.

Methods

A PubMed and EMBASE query was performed, screening all relevant literature of closed reduction techniques mentioning the success rate written in English, Dutch, German and Arabic. Studies with a fracture dislocation or lacking information on success rates for closed reduction techniques were excluded. We used the modified Coleman Methodology Score (CMS) to assess the quality of included studies and excluded studies with a poor methodological quality (CMS < 50). Finally, a meta-analysis was performed on the data from all studies combined.

Results

2099 studies were screened for their title and abstract, of which 217 studies were screened full-text and finally 13 studies were included. These studies included 9 randomized controlled trials, 2 retrospective comparative studies and 2 prospective non-randomized comparative studies. A combined analysis revealed that the scapular manipulation is the most successful (97%), fastest (1,75 min) and least painful reduction technique (VAS 1,47); the "Fast, Reliable, and Safe" (FARES) method also scores high in terms of successful reduction (92%), reduction time (2,24 min) and intra-reduction pain (VAS 1,59); the traction-countertraction technique is highly successful (95%), but slower (6,05 min) and more painful (VAS 4,75)

Conclusions

For closed reduction of anterior shoulder dislocations, the combined data from the selected studies indicate that scapular manipulation is the most successful and fastest technique, with the shortest mean hospital stay and least pain during reduction. The FARES method seems the best alternative.



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651 Resurfacing Hemiarthroplasty Of The Shoulder For Patients With Juvenile Idiopathic Arthritis

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Aim

To report the outcome of resurfacing hemiarthroplasty (RHA) in a cohort of patients with Juvenile Idiopathic Arthritis (JIA) affecting the shoulder joint.

Background

Patients with JIA affecting the shoulder often present with distorted bony anatomy and severe soft tissue contracture, making surgical management technically challenging. Two series using stemmed hemiarthroplasty have described satisfactory results. RHA is a bone-sparing alternative and the outcome has not been reported previously.

Methods

Fourteen uncemented RHA procedures were performed for 11 consecutive patients (9 females, 2 males) who required surgery because of JIA. Mean clinical follow-up was 10.4 years (range 5.8-13.9 years). Mean age at surgery was 36.4 years (range 18-49 years). Significant humeral head erosion (up to 40% surface area) was found in 7 cases and filled with bone graft (3 shoulders required allograft). At the time of index procedure, acromioclavicular joint excision was performed in all shoulders and the extent of soft tissue release depended on the severity of contracture.

Results

At latest follow-up, no patient had required revision. There was excellent relief from pain. Mean Oxford Shoulder Score (OSS) and Constant-Murley Score (CMS) had improved significantly (OSS: 24.2 point improvement, range 7-38, $p = <0.00001$; CMS: 41.8 point improvement, range 16-68, $p = <0.00001$). No shoulder had a poor outcome and 6 had a very good or excellent outcome. Worse outcome was associated with the intra-operative finding of significant humeral head erosion. Two patients required early subacromial decompression but there were no other re-operations. There were no instances of radiographic implant loosening or proximal migration. Glenoid erosion of up to 5mm was seen in 5 shoulders but not associated with poor outcome.

Conclusions

The mid-term results of RHA for JIA are extremely encouraging and at least comparable to those for stemmed hemiarthroplasty. Worse outcome is associated with significant humeral head erosion.



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825 Impact Of Radiolucent Humeral Lines On ATSA Clinical Outcomes

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Aim

This study quantifies outcomes of anatomic TSA (aTSA) with and without radiolucent humeral lines using one specific prosthesis to determine their impact on clinical outcomes.

Background

Humeral radiolucent lines after aTSA have been well described; however, little clinical consequences have been attributed.

Methods

591 patients (mean 66.5 yrs; 327F/266M) with an average follow-up of 47.9 months were treated with aTSA for OA by 13 fellowship trained orthopaedic surgeons. Radiographs were reviewed at latest follow up for humeral radiolucent lines based on the technique described by Gruen. Outcomes were scored using SST, UCLA, ASES, Constant, and SPADI metrics; active ROM was also measured. A two-tailed, unpaired t-test identified differences ($p < 0.05$) in pre-operative, post-operative, and pre-to-post improvements.

Results

31 patients (mean 64.2 yrs; 19F/12M) had a radiolucent humeral line at latest follow-up (5.3%). Pre-operatively, no difference was noted in any clinical metric score between patients with or without radiolucent humeral lines. However post-operatively, patients with radiolucent humeral lines had significantly worse ASES ($p < 0.0001$), Constant ($p < 0.0001$), UCLA ($p < 0.0001$), SST ($p < 0.0001$), and SPADI ($p < 0.0001$) scores and significantly less abduction ($p < 0.0001$), forward flexion ($p = 0.0002$), and internal rotation ($p = 0.0227$). Humeral radiolucent line patients also had significantly lower improvements according to all 5 outcome metric scores and also abduction and forward flexion relative to patients without radiolucent humeral lines. Finally, patients with humeral radiolucent lines had a significantly higher complication rate (25.8% vs 6.1%, $p < 0.0001$) as compared to patients without radiolucent humeral lines.

Conclusions

The study demonstrated a relatively low incidence of humeral radiolucent lines with aTSA. Patients whose shoulders had radiolucent humeral lines were associated with significantly lower clinical outcomes and significantly less active ROM as compared to those without radiolucent lines. Additional and longer term clinical follow-up is necessary to confirm the results of this study.



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272 Assessment Of Throwing Shoulders Of KBO League Pitchers And Affecting Factors For Kerlan Jobe Orthopedic ScoresJoo Han Oh¹, Joon Yub Kim²

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Aim

The aim of this study is to assess the throwing shoulder in Korean Baseball Organization (KBO) league pitchers and to look for affecting factors for Kerlan Jobe Orthopedic Scores (KJOS).

Background

There were limited reports about correlation between Kerlan Jobe Orthopedic score and shoulder functions in professional baseball pitchers.

Methods

Twenty seven pitchers from KBO league were enrolled at preseason in 2017. The Korean version of Kerlan-Jobe Orthopedic Clinic (K-KJOC) score was administered to each pitcher. Demographics and pitching related factors such as innings pitched as well as earned run average (ERA) of previous season were identified. Through the physical examination, authors evaluated the shoulder range of motion (ROM; internal/external rotation at 90° abduction and horizontal adduction), scapulothoracic dyskinesia, impingement test and O'Brien test. GIRD (Glenohumeral Internal Rotation Deficit) of throwing arm was defined by following two criteria; 1) more than 8° deficit of total arc of shoulder rotational ROM, 2) more than 20° deficit of internal rotation compared to non-throwing arm.

Results

The total arc of rotational motion ($r=0.450$, $p=0.027$) and the degree of internal rotation at 90° abduction ($r=0.492$, $p=0.015$) of throwing arm were positively correlated with the K-KJOC score. There were no correlations between K-KJOC score and horizontal adduction, ERA and innings pitched (all $p>0.05$). Furthermore, the positive findings of scapulothoracic dyskinesia, impingement symptom, O'Brien test and GIRD did not reveal the significant difference with K-KJOC score to negative ones (all $p>0.05$). Multiple regression analysis among positive physical findings revealed the degree of internal rotation of throwing arm was the only significant finding correlated with higher K-KJOC score ($r^2=0.242$, $p=0.015$).

Conclusions

Improving the degree of internal rotation of throwing shoulder was the only modifiable physical finding to acquire better functional outcome among KBO league pitchers.



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519 Association Between High Normal Fasting Plasma Glucose Level And Posterosuperior Rotator Cuff TearsHyung Bin Park, Ji-Yong Gwark, **Mincheol Kam**, Jin-Hyung Im

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Aim

The purpose of this study was to determine the cut-off value for the fasting plasma glucose (FPG) level within the normoglycemic range for which it becomes a risk factor for posterosuperior rotator cuff tear (PSRCT) in the non-diabetic general population.

Background

A FPG level at the high end of the normoglycemic range has been proposed as a risk factor for rotator cuff tendon tear. However, no study has evaluated the proposed risk factors for the general population. Furthermore, no study has suggested a cut-off value for FPG associated with PSRCT.

Methods

This study involved the 488 shoulders of 488 non-diabetic subjects from the general population. Each subject received a questionnaire, physical examinations, blood tests, and simple radiographs and MRI evaluations on both shoulders. Using logistic regression analysis, we calculated the odds ratios (ORs) and 95% confidential intervals (CIs) for FPG level and various factors possibly affecting PSRCT. We calculated the cut-off value for the FPG level, using the ROC curve. We performed multivariate analysis for the cut-off value for the FPG level, using the variables that were significant in the univariate analyses.

Results

In the univariate analysis, FPG level was significantly associated with PSRCT (OR, 1.021 [95% CI, 1.001 to 1.042]; $p = 0.029$). The cut-off value of FPG level for PSRCT was 87.50 mg/dL, which is also significantly associated with PSRCT (OR, 2.249 [95% CI, 1.350 to 3.745]; $p = 0.002$). A high FPG level (> 87.50 mg/dL) was significantly associated with PSRCT in the multivariate analysis after adjustment with other significant variables noted in univariate analyses (OR, 2.187 [95% CI, 1.251 to 3.822]; $p = 0.006$).

Conclusions

This study suggests that a high FPG level which is nonetheless normoglycemic is significantly associated with PSRCT. The cut-off value for safe FPG levels was relatively low (< 87.50 mg/dL).



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809 Treatment Of Recurrent Anterior Shoulder Instability With The Latarjet/Bristow Procedure In Elderly Patients

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Aim

Determine the outcome after coracoid transfer procedure for treatment of anterior shoulder instability in elderly patients.

Background

There is concern that the outcome of the coracoid transfer procedure might be inferior in elderly patients due to decreased bone quality and the concomitant presence of irreparable cuff-tears (RCTs).

Methods

All patients above 40 years treated with a coracoid transfer procedure between 1998 and 2013 due to anterior shoulder instability with (1) glenoid bone loss, (2) irreparable RCT, or (3) both were included in this study. 25 out of 27 consecutive patients (93%) were followed-up after an average of 9 years (2 to 15 years) clinically (WOSI, Rowe, ASES, CS, and SSV) as well as by means of CT scans. Average age at the time of surgery was 62 years (range: 40 to 85 years).

Results

Nine patients (36%) had to be revised during the follow-up period. Eight due to bone graft- or hardware-related problems and one due to recurrence of instability. Revision surgery included reverse shoulder arthroplasty (n=5), anatomical shoulder arthroplasty (n=1), iliac-crest bone grafting (n=2), and hardware removal (n=1). The average WOSI of the non-revised patients was 556 (210 to 1150), Rowe Score 77 (30 to 100), ASES Score 75 (38 to 100), CS 65 (25 to 97), and SSV 70% (40 to 100). The presence of an irreparable RCT showed no significant effect on the clinical outcome or revision rate.

The average preoperative instability arthropathy score of 0.8 increased to 2.0 at follow-up. A partial (82%) or complete (12%) resorption of the transferred coracoid was observed in 94% of the patients.

Conclusions

The coracoid transfer procedure represents an option for joint-preserving treatment of anterior shoulder instability in elderly patients with glenoid bone loss and/or irreparable RCT. However, the complication rate as well as revision rate are higher than reported for a younger population.



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776 The Effect Of Scapula Tilt And Best-Fit Circle Size When Measuring Glenoid Bone Loss In Shoulder Instability Patients On 3D CT

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Aim

Determine the influence of impreciseness of en-face view orientation and best-fit circle size on the results obtained using the current gold standard measurement techniques for glenoid bone loss.

Background

Currently, neither a clear recommendation for the positioning of the scapula nor a precise definition for the correct best-fit circle placement for the measurement of bony glenoid defects on en-face view 3D-CT scans in patients with anterior shoulder instability exists.

Methods

Ten consecutive patients with anterior glenoid bone loss due to recurrent anterior shoulder instability and available CT scans of the affected shoulder were included in this study. 170 3D en-face view images of the ten glenoids with up to 20° degrees of tilt in the anterior, posterior, superior, and inferior direction were rendered. Three independent observers first identified the en-face view images and subsequently performed measurements of the defect surface and diameter as well as the glenoid surface and diameter on all 170 images. The measurements were completed based on the conventional best-fit circle technique using the edge of the visible glenoid bone as reference and additionally based on the so-called "spoon technique" which places the best-fit circle on the edge of the visible glenoid concavity.

Results

The overall percent agreement regarding en-face view image selection between the three observers was 30% (K-alpha = 0.10, CI 95% 0.02 – 0.22). Tilt of the en-face view in any direction resulted in significant alterations of all four measurement parameters as well as the relative defect area and diameter (p<0.05). The conventional and the spoon technique rendered significantly different results regarding all four measurement parameters as well as the relative defect area (p<0.05).

Conclusions

Impreciseness of scapula positioning for creation of an en-face view of the glenoid as well as varying best-fit circle size significantly alter glenoid defect extent measurements.



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355 Is Resurfacing Shoulder Arthroplasty A Good Option For Osteoarthritis In Patients Of 50 Years Or Younger?

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Aim

To demonstrate that resurfacing shoulder arthroplasty is not a good option for osteoarthritis in patients \leq 50 years.

Background

Shoulder osteoarthritis in young patients is often secondary to shoulder instability, fracture of the proximal humerus, osteonecrosis, or rheumatoid arthritis. Bone preserving shoulder replacement has been proposed to treat these patients. However, concerns have been raised concerning the efficiency of this procedure in young patient.

Methods

A shoulder resurfacing arthroplasty has been performed on 29 patients (22 men, 7 women, 2 bilateral) of 42 years on average (26-50): 25 hemiarthroplasties and 4 totals. Etiologies were: post-instability OA (13), primary OA (6), post-traumatic OA (3), AVN (2), dysplasia (2), and inflammatory arthritis (3). According to Walch classification glenoid wear was centered in 22 cases (18 A1 and 4 A2), and non centered in 7 (6 B1 and 1 B2).

Results

At 5-years average follow-up (2-9), Neer score were very satisfactory in 14 (48%), satisfactory in 4 (14%), and non satisfactory in 11 (38%) including 7 after post-instability OA. Average Constant score was 61% (15-97), DASH score 34 points (0-89) and SSV 62%. Nine patients were still painful including 5 after post-instability OA. Ranges of motion were all improved. No lucent lines were observed. Cervico-diaphysis angle averaged 128° with 13 resurfacing implants in varus, and increase of the lateral offset. Significant glenoid wear was observed in 11 out of 25 (40%) hemiarthroplasties. There were 10 complications (34.5%) including 7 symptomatic glenoid wear necessitating implant revision in 5 cases (17%). Best results were observed for primary OA whereas worst results were seen after post-instability OA.

Conclusions

Resurfacing shoulder arthroplasty in patients \leq 50 years is not a good option with a high rate of complications and revisions secondary to early wear of the glenoid. Other therapeutic alternative must be chosen in this young population.



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665 Shoulder Arthroplasty In Patients <50 Years Of Age: A Study Of Glenoid Morphology And Clinical OutcomesYousef Shishani¹, Patrick Denard², Evan Lederman³, Reuben Gobezie⁴

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Aim

To calculate the incidence of dysmorphic glenoids in a large sample of young patients who have undergone shoulder arthroplasty and determine if dysmorphic glenoids within this population impacted clinical outcomes.

Background

Treatment of osteoarthritis in the young is challenging. The reported outcomes for various types of arthroplasty in this patient population are inferior to those reported for older patients evaluated using non-constrained primary total shoulder arthroplasty. Previous studies have evaluated the type of procedure or implant in young patients but have not stratified outcomes by glenoid morphology.

Methods

We examined 75 patients under the age of 50 who underwent shoulder arthroplasty. Each patient had a preoperative MRI or CT to classify glenoid morphology according to the Walch classification system. In addition to glenoid classification, gender, age at surgery, surgical indication, surgery type, and co-morbidities were also considered. Clinical outcomes of revision rate, complications, and range of motion were assessed.

Results

Mean age at time of procedure was 43.5 years (range 20-50), 50 patients were men. Thirty four (44%) patients had B2 glenoids and 41 (56%) patients had A1, A2 or B1 type glenoids. Of the 50 males, 76.4% had B2 glenoids, while only 23.6% of females had B2 glenoids ($p < 0.001$). Comparing outcomes of patients with A1/A2/B1 glenoids vs B2 glenoids: both groups had significant improvements in forward flexion ($p < 0.001$), A1/A2/B1 glenoids demonstrated improved external rotation 28° to 39° ($p = 0.024$), and B2 glenoids have significantly improved internal rotation sacrum to L4 ($p = 0.014$). Eight patients with B2 type glenoids required revisions, 6 patients with A1/A2/B1 type glenoids required revision

Conclusions

It appears that there is a much higher incidence of B2 glenoids in males than females. Additionally it appears that patients with B2 glenoid have higher revision and complication rates than individuals with less retroverted glenoids. Continued follow-up and additional statistical analysis will be performed.



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564 Arthroscopic Release Of Elbow Arthrofibrosis: The Serdang Hospital Experience.

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Aim

Elbow arthroscopy is one of the treatment options available for elbow arthrofibrosis. We aim to find out its effectiveness in regaining the range of motion (ROM) of post-traumatic stiff elbows.

Background

Post-traumatic elbow stiffness greatly limits patients' daily activities and this is particularly troublesome for younger patients who have long life expectancies ahead of them. Arthroscopic release of elbow arthrofibrosis has shown good outcome in terms of improvement in ROM and pain control. The fact that it is a minimally invasive diagnostic cum therapeutic tool makes it an attractive treatment option. We wish to report a case series of arthroscopic releases that were done for 5 of our patients who experienced post-traumatic elbow stiffness.

Methods

We performed elbow arthroscopy for 5 patients, with average age of 29.8 (range, 18-50). All had injury over the elbow region. 3 of them sustained open fractures which were treated with delayed internal fixation. The other 2 sustained closed fractures; 1 treated conservatively and 1 with internal fixation. Subsequently they developed elbow stiffness which was detected during follow-up, 4 of which are painless stiffness. All patients underwent arthroscopic release of arthrofibrosis and manipulation under anaesthesia, with 2 of them requiring excision of bony spurs during the procedure. Post-operatively all patients were followed-up for 1 year.

Results

Post-operatively, 4 of the patients showed marked improvement in ROM. Average improvement of flexion is 22.5° (0-60°) while extension is 31.25° (0-65°). The only patient with the painful stiff elbow initially improved post-operatively but after 4 months of follow-up his elbow became stiff again due to non-compliance to physiotherapy. None of them developed any neurovascular complications.

Conclusions

Following our experience with its good outcome, we wish to highlight that elbow arthroscopy can be offered as a viable treatment option to patients with post-traumatic stiff elbow.



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463 Gap Formation After Single Lateral Row Versus Dual Row Suture Bridge Repair: An Ovine Biomechanical Model

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Aim

The aim of this study is to compare the gap formation after cyclical loading and the ultimate strength of a standard dual-row cuff repair compared to a single lateral row repair. The hypothesis is that the dual-row repair will demonstrate superior biomechanical performance compared to the single lateral row repair.

Background

Traditional single row repairs that are medially based do not achieve much compression on the repaired cuff as they are not of suture bridge configuration and permit gap formation after cyclical loading. This causes failure to heal and is clinically detrimental.

Methods

Six pairs of sheep infraspinatus tendon tears repaired with either dual-row (DR) suture bridge technique or single lateral row (SR) repair technique were tested for gap formation, ultimate failure load and mode of failure, in a custom-designed rig. DVRT was placed across the repair to accurately measure the gap after cyclical loading.

Results

Mean gap formation after 3000 cycles was significantly lower in the DR group (0.81 ± 0.2 mm) than the SR group (2.44 ± 0.27 mm); ($p = 0.002$). The DR repairs failed at a higher load (523.4 ± 80.4 N) compared to the SR repairs (452.3 ± 66.3 N), but this did not reach significance ($p = 0.1797$). All repairs failed with sutures pulling through the tendon during load to failure testing.

Conclusions

The dual-row suture bridge repair technique is biomechanically stronger than the single-lateral row technique; with higher failure loads and less gap formation after cyclical loading.



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461 Do Critical Shoulder Angle (CSA) And Acromial Index (AI) Affect Outcomes Of Rotator Cuff Repair?

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Aim

This study aimed to investigate the influence of CSA and AI on mid-term functional outcome after arthroscopic rotator cuff repair. The hypothesis was that a larger CSA or AI would result in poorer post-operative outcomes.

Background

Recent studies have shown a correlation between scapular geometry and the development of atraumatic rotator cuff tears.

Methods

147 patients who underwent arthroscopic double row rotator cuff repair for radiologically documented full-thickness supraspinatus tears were included in this study. An independent reviewer measured the CSA and AI on preoperative radiographs. These patients were prospectively followed up and evaluated pre-operatively, as well as at 3, 6, 12 and 24 months post-operatively. Functional outcome was assessed with CSS, Oxford Shoulder Score (OSS), and UCLA Shoulder Rating Scale. The patients were first divided based on CSA: 1) $\leq 35^\circ$ (control CSA) and 2) $> 35^\circ$ (abnormal CSA), and then based on AI: 1) ≤ 0.7 and 2) > 0.7 . The Student unpaired t-test, Pearson Chi-Square test, and Pearson correlation were performed to examine the influence of CSA and AI on post-operative functional outcome scores.

Results

At 6 months follow-up, the CSS, OSS and UCLA Shoulder Rating Scale were 10 ± 1 , 4 ± 2 and 3 ± 1 points poorer in the abnormal CSA group compared to the control CSA group ($p=0.005$, $p=0.030$, $p=0.035$ respectively). By 24 months follow-up, all outcome scores were comparable between both CSA groups. At 3 months follow-up, the CSS was 6 ± 1 points poorer in the abnormal AI group compared to the control AI group ($p=0.039$); this difference was not seen at 24 months. There was no significant correlation between CSA or AI with CSS, OSS or UCLA Shoulder Rating Scale at 24 months follow-up.

Conclusions

CSA and AI do not appear to influence mid-term functional outcomes post-operatively, and hence are not contraindications to arthroscopic rotator cuff repair.



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510 A Schwannoma-Like Organizing Thrombus Causing Impingement In The Subacromial Space : Arthroscopic Excision

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Aim

To introduce a case report of shoulder impingement syndrome with an organizing thrombus

Background

In general, a hematoma resulted from bleeding in the tissue which may be gradually resolve with time. However, with failure to resolve, it becomes surrounded by a fibrous membrane and forms a hard mass, which is called an "Organizing thrombus". This lesion is easy to be misdiagnosed as a neurogenic tumor on the imaging study. We report an organizing thrombus with shoulder impingement symptoms.

Methods

A 20-year-old man was referred to the out-patient department with left shoulder pain and 'clicking sound' perceived by himself for one year. There was no trauma or dislocation history before. He previously treated by medication and physical therapies, and did not have any injection history at all. The initial roentgenographic studies of the shoulder showed no abnormal findings. On physical examination, there was a snapping of the shoulder with mild to moderate pain, and impingement signs were positive. We started conservative care, recommending the strengthening exercise. After fourteen months, the patient revisited without improving. On MRA study, there were a round mass, about 1.8 cm x 1.3 cm sized, was noticed in the subacromial space. A neurogenic tumor like a schwannoma was suspected.

On the arthroscopy, there was a red and pinkish, round mass located on the superolateral aspect of the coracoid process under the AC joint. Its surface was composed of hard and heavy shells like as an encapsulation.

Results

The pathologic finding was an organizing thrombus. Postoperatively the patient not only experienced an improvement of pain, but also did not perceive 'clicking sound' any more.

Conclusions

Clinically, it is difficult to distinguish between an organizing thrombus and other neurogenic tumor like a schwannoma. They can be misdiagnosed on the imaging study, so the pathologic study is required for a precise diagnosis.



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391 Revision Total Elbow Arthroplasty With A Semiconstrained Hinge Prosthesis: 33 Cases Reviewed With 5-Year Average Follow-Up

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Aim

Evaluate the results of a non-custom semiconstrained total elbow arthroplasty (TEA) for revision of previous TEA.

Background

Revision for failed TEA remains a surgical challenge because of soft tissue lesions and loss of bone stock. Results can be non reliable with high rate of complications and revisions.

Methods

31 patients (33 elbows) were revised for failed TEA (7 men and 24 women of 61 years). Initial etiologies were: RA in 19, and traumatic sequela in 12. Delay between initial TEA and the revision procedure was 122 months (20-360). Indications of revisions were: bipolar loosening (14), unipolar loosening (10), infection (3), ulnar component fracture (1), and others (5). A Coonrad-Morrey prosthesis was used in all cases. A massive allograft was necessary in 2, and an autograft in 2.

Results

At 58-months average follow-up (12-129), MEPS increased from 38 points preoperatively to 68 points at F/u, and quick-DASH score decreased from 69 to 45 points. Arc of motion improved from 41° lack extension to 112° of flexion, to 32° lack extension to 131° of flexion. Radiographic analysis showed lucent lines around the humeral component in 9 cases and around the ulna component in 8. One ulna implant and one humeral implant were loose. Osteolysis was present around one allograft. There were 22 complications on 18 patients (55%): 5 ulnar nerve dysesthesia, 4 deep infections, 2 wound problems, 2 triceps insufficiency, 2 ulna fractures, 3 humeral fractures, 2 ossifications with proximal RUJ impingement, one hematoma, and one axle system disassembling.

Conclusions

Revision TEA is a complex surgery which must deal with soft tissue lesions, triceps insufficiency, ulnar nerve involvement, and loss of bone stock. A link prosthesis with stem modularity is mandatory allowing restauration of a stable and functional elbow joint. Satisfactory results can be obtained, but with a high rate of complications.



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753 RESULTS OF PRIMARY REPAIR OF DISTAL TRICEPS TENDON RUPTURES IN A GENERAL POPULATION

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Aim

A multicenter study was performed to analyze the clinical results of primary tendon reinsertion of acute and chronic distal triceps ruptures (TR) in a general population, excluding professional athletes.

Background

TR are very rare injuries. The few case series available have mainly focused on the surgical results of professional sportspeople.

Methods

Twenty-eight primary TR reinsertion procedures (one bilateral) were analyzed in 21 males and 6 females with a mean age of 45 years. Five TR were inveterate. Seven and 4 patients had ipsilateral injuries and significant comorbidities, respectively. Twenty-one transosseous and 7 suture-anchors reinsertions were performed. The MEPS, m-ASES, Q-DASH and MRC scale were used for the clinical evaluation. The Kolmogorov-Smirnov test was used for the statistical analysis.

Results

The mean follow-up was 50 months. The mean MEPS, Q-DASH and M-ASES scores were 94, 10 and 94, respectively. The results were excellent in 21 cases, good in 5 and fair in 2. Eighteen and 10 cases achieved 5/5 and 4/5 of muscle strength, respectively; 60% of patients with 4/5 presented associated lesions or comorbidities. One re-rupture and one mild stiffness were observed. No significant differences in clinical outcomes were observed between patients with acute and chronic lesions, or between patients in whom recovery of muscle strength was partial and those in whom it was full ($p > 0.05$). A mildly significant difference was observed in the MEPS between patients with and those without associated lesions ($p = 0.046$), whereas no significant differences were observed in the m-ASES and Q-DASH ($p > 0.05$).

Conclusions

Primary repair of acute and chronic TR in the general population yields excellent results and a very low prevalence of re-rupture in the majority of patients. In chronic lesions, primary repair does not appear to affect the outcome but requires an extensive tendon release. Associated lesions and comorbidities may affect the full recovery of muscle strength.



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468 Arthroscopic R-LCL Plication For Symptomatic Minor Instability Of The Lateral Elbow.

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Aim

The aim of this study is to present the results of the arthroscopic plication of the radial component of the lateral collateral ligament (R-LCL) to reduce minor instability of the lateral elbow.

Background

Minor instability has been proposed as a possible aetiology of recalcitrant lateral elbow pain. However, no studies have yet investigated if a treatment aimed at reducing microinstability can produce a clinical benefit.

Methods

Twenty-seven patients with recalcitrant lateral epicondylitis who had failed conservative therapy, and had no previous trauma or overt instability were included. R-LCL plication was performed in presence of at least one sign of lateral ligamentous patholaxity and one intra-articular abnormal finding. Single assessment numeric evaluation (SANE), Oxford Elbow Score (OES), quickDASH (Disabilities of the Arm, Shoulder, Hand), patient satisfaction and post-operative range of motion were evaluated.

Results

SANE improved from a median of 30 [1st-3rd quartiles: 2 - 40] points pre-operatively to 90 [80 - 100] at final follow-up ($p < 0.0001$) and 26 patients (96.3 %) obtained good or excellent subjective results. Post-operative median quickDASH was 9.1 [0 - 25] points and OES 42 [34 - 48]. Median postoperative flexion was 145° and extension was 0°. Post-operative flexion was restrained in 7 patients and extension in 8; 16 patients (59 %) reached full ROM at final follow-up.

Conclusions

R-LCL plication produces subjective satisfaction and positive clinical results in patients presenting with a symptomatic minor instability of the lateral elbow (SMILE) at two years median follow-up. A slight, well tolerated limitation in range of motion is a possible undesired consequence of this intervention.



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466 Intra-Articular Findings In Symptomatic Minor Instability Of The Lateral Elbow

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Aim

The aim of the study was to evaluate the correlation of lateral ligamentous laxity with aspects of intra-articular elbow lateral pathology, investigating the role of minor instability in lateral elbow pain.

Background

Lateral epicondylitis is generally considered an extra-articular condition. However, in some cases extra-articular causes fail to explain the recalcitrant nature of this pathology. The role of minor instability in the etiology of lateral elbow pain has rarely been considered.

Methods

Thirty-five consecutive patients aged between 20 and 60 years old with recalcitrant lateral epicondylitis who had failed conservative therapy, and had no previous trauma or overt instability were included. The presence of three signs of lateral ligamentous patholaxity and five intra-articular findings were documented during arthroscopy. The relative incidence of each of these was calculated, and the correlation between patholaxity and intra-articular pathology was evaluated.

Results

At least one sign of lateral ligamentous laxity was observed in 48.6% of the studied cohort, and 85.7% demonstrated at least 1 intra-articular abnormal finding. Radial head ballottement was the most common sign of patholaxity (42.9%). Synovitis was the most common intra-articular aspect of pathology (77.1%), followed by lateral capitellar chondropathy (40.0%). A significant association was found between the presence of lateral ligamentous patholaxity signs and capitellar chondropathy (p: 0.0409) as well as anteromedial synovitis (p: 0.0408).

Conclusions

Almost one half of patients suffering from recalcitrant lateral epicondylitis display signs of lateral ligamentous patholaxity, and over 85% demonstrate at least one intra-articular abnormal finding. The most frequent intra-articular findings correlate significantly with presence of lateral ligamentous patholaxity. The presence of multiple intra-articular findings in relation to laxity provide support to a sequence of pathologic changes that may result from a symptomatic minor instability of the lateral elbow (SMILE) condition.



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804 Arthroscopic Dissection Of The Posterior Interosseous Nerve At The Elbow: Unexpected Findings.

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Aim

The aim of this anatomical study was to describe the position of the posterior interosseous nerve (PIN) with respect to the elbow joint capsule and the midline of the radial head, with particular attention on the changes occurring with forearm movements.

Background

The PIN innervates the supinator and the extensor muscles of the wrist and the digits and its lesion may have dramatic consequences. Measurements of PIN course have been provided from open surgical approaches, but arthroscopic descriptions are lacking.

Methods

Five fresh-frozen cadaver specimens were dissected under arthroscopy. Attention was paid to the possibility of identifying the PIN immediately after anterior capsulectomy. The distance between the nerve and the most anterior part of the radial head was then measured with a graduated hook inserted via the midlateral portal with the forearm in neutral position, full pronation and full supination.

Results

The PIN was identified as immediately extracapsular only in one specimen. In the other specimens, a thick layer of adipose tissue surrounded it. The relative position of the PIN to the midline of the radial head changed with forearm pronosupination, moving from lateral in supination to medial in pronation in all cases. A tendency to increased distance in full supination as compared to neutral position and full pronation was noted.

Conclusions

At the level of the radiocapitellar joint the PIN does not lay just extracapsular but a thick layer of adipose tissue may hide it. Furthermore, movements of the forearm change its position with respect to the radial head. The use of retractors can be helpful in protecting this nerve from accidental injury when performing procedures on the radial head.



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611 Radial Head Fracture Pattern In Acute Posterolateral Instability

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Aim

To characterize radius head fracture pattern in acute posterolateral instabilities

Background

Mechanism of injury in elbow triad involves the external rotation of the forearm, valgus and finally posterior elbow dislocation. Although fracture configuration, coronoid and ligament lesions have been well defined in this type of injury, the fracture pattern of the radial head has been poorly studied. Knowledge of this fracture pattern in acute posterolateral instabilities may help to recognize and treat these lesions, especially in non documented dislocations.

Methods

We retrospectively reviewed the CT Scans of patients who were operated on in our hospital over the last 6 years with a diagnosis of elbow triad fracture. Finally, data from 11 patients was collected. The images are studied by reconstructing and overlapping the head and the "zero" in the bicipital tuberosity. Thus a "fracture angle" is obtained according to the involvement of the articular surface of the radius. We collected intraoperative and surgical findings

Results

We found a more frequent affectation of the anteromedial quadrant, with an average of 110° in extension. In all cases the side collateral ligament was repaired, most of the fractures were treated with prostheses; all of those with 3 or more fragments, and four fractures were treated by osteosynthesis (2 fragments).

Conclusions

Some authors have associated a extensive head fracture with a high energy trauma and greater instability. While according to another study, radio-fractures affect the anterolateral quadrant, and in our study we observed an anteromedial quadrant fracture. This pattern seems consistent with the mechanism of forearm supination injury and posterolateral dislocation in elbow triads, such as those presented in our series.

The CT Scan study is of great value in diagnosing and treating elbow fractures. Completing a study, including bicipital tuberosity and characterizing the radial fracture pattern, could aid in diagnosis and surgical planning



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733 Clinical Outcomes After Fixation And Arthroplasty For Treatment Of Comminuted Fracture Radial Head (Mason Type III Or IV): A Systematic Review And Meta-Analysis

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Aim

To compare clinical outcomes after fixation, resection or arthroplasty of comminuted radial head fracture.

Background

Radial head fractures make up approximately 3% of all fractures and they are the most common elbow fracture in adults. The treatment for comminuted radial head fracture remains controversial. Currently, the most frequently used treatment for comminuted radial head fracture is fixation, resection or arthroplasty.

Methods

This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Relevant studies were identified from Medline and Scopus from inception to Feb 13th, 2017 that reported Mayo elbow performance score, pain visual analog score (VAS), postoperative complications and reoperation of either treatment.

Results

Thirty-eight studies were included for the analysis of arthroplasty, 20 studies were included for analysis of fixation, 5 studies were included for analysis of resection, 11 comparative studies were included for compared fixation and arthroplasty and only 1 study were included for compared fixation, resection and arthroplasty. Indirect meta-analysis, radial head arthroplasty provided better postoperative pain (VAS) and Mayo clinical performance score when compared to fixation and resection group, but the complication and reoperation rate was not significant difference between groups. However, direct meta-analysis between comparative studies of arthroplasty has better pain, performance score and lower complication when compared to fixation group

Conclusions

In comminuted radial fracture; both arthroplasty and fixation had acceptable post-operative outcomes. Arthroplasty group had better post-operative outcome than fixation and resection. Prospective randomized controlled studies are needed to confirm these findings as the current literature is still insufficient.



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32 Fixations Method For Treatment Unstable Distal Clavicle Fracture: Systematic Review And Network Meta-Analysis

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Aim

To compare the post-operative outcomes among distal clavical fixations and identify which method is the best for unstable distal clavicle fractures

Background

Surgical managements are recommended for unstable distal clavicle fractures. A variety of methods have been previously reported, but there is no current consensus regarding which method is the most suitable

Methods

We searched all comparative studies that compared post-operative outcomes of coracoclavicular (tight-rope, screw or endobutton), hook plate, plate screw, tension band wiring and transacromial pin fixation for unstable distal clavicle fractures from the PubMed and Scopus databases up to 2 October 2016. A network meta-analysis was applied to assess treatment outcomes. Probability of being best-treatment was estimated using surface under the cumulative ranking curves (SUCRA)

Results

Seven comparative studies and one RCTs (N=401 patients) met inclusion criteria. Interventions were coracoclavicular (N= 67 patients), hook plate (N= 211 patients), plate screw (N = 28 patients), tension band wiring (N = 28 patients) and transacromial pin (N = 14 patients) fixation. A network-meta-analysis showed that effects of coracoclavicular, hook plate and plate screw fixation were significant higher to tension band wiring with the pooled mean CMS of 8.05 (95%CI: 2.84, 16.50), 4.05 (2.59, 6.58) and 15.05 (0.42, 0.92), respectively. For UCLA, plate screw fixation was significant higher to hook plate and coracoclavicular fixation with the mean score of 3.2 (1.37, 5.03) and 2.5 (0.51, 4.49). In term of complication, plate screw fixation was lower risk with RR of 0.17 (0.02, 1.41), 0.11 (0.01, 0.95), 0.03 (0.003, 0.33) and 0.01 (0.0002, 0.11) when compared to coracoclavicular, hook plate, tension band wiring and transacromial pin. Results of SUCRA indicated plate screw fixation was the first ranks for CMS UCLA score and complications

Conclusions

We recommended using plate and screw as a fixation method for treatment unstable distal clavicle fracture



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785 Brachioradialis Muscle Flap For Posterior Elbow Defects. A Simple And Effective Solution For The Upper Limb Surgeon.

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Aim

To present the brachioradialis (BR) muscle flap as a simple, safe and effective solution for the treatment of soft tissue defects of the posterior elbow

Background

Trauma, infection and surgical approaches on posterior elbow are the most frequent causes of soft tissue defects and in most of the cases coverage is necessary. The BR muscle flap is rotational muscular pedicled flap with the pivot point of the flap at the dominant vascular pedicle. The dominant vascular pedicle in most cases is the radial recurrent artery arriving in the proximal portion of the muscle.

Methods

Five patients (3 males and 2 females) with soft tissue defects of the posterior elbow underwent surgical treatment with the BR muscle flap in the period 2011-2015. The mean age was 63 years old (range, 40-78) and the causes of the soft tissue defect were: two patients with total elbow arthroplasty and postsurgical infection, one patient with elbow arthrodesis due to neurologic elbow disruption and two patients with postsurgical infection after internal fixation of olecranon. All patients had a BR muscle flap and skin grafting. In two cases there was retention of the hardware and in three cases hardware was removed.

Results

At 45 months mean follow up (range, 26-61) all patients had viable and functional soft tissue coverage. All patients were free of infection, while one patient had a posterior elbow discomfort in daily activities. None of the patient reported wrist problems

Conclusions

The brachioradialis muscle flap is reliable, easy to harvest without requiring microsurgical expertise and provides stable coverage to the posterior elbow. It is an one stage procedure with low morbidity to the harvest site. As a disadvantage the need for skin coverage should be noted.



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873 Arthroscopic Release Of Extrinsic Elbow Contracture- Recovery And Final Results

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Aim

The aim of this study was to evaluate the range of motion recovery and final outcome of patients after arthroscopic elbow release.

Background

Elbow stiffness substantially limits function of the upper extremity, resulting from both traumatic and degenerative etiology.

Methods

Study is based on 44 consecutive patients with arthroscopic elbow release followed prospectively for at least 6 months. All patients were operated by one surgeon, between 2010-2015. The group included 9 females, 35 males, mean age $36,2 \pm 12,8$ y.o., mean FU $18,5 \pm 17,7$ weeks, with extrinsic elbow contracture resulting from trauma (22) and osteoarthritis (22). Mayo Elbow Performance (MEP) score was used for functional evaluation preoperatively and at final follow-up. Severity of contractures according to Morrey in majority were minimal (21 patients) and moderate (17 patients).

Results

The average ROM improved significantly in the final follow up by: extension $13,8^\circ$, flexion $11,7^\circ$, arc $28,3^\circ$. Significant improvement in arc has been achieved in both severity groups, however larger in moderate contracture. Best improvement was achieved intraoperatively, then in decreased within 1 week and finally improved over recovery time. Final extension was significantly lower than range achieved intraoperatively. Improvement in ROM was similar in both traumatic and degenerative contractures. MEP improved significantly from $73,5 \pm 12$ to $92,2 \pm 15,3$. There was one complication of resulting in mild median nerve neuropathy.

Conclusions

Arthroscopic elbow release improves significantly range of motion and function in minimal and moderate elbow contractures also improving overall function. It is equally successful in posttraumatic and degenerative etiology of stiffness. Intraoperative improvement may not be achieved once the treatment is accomplished.



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186 Use Of Cortical Button With The Double Incision Technique For Distal Biceps Tendon Avulsion – The Importance Of Drill Trajectory

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Aim

To study the safety of drill trajectories using cortical buttons with the double incision technique for distal biceps tendon fixation.

Background

The double incision technique is an established approach for distal biceps tendon fixation and more reliable for anatomical reconstruction than the single anterior approach. Reattachment can be achieved with transosseous sutures and anchors. However, the strongest fixation is achieved with cortical button. For the double incision technique the forearm has to be in full pronation to expose the radial tuberosity. Cortical buttons may be used with this technique as well. However, there is no data available about interference of the cortical button with the posterior interosseous nerve (PIN) when the double incision technique is used.

Methods

A double incision approach was performed in 10 fresh cadaveric elbows. Nine different bicortical posterior drill trajectories through the radial tuberosity were analyzed (perpendicular, distally, proximally, radially, ulnarly and combinations). The forearm was kept in full pronation for the drilling. The shortest distance between PIN and drill tip and as well between PIN and BicepsButton™ was measured for all trajectories.

Results

Longest distances between drill tip and PIN were observed with distal-ulnar (mean 14mm (range 6-20mm)) and ulnar (10mm (6-17mm)) trajectories. Only ulnar trajectories (ulnar/proximal ulnar/distal ulnar) did not interfere with the PIN. Regarding the BicepsButton™ with a size of 12x4mm, mean distance decreased to 10mm (range 2-16mm) (distal-ulnar) and 6mm (range 2-13mm) (ulnar). All other trajectories had at least one interference of the BicepsButton™ with the PIN.

Conclusions

Bicortical drilling for cortical buttons should be aimed in a distal-ulnar direction when the posterior approach is used to achieve a safe distance between the button and the PIN. Even with this trajectory, the shortest distance using the BicepsButton™ was measured only 1.6mm in this study.



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598 „Osborne Cotterill Lesion“ Revisited: An Underestimated Trauma Mechanism In Posterolateral Fracture Dislocation Of The Elbow

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Aim

In a tertiary elbow center all cases with an Osborne-Cotterill mechanism (OCM) were identified. Besides the incidence, the outcome in the acute and nonacute setting were itemised.

Background

The Osborne Cotterill Lesion has been described in 1966 as rare cause of recurrent posterolateral elbow instability. Besides a defect of the dorsolateral capitulum, a chronic posterolateral damage to the capsule and the ligaments of the LUCL complex has been discussed as pathoanatomical correlate. The trauma mechanism includes a posterolateral dislocation with proximal tear of the LUCL as well as shearing of the cartilage in the area of the dorsoradial capitulum.

Methods

51 patients with either primary, secondary or tertiary complex pathology after posterolateral dislocation have been prospectively included into the database, recording patient-specific data, trauma mechanism, intraoperative findings, complications, neuronal status, functional (MEPI) and patient-specific outcome (q-DASH, OE) and several cost-benefit parameters.

Results

25 acute and 26 revision cases were included. An OCM was detected in 18 cases (35% incidence). In the acute group, an OCM was seen 12 times (50%). At a ~FU of 8 months (\pm 6 months) ~MEPI was 96 (\pm 16) and ~q-DASH was 16 (\pm 8). In the revision group 6 OCM were identified (23%). In 5 patients with chronic instability advanced arthrosis of the radial column was detected. Open arthrolysis and reinsertion of the LUCL was effected using an expanded Kocher approach in 4 patients, in 2 patients a ligament graft using triceps tendon was necessary. At a ~FU of 7 months (\pm 7 months) ~MEPI was 76 (\pm 24) ~q-DASH was 36 (\pm 18). The cost-benefit analysis of the acute group had a positive balance while the chronic had a negative balance.

Conclusions

The OCM is no rarity, but occurs often in acute complex injuries and if treated in a revision setup leads to unfavourable results.



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790 Biomechanical Effect Of Rotator Cuff Tears On Deltoid Function

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Aim

Purpose was to investigate the range of motion and forces of the anterior, middle, and posterior heads of the deltoid during dynamic glenohumeral abduction in the setting of rotator cuff tears. We hypothesized that forces generated by the deltoid would gradually increase as rotator cuff tears became larger.

Background

Current studies regarding glenohumeral abduction and deltoid forces have primarily utilized static testing. This study investigated separately anterior, middle, and posterior deltoid forces during dynamic glenohumeral abduction with rotator cuff tears.

Methods

Twelve cadaveric shoulders (age 66.8, 64-74 years) were utilized. The anterior, middle, and posterior deltoid tendons and rotator cuff tendons were attached to individual shoulder simulator actuators. Deltoid pulleys were spread over the lateral edge of the acromion according to the native force vectors. Cuff pulleys were loaded in the direction of the musculotendinous unit. Optical tracking tripods on the lateral distal humerus (dynamic) and the lateral acromion (static) tracked 3D motion during dynamic testing.

Results

Intact shoulders required 193.8 N (95%) total deltoid force to achieve 79.8° (95% CI) maximum glenohumeral abduction. Compared to native shoulders, abduction decreased following SSP (27.2%), posterosuperior (29.2%), anterosuperior (51.5%) and massive (48.4%) cuff tears. Increased total deltoid forces were required for SSP (29.8%), posterosuperior (55.2%), anterosuperior (108.1%) and massive (57.2%) cuff tears. Anterior deltoid forces were significantly greater in anterosuperior and massive tears, while middle and posterior deltoid forces were significantly greater in posterosuperior tears.

Conclusions

Following supraspinatus dysfunction, dynamic glenohumeral abduction is permanently reduced despite increasing total deltoid force. Posterosuperior tears maintain some degree of mechanical advantage, allowing the shoulder to function like an isolated supraspinatus tear with only modestly increased deltoid forces. Anterosuperior tears have significant mechanical disadvantages, requiring a significant amount of deltoid force to achieve maximum glenohumeral abduction. This compensational deltoid force may result in further cuff tear progression.



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572 The Integrity Of The Acromioclavicular Capsule Ensures Physiologic Centration Of The Acromioclavicular Joint Under Rotational And Translational Loading

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Aim

The purpose of this study was to evaluate the specific capsular structures of the acromioclavicular (AC) capsule and their contribution to preserve translational as well as rotational stability. The hypothesis was that a successive cutting of each of the AC-capsular structures will result in a progressive instability and de-centration of the acromion in correlation to the clavicle.

Background

No goldstandard for best type of surgical reconstruction exists. Therefore, the contribution of the distinctive capsular structures has to be known to optimally reproduce the complex three-dimensional guidance of the AC joint.

Methods

30 human cadaveric shoulders were used and fixed to a servohydraulic testing system (MTS Systems Corp). A 3D optical measuring system was used to evaluate the 3D movement (horizontal translation and rotation). Markers were tracked during all trials for 3D video motion analysis by using MaxTraQ Pro (Innovision Systems Inc) software. Each specimen was tested native as control. The AC capsule was dissected in serial steps with testing after each cut. The CC-ligaments were left intact to detect the specific contribution of each AC capsular structure. Torque, axial force required to rotate and translate the clavicle as well as 3D displacement were recorded.

Results

Sectioning of each area of the AC capsule resulted in significant reduction of the joints resistance against translation and rotation. A complete cutting of the capsule resulted in a reduction of more than 70 % of resistance against posterior translation as well as 90 % for posterior rotation.

Conclusions

Each area of the AC capsule is an important factor to stabilize and center the joint. This was especially important for rotational motion. No area of the AC capsule can be cut without reducing the joints stability. Future techniques for anatomic AC joint reconstruction should consider these findings to optimally reconstruct the joints physiology.



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578 The Use Of Scapular Weighted Constant-Murley Score To Assess Scapular Dyskinesis In Anatomical And Reverse Shoulder Arthroplasty: A Prospective Study

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Aim

The aim of this study was to assess patients with total shoulder arthroplasty (TSA) and reverse shoulder arthroplasty (RSA) using the "Scapula Weighted Constant-Murley score" (SW-CMS). We hypothesize that scapula compensatory movements are recovered at 6 months postoperative.

Background

The SW-CMS assess the effects of scapular kinematics on the total CS score. This score weights the points of CMS for humerus elevation and abduction, based on a quantitative analysis of scapula dyskinesia.

Methods

This was a prospective comparative study including a sample of 25 shoulders: TSA (12 shoulders, age 62±7) or RSA (13 shoulders, age 76±8). Replaced shoulders were assessed with CMS and SW-CMS preoperatively (T0), and postoperatively at 6 (T1) and 12 months (T2). Shoulder kinematics was analyzed using a stereophotogrammetric system (Vicon, UK). A two-way repeated measure ANOVA was applied separately for TSA and RSA using Scores (CMS, SW-CMS) and Times (T0, T1, T2) as independent variables

Results

We found a statistically different distribution of CMS and SW-CMS. RSA did not show significant changes between T1 and T2. TSA patients showed an improved humerus elevation both at T1 (+20%) and T2 (+20%), associated with an increased scapula compensatory movement at T1 and then a lowering at T2, with a compensated medio-lateral (ME-LA) scapula rotation. RSA patients showed a significant improvement > 50% in humerus elevation, between T0 and T1. At T2, there was a small improvement in abduction but not in flexion; at T0 ME-LA had the worst compensation, at T1 there was a general improvement of scapula compensation, and at T2 there was an improvement for ME-LA and protraction-retraction, but a worsening tilting.

Conclusions

SW-CMS was significantly different from CMS. TSA and RSA had compensatory movement even at 6 months; TSA and RSA exhibit different patterns of scapular dyskinesia.



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**696 Is The Articular Layer Purely Tendon Or Capsule In Delaminated Rotator Cuff Tear?
: Histological Evaluation Of The Tendon****Gwang Young Sung**, Yang-Soo Kim, Hyo-Jin Lee, Jong-Ho Kim, Dong-Jin Kim

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Aim

Evaluate articular layer of the delaminated rotator cuff tear(RCT) histologically, in order to distinguish whether this layer is a part of the torn tendon or remaining capsule layer.

Background

Bursal layer of delaminated cuff tear is part of torn tendon without any doubt, but there is debate on that the articular layer is composed of tendon or capsule.

Methods

Tendon and capsule tissues were acquired from articular and bursal layer of the 3 patients with delaminated RCT during surgical repair. Normal rotator cuff tendon and capsule tissues were acquired from 1 cadaver as a control. Histological morphology under H&E stain was observed and immunofluorescence stains were applied to the tissues on four different tissues in order to evaluate expression of CD68+ macrophage, which shows high expression in capsule, Type 1 collagen and Tenascin-C, which show high expression in tendon.

Results

In histologic investigation, fibers that makes up collagen bundles were observed in tissue of normal rotator cuff tendon. These collagen bundles were also observed in both articular and bursal layers of delaminated RCT. However, different from the tendon layer tissues of delaminated tear, outer layer of cadaveric capsule tissue (control) was surrounded by the proliferated synovial cells. The expression of CD68+ macrophage was higher in cadaveric capsule tissue than normal tendon of a cadaver and both layers of delaminated rotator cuff tear. Meanwhile, the expression of Type I collagen and Tenascin-C was higher in normal tendon of a cadaver and both layers of delaminated RCT.

Conclusions

Articular layer of delaminated RCT turned out to a part of the torn tendon, rather than remaining joint capsule. Therefore articular layer should also be repaired in the treatment of the delaminated RCT.



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695 Is It Possible To Reduce The Postoperative Shoulder Stiffness After Arthroscopic Rotator Cuff Repair By Performing The Extensive Rotator Interval Release ?Jong-Ho Kim, Yang-Soo Kim, Hyo-Jin Lee, **Gwang Young Sung**, Dong-Jin Kim

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Aim

The aim of this study is to evaluate the effect of extensive rotator interval release including coracohumeral ligament during the early period after arthroscopic rotator cuff repair.

Background

Postoperative stiffness is one of the great concerns after arthroscopic rotator cuff repair. Thickened coracohumeral ligament in the rotator interval is known as a factor limiting external rotation.

Methods

Between March 2016 and September 2016, 69 patients who underwent arthroscopic rotator cuff repair were enrolled and randomly allocated to 2 groups; extensive rotator interval release including coracohumeral ligament insertion site release (Group I, n=36) or no interval release (Group II, n=33). The rotator interval release was performed through the standard anterior working portal until the exposure of the coracoid base. In group II, only the anterior portal was made on the interval without the actual release of the tissue. The American Shoulder and Elbow Surgeons score (ASES), Constant score, KSS score, pain VAS and ROM were evaluated at initial and 3, 6 months after surgery.

Results

Group I showed significant higher range in external rotation at side ($p=0.01$) and external rotation at abduction ($p=0.02$) at 3 months after surgery. There was no significant difference at postoperative 6 months. Both groups showed no significant differences in the other range of motion and ASES, Constant, KSS score and pain VAS at each time point.

Conclusions

The extensive rotator interval release including coracohumeral ligament showed faster recovery in terms of external rotation during the early postoperative period after arthroscopic rotator cuff repair. However, there were no more advantageous effect in the ROM and functional scores after 6 months after surgery. The extensive rotator interval release can help the rehabilitation in the early period after surgery as a method for resolving postoperative stiffness.



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580 Neuralgic Amyotrophy Is Not The Most Common Neurologic Disorder Of The Shoulder: 78-Month Prospective Study Of 60 Neurologic Shoulder PatientsCiaran J Clarke¹, Emma Torrance², Jerome Mcintosh¹, Lennard Funk³

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Aim

The aim of this study was to compare the onset, diagnosis, investigation, and treatment of all neurologic shoulder conditions at a specialist shoulder unit.

Background

Neuralgic amyotrophy (NA) was first described in 1948. Traditional literature describes a painful attack with sudden onset, followed by paresis, with varied outcomes. Recent studies have suggested NA is currently underdiagnosed. However, a large number of studies detailing NA originate from a small group of sources.

Methods

Data were collected from 60 patients (81.6% male; median age, 41.5 years) during a 78-month period. Patients with a diagnosis of a neurologic disorder of the shoulder with confirmatory electromyogram (EMG) studies were included.

Results

NA was diagnosed in 18 patients before the EMG investigation. Of the clinically diagnosed NA patients, only 5 (27.8%) had EMG findings supportive of NA. A further 5 patients with a clinical diagnosis other than NA were diagnosed with NA after EMG findings. Overall, 10 patients (16.6%) in our study were diagnosed with NA after EMG studies. Only 4 (40.0%) reported a sudden onset attack associated with NA. Supraspinatus and infraspinatus were involved in 9 patients (90.0%), suggesting a predictable distribution of muscle involvement.

Conclusions

These results suggest that NA is overdiagnosed and does not warrant the increased attention suggested by recent articles. The current study also highlights a necessity to perform EMG investigations in all cases of suspected NA because the accuracy of the clinical assessment is poor.



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344 Middle Term Clinical Result And Image Evaluation After Distal Clavicle Resection For The Treatment Of Acromioclavicular Joint Osteoarthritis

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Aim

The purpose of this study was to evaluate middle term clinical results and image evaluation after distal clavicle resection for the treatment of acromioclavicular (AC) joint osteoarthritis.

Background

Degenerative acromio-clavicular (AC) joint osteoarthritis is often observed. Good short term clinical results after distal clavicle resection for this disease was reported, but there were a few reports of middle term clinical results.

Methods

We retrospectively evaluated 34 shoulders in 31 patients who had undergone arthroscopic distal clavicle resection with a minimum 5 years follow up. The patients undergone arthroscopic rotator cuff repair were excluded. Average age at the time of surgery was 62 years old. We evaluated active ROM in flexion, active ROM in abduction, tenderness of the AC joint and horizontal adduction test at preoperation, 1 and 5 years follow up. We also evaluated new bone formation of distal clavicle by X-ray at 1 and 5 years follow up.

Results

Preoperative average active ROM in flexion and preoperative average active ROM in abduction was significantly improved at 1 and 5 years follow up. Complete disappearance of AC joint tenderness was recognized in 20 shoulders at 1 year follow up and 27 shoulders at 5 years follow up. Mild AC joint tenderness remained in 12 shoulders at 1 year follow up and 7 shoulders at 5 years follow up. Complete disappearance of horizontal adduction test was recognized in 32 shoulders at 1 year follow up and 33 shoulders at 5 years follow up. New bone formation of distal clavicle was recognized in 2 shoulders at 1 year follow up and 4 shoulders at 5 year follow up.

Conclusions

Arthroscopic distal clavicle resection was an effective surgical procedure at middle term follow up.



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346 Short Term Postoperative Clinical Results After Arthroscopic Bankart Repair With Jugger Knot Soft Suture Anchors

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Aim

The purpose of this study was to evaluate minimum 6 months clinical results of arthroscopic Bankart repair with Jugger knot soft suture anchors.

Background

Recently Jugger Knot 1.4mm all-soft suture anchors have been introduced. These volumes are substantially less than those of conventional glenoid anchors. The advantage of these anchors is increasing the numbers of suture anchors, decreasing the mechanical stress in each anchor and decreasing the joint damage.

Methods

We retrospectively evaluated 25 shoulders (25 patients, 21 male and 4 female) with Bankart lesions arthroscopically treated with Jugger knot soft suture anchors. An average age at the time of surgery was 28.4 years (range, 16-61 years). An average follow-up was 15.1 months (range, 6-23 months), with a minimum of six months. Numbers of used Jugger knot soft suture anchors were evaluated. Clinical results were evaluated using a Rowe score. Range of motion of external rotation at 90 degrees of abduction at supine position was measured and compared to those of healthy shoulders.

Results

Numbers of used anchors were 5.9 in average (range, 5-9). Recurrence of shoulder dislocation was observed in one case of a rugby player within 25 cases of this study; thus recurrence rates of anterior instability were 4 %. The averaged Rowe score was 49.2 points in stability, 19.8 points in motion, 28.8 points in function and 97.8 points in total. Averaged acquired range of motion of external rotation was 82.4 degrees at surgically treated shoulders and 91.4 degrees at healthy shoulders; the ratio between these was 90.2%.

Conclusions

Patients treated with arthroscopic Bankart repair with Jugger knot soft suture anchors have showed excellent clinical outcomes at a minimum of six months follow up.



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784 Constant-Murley Score : Can We Assess It With An Auto-Questionnaire?

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Aim

To find whether it is possible to assess the Constant-Murley functional shoulder score with an auto-questionnaire.

Background

The Constant score, allows an objective and subjective assessment of the shoulder function. It has been proven to have a poor inter-observer reliability for some of its aspects, and is not usable as a remote assessment tool.

Methods

We conducted a prospective continuous study in a shoulder-specialized service. For each patient seen in consultation or hospitalized for a shoulder pathology, an auto-questionnaire was delivered and a clinical examination was performed by a surgeon. The questionnaire was composed of checkboxes only, with pictures preferred over text for most items. Correlation with surgeon examination were assessed with the intraclass correlation coefficients, differences with the Student test.

Results

One hundred consecutive patients were analyzed. The mean total score was 3 points lower for the auto-questionnaire (CI95 : -5 ; -1). Activity and pain were not significantly different (-0.4/20 and -0.3/40 ; $p > 0.05$) but pain and force were slightly different (+0.8/15 ; -3.0/25 ; $p < 0.01$). Correlation between the two scores was excellent (0.87), as were the range of motion and the pain subitems (0.85 and 0.78), good for the activity (0.69) and fair for the strength (0.57).

Conclusions

The auto-questionnaire is an excellent estimator of the Constant score, and of its pain and mobility subitems. It is less accurate for the evaluation of the strength, but differences between subitems compensate and allow its use in daily practice.



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69 Prevalence Of Propionibacterium Acnes In The Glenohumeral Versus Subacromial Space In Shoulders With Intact Rotator CuffThilo Patzer¹, Sabine Petersdorf², Birgit Henrich², Ruediger Krauspe¹, Martin Hufeland¹

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Aim

To evaluate the prevalence of Propionibacterium acnes (P. acnes) on the skin after surgical disinfection, in the glenohumeral and subacromial space in shoulder arthroscopies.

Background

P. acnes is part of the physiological skin surface but potentially pathogenic and the at most detected germ in low grade infections of shoulder arthroplasties.

Several studies have found P. acnes in the glenohumeral space in up to 42% of shoulder operations. It is still unclear whether it is a commensal colonisation, a subclinical infection or contamination by the approach. The glenohumeral space is anatomically separated from the subacromial space by the rotator cuff. The prevalence of P. acnes in the subacromial space has not been described yet.

Methods

Patients >18 years with shoulder arthroscopies were included.

An informed consent by the patients and the local University ethical board was given.

Exclusion criterias were shoulder operations, complete rotator cuff tears, systemic inflammatory diseases, tumors, shoulder injections <6 months, antibiotic therapy <14 days preoperatively.

After standardized surgical skin disinfection (Kodan Tinktur forte) a skin swab was taken directly at the posterior portal. Arthroscopy was performed randomized first either in the glenohumeral or subacromial space and synovial assays were taken. Asservation and cultivation was done according to standardized criterias (Amies culture medium, Thioglycolate- and Brain-Heart-infusion, MacConkey, Columbia Blood, Chocolate, Schaedler) for 14 days. Germs were detected and identified with MALDI mass-spectrometry.

Results

84 consecutive patients with normal blood inflammation parameters were prospectively included (52% male, mean age 49.5±14.8 years).

P. acnes was detected in 30% on the skin, in 14% in the glenohumeral and in 3% in the subacromial space.

Conclusions

P. acnes is regularly present in arthroscopic glenohumeral biopsies, significantly fewer in subacromial biopsies. This does not confirm the contamination-theory because the assay extraction was performed similarly in both spaces.

The standardized surgical skin disinfection could not eliminate P. acnes on the skin in 30%.



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65 Is The Critical Shoulder Angle A Risk Factor For SLAP Lesions?Thilo Patzer¹, Nina Wimmer¹, Anika Rottmann², Rüdiger Krauspe¹, Hannes Kenji Kubo¹

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Aim

The evaluation of the critical shoulder angle (CSA) and different specific acromion parameters in the x-ray of patients with arthroscopically diagnosed SLAP lesions compared with arthroscopy patients without SLAP lesions.

Background

The critical shoulder angle (CSA) has been described as a predictor for rotator cuff tears (CSA > 35°) and for glenohumeral osteoarthritis (CSA < 30°). SLAP lesions correlate significantly with glenohumeral chondral lesions and have shown an influence as a prearthrotic factor of the shoulder.

Methods

Consecutive patients with shoulder arthroscopy and isolated SLAP lesions type II-IV without complete rotator cuff ruptures were included. SLAP evaluation was performed according to Burkhart's criteria intraoperatively. Patients with shoulder arthroscopy without SLAP lesions > type I served for the control group. Exclusion criteria for both groups were shoulder dislocation in past, SLAP lesions > type IV and higher grade glenohumeral osteoarthritis. Standardized x-ray measurements of different acromion parameters were done: CSA, acromion index and lateral acromion angle on true-ap-view, acromion slope on outlet view. All measurements were performed by two independent observers. For statistic calculation a logistic regression was used and the area under curve (AOC) was measured for several parameters and an inter observer reliability analysis was done.

Results

N=75 patients with SLAP lesions type II-IV were included (61% male, mean age 46.5±13.0 years). The control group consisted of n=326 patients (52% male, mean age 57.3±15.0 years).

The CSA of patients with SLAP lesion was 29.6±3.5°, the CSA of the control group 34.9±3.9° (p<0.01), the CSA of patients with complete ruptures of supraspinatus tendon (n=115) 36.7±3.6°. AOC for CSA in SLAP patients was measured to be 0.84, for complete ruptures of supraspinatus tendon 0.76.

Conclusions

SLAP lesion correlate with a low CSA (<30°) comparable with CSA values for glenohumeral osteoarthritis. A CSA <30° can therefore be seen as a risk factor for osteoarthritis as well as for SLAP lesions.



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579 Low-Grade Infections In Non-Arthroplasty Shoulder Surgery

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Aim

The current study assessed patient-related risk factors, outcomes and clinical presentation of low-grade infection following open and arthroscopic non-arthroplasty shoulder surgery.

Background

Recent studies have identified the diagnostic challenge of low-grade infections following shoulder arthroplasty surgery. Infections following non-arthroplasty procedures have not been reported in the literature.

Methods

Thirty-five patients presenting with suspected low-grade infection were reviewed. Biopsies taken at revision surgery were cultured in the sterile environment of a class II laminar flow cabinet and incubated for a minimum of 14 days at a specialist orthopaedic microbiology laboratory. Patient-related factors (age, occupation, injection), index surgery and infection characteristics (onset of symptoms, duration to diagnosis, treatment) were analysed.

Results

Positive cultures were identified in 21 cases (60.0%), of which 15 were male (71%). Of all patients with low-grade infection, 47.6% were males between 16-35 years of age. *Propionibacterium acnes* and coagulase negative staphylococcus were the most common organisms isolated (81.1%, n=17 and 33.3%, n=7, respectively). Of fourteen negative culture cases, nine were treated with early empirical antibiotics (64.3%); seven of whom reported symptomatic improvement (77.8%). Of five patients treated with late empirical antibiotics, four improved.

Conclusions

Young male patients are at greatest risk for low-grade infections following arthroscopic and open non-arthroplasty shoulder surgery. *Propionibacterium acnes* was the most prevalent organism. Patients presented with classical post-operative frozen shoulder symptoms, resistant to usual treatments. Interestingly, 78.6% of patients with negative cultures responded positively to empirical treatment.



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248 Carbon Dioxide Contrast-Enhanced Ultrasonography Revealed The Unexpected Translation Of Patient Controlled Interscalene Analgesia Catheter After Arthroscopic Shoulder Surgery

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Aim

The aim of this study was to evaluate the actual distance between catheter orifice and C5/C6 nerve roots by using carbon dioxide (CO₂) contrast-enhanced ultrasonography technique.

Background

Patient Controlled Interscalene Analgesia (PCIA) catheter was reported to be the effective way to achieve enough analgesic effect after shoulder surgery. The positional relationship of catheter orifice and nerves after the operation was concerned with postoperative analgesic effect. However, there were no reports evaluated the actual distance between catheter orifice and nerve because of the difficulty of viewing the catheter orifice accurately.

Methods

Twenty patients receiving a PCIA catheter for arthroscopic shoulder surgery were included in this study. We measured the distance between catheter orifice and C5/C6 nerve by CO₂ contrast-enhanced ultrasonography technique in the recovery room and at 24 hours after the operation. Concurrently, patients were examined VAS score, decrease in perception of C5/C6 nerve area and manual muscle test (MMT) of biceps. We also examined the correlation between these distances and clinical scores.

Results

The orifice of the catheter was clearly detected by CO₂ contrast-enhanced ultrasonography at any time points. The distance between catheter orifice and C5/C6 nerve roots significantly increased from 2.57 ± 1.95 mm at just after surgery to 8.58 ± 6.23 mm at 24 hour after surgery. Analgesic effect became smaller with increasing distance. The distance showed close correlation with VAS score, decrease in perception of C5/C6 nerve area and MMT of biceps ($p < 0.05$).

Conclusions

This is the first report addressing the actual position of PCIA catheter tube orifice after surgery. CO₂ contrast-enhanced ultrasonography is the effective way to evaluate the position of catheter orifice even in the patients after arthroscopic shoulder surgery. The PCIA catheter tube could move easily to unintended location after operation. Positional relationship of the catheter orifice and nerve was associated with analgesic effect of the PCIA after shoulder surgery.



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252 Influence Of LHB Tendon Deficiency On The Shoulder With Massive Rotator Cuff Tear

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Aim

The aim of this study was to evaluate the short-term clinical results of arthroscopic rotator cuff repair (ARCR) in a focused group of massive rotator cuff tear and to correlate these results with the LHB tendon deficiency.

Background

LHB tendon has an important role to maintain shoulder function. LHB tendon rupture sometimes occurs in the cases of massive rotator cuff tear, though it is not well known about whether the deficiency of LHB tendon influences on the preoperative and postoperative ARCR function of the shoulder with massive rotator cuff tear.

Methods

We evaluated 85 shoulders that had undergone arthroscopic rotator cuff repair surgery for massive rotator cuff tear. We evaluated LHB tendon during arthroscopy; 26 shoulders were classified into the group of LHB tendon deficiency (group minus) and 59 shoulders were classified into the group of intact LHB tendon (group plus). We assessed each surgical procedure as a complete repair or an insufficient repair. Clinical outcomes were evaluated by the Japanese Orthopaedic Association shoulder scoring system (JOA score), active range of motion (ROM) preoperatively and postoperatively. Each parameter was statistically analyzed between the two groups.

Results

There was no significant difference between average preoperative JOA score and active ROM in the two groups. Complete repair was performed in 15 shoulders/26 shoulders (58%) in group minus and in 50 shoulders /56 shoulders (89%) in group plus. Postoperative clinical results in group minus included insufficient repair were significantly lower than those in group plus.

Conclusions

LHB tendon deficiency didn't affect preoperative shoulder dysfunction in the shoulders with massive rotator cuff tear. However, complete rotator cuff repair was more difficult in the cases of LHB tendon deficiency than those of intact LHB tendon. Postoperative shoulder function in the cases of intact LHB tendon was better than those of LHB tendon deficiency.



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247 Long Term Radiographic Analysis Of The Fatty Infiltration And Atrophy Of Well Repaired Rotator Cuff Muscles

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Aim

The purpose of this study is to evaluate the radiographic change of rotator cuff muscle atrophy after successful arthroscopic rotator cuff repair (ARCR).

Background

There are few studies demonstrated the reversible change of rotator cuff muscle atrophy after successful ARCR.

Methods

66 patients were included in this study. The patients included in this study were performed ARCR and magnetic resonance imaging (MRI) at 6-month postoperatively and final examination. These patients also had defined healed rotator cuff (Sugaya's classification Type I - III) on both series of postoperative MRI. The minimum follow-up was 5 years, and the mean follow-up duration was 83.5 months. Serial changes in the supraspinatus muscle area on the most matching MRI scans (sagittal-oblique view) were evaluated.

Results

Statistically significant clinical improvements were observed after ARCR. Range of motion and JOA scores improved from preoperatively to at six months. Paired analyses showed no differences between the clinical scores at six months and mean eight years. There were no significant differences in the area of the supraspinatus muscle between the 6-month and final examination. Fatty infiltration of rotator cuff muscles got worse from 6-month postoperatively to final follow-up.

Conclusions

There was no increase in muscle volume from 6month postoperatively to final examination after successful ARCR. Fatty infiltration according to the Goutallier grade was not reversed too.



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583 Translation, Cross-Cultural Adaptation And Validation Of The French Version Of The Wheelchair User's Shoulder Pain Index (WUSPI)

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Aim

to translate and validate in French the WUSPI (Wheelchair User's Shoulder Pain Index) used to follow up shoulder's musculo-skeletal complications in patients in a wheelchair.

Background

25 to 75% of patients in a wheelchair develop shoulder pain responsible for functional impairment. Even though surgery seems to improve their function, adequate score are necessary to evaluate these patients before and after surgery.

Methods

The WUSPI was forward and back translated, cross-culturally adapted and validated using international guidelines. The validation study was performed on a series of patients using a manual wheelchair who underwent shoulder surgery between 2007 and 2013 in one orthopaedic department. At the last follow-up, patients completed WUSPI twice within 2 days, the Constant score and the SCIM-III (Spinal Cord Independence Measure). Preoperative WUSPI score was entered retrospectively. Shoulder imaging was performed at last follow-up according to the pathology (standard X-Ray for arthroplasty, MRI for cuff lesions). Statistical tests assessed the construct validity, sensitivity to change, internal consistency, reliability and feasibility of the WUSPI.

Results

16 patients (22 shoulders) underwent surgery, 10 acromioplasty, 7 arthroscopic cuff tear repair and 5 total shoulder arthroplasty, mean age 59.3 ± 10.8 years, sex-ratio 1:1. 12 patients (18 shoulders) were available for final analysis. The WUSPI score was significantly correlated to pain sub-item of the Constant score ($r = -0.69$, $p = 0.002$) and transfers sub-item of the SCIM-III ($r = -0.46$, $p = 0.05$). Internal consistency was high ($\alpha = 0.91$) and test-retest reproducibility excellent ($\rho = 0.95$ [0.91-0.99], $p < 0.00001$). The mean WUSPI score improved significantly after surgery (83.3 ± 24.1 vs 43.8 ± 19.4 , $p = 0.0003$). No ceiling/floor effects were found. At last follow-up, WUSPI was worse in case of anatomical lesion on imaging but non-significantly (42.8 ± 19.9 vs 28 ± 6.7 , $p = 0.18$).

Conclusions

the French version of the WUSPI score is valid and reproducible. After shoulder surgery this score has improved significantly. This questionnaire is useful to assess shoulder pain among wheelchair users.



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663 Outcomes And Risk Factors Of Adhesive CapsulitisYousef Shishani¹, Evan Lederman², Patrick Denard³, **Reuben Gobezie**⁴

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Aim

To examine the relationship between multiple variables and frozen shoulder and to provide evidence regarding which treatment options are best depending on specific clinical presentation.

Background

Adhesive capsulitis (AdCap) is a painful and limiting condition. While there exists multiple conservative and surgical treatment options for the disorder, much is still unknown regarding which populations are at risk and what the best treatment option is for individual patients.

Methods

A retrospective review of 1377 patients diagnosed with and treated for AdCap between June 2008 and December 2014 was performed. We evaluated the following: age at diagnosis, race, gender, number of cortisone injections, previous surgeries, range of motion, comorbidities (diabetes and thyroid disorders), whether onset was idiopathic or secondary, trauma, previous operations and capsular release surgeries. We compared demographics, outcomes and co-factors within the AdCap cohort and also between patients with AdCap and a control group.

Results

Between the AdCap cohort and control group more patients were females 68.7% vs 55% ($p < 0.001$), and more were diabetic 20% vs 8% ($p < 0.001$). Within the AdCap cohort there were more females than males, 945 vs 428 ($p < 0.001$), more males were diabetic than females, 24.8% vs 17.3% ($p = 0.001$), and more females had hypothyroidism than males 13.4% vs 5.6%. Comparing non diabetic vs diabetic patients within the AdCap cohort: non diabetics presenting with AdCap had better forward flexion than non-diabetics 113.8° vs 107.9° ($p = 0.015$), and more diabetics required capsular release than non-diabetics 13% vs 7.3% ($p = 0.003$). Significantly more non-diabetic patients resolved frozen shoulder without corticosteroid or surgical intervention than diabetics, 83.6% vs 61.7% ($p < 0.000$). Significantly more non-diabetic patients resolve frozen shoulder following single cortisone injection than diabetics, 95.9% vs 86.7% resolved ($p < 0.000$).

Conclusions

Female sex and diabetes mellitus appear to be risk factors for AdCap. Our data indicates that diabetics may respond to treatment options less favorably than non-diabetics.



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642 Ultrasound Analysis Of The Subscapularis Muscle Healing Following Total Shoulder Arthroplasty Using The Peel Technique

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Aim

The purpose of this study was to assess the subscapularis muscle status after subscapularis peel by performing a postoperative ultrasound and correlate healing to physical examination findings.

Background

The integrity of the subscapularis tendon repair is a primary concern after total shoulder arthroplasty (TSA) because the procedure requires that the tendon be mobilized to gain exposure to the glenohumeral joint.

Methods

Consecutive patients who underwent TSA between Jan, 2014 and Mar, 2015 were enrolled. Patients were evaluated at a single clinical visit at a minimum of 12 months after the operation but not beyond 18 months. Each patient underwent active range of motion measurements using a digital measuring application. We also recorded the American Shoulder and Elbow Surgeons score (ASES), Single Assessment Numeric Evaluation score (SANE), Simple Shoulder Test (SST) and Visual Analogue Scale score (VAS). Belly press and Lift off tests were also performed.

Results

At an average follow up of 15 months we examined 60 shoulders. Average age was 64 years. Average forward flexion was $134.6^{\circ} \pm 22.0^{\circ}$, external rotation was $51.7^{\circ} \pm 16.4^{\circ}$ and internal rotation ranged from the level of T6 to buttocks. ASES score significantly improved from 33.5 to 80.3 ($P < 0.005$). Visual analog scale also significantly improved from 5.8 to 0.7 ($P < .005$). The SANE and SST tests both showed significant improvement from 31.9 to 85.1 and 36.5 to 84.7 respectively ($P < .005$). The ultrasound examination revealed 55 (91.7%) intact, 3 (5%) intact/attenuated and 2 (3.3%) torn subscapularis. Belly press test was positive in three cases, two of which had torn subscapularis on the ultrasound exam and one was intact.

Conclusions

Subscapularis repair following TSA using the peel technique showed significant improvements in outcome measurement scores post-operatively. The ultrasound examination and assessment of the subscapularis revealed that the muscle was intact and well healed in the vast majority of the patients.



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183 Shoulder Arthroplasty Complications: Definition Of A Core Event Set By Delphi Consensus Process

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Aim

We aim to define a consensus core set of negative events (CES) of SA.

Background

Valid reporting of the occurrence of shoulder arthroplasty (SA) complications requires standardization.

Methods

We initiated a Delphi consensus process with on-line surveys. An international panel of 185 experienced shoulder surgeons was nominated through professional Societies. Based on a systematic review and a recently developed CES in arthroscopic rotator cuff repair, an initial survey was implemented with two parts: one concerning imaging parameters for SA monitoring and the other covering intra- and postoperative adverse events. Open questions captured the experts' opinion. For closed questions about event groups, definitions, specifications and timing of occurrence, consensus was reached with two-third agreement.

Results

Eighty-nine surgeons (48%) responded. Consensus was reached to further consider and define 8 radiological parameters (radiolucency, loosening, implant migration, signs of instability, bone resorption, stress shielding, scapular notching and implant wear). Consensus with 91-93% agreement was reached for a core list of local events including 3 intra-operative event groups (device, osteochondral, soft tissue) and 8 post-operative event groups (device, osteochondral, pain, surgical site infection, peripheral neurological, vascular, superficial soft tissue, deep soft tissue), along with definitions and specifications. Suggestions for modifications were made. The timing for monitoring postoperative events remained uncertain.

Conclusions

A structured core set of local radiological parameters and adverse events of SA is being developed by international consensus. Further Delphi surveys and meetings are required to reach a final agreement as a major step towards the standardization of SA complications.



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202 Midterm Outcomes After Arthroscopic Anteroinferior Capsular Release For The Treatment Of Idiopathic Adhesive Capsulitis

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Aim

The purpose of this study is to report the early and midterm functional outcomes and complications of a consecutive series of patients with primary adhesive capsulitis who were treated with isolated anteroinferior arthroscopic capsular release after they did not respond to conservative treatment

Background

There is controversy in the literature as to the optimal method of release. Some authors recommended release of the subscapularis tendon, inferior capsule, posterior capsule, or global capsule to improve elevation and internal rotation, as well as external rotation. Moreover, although previous studies have suggested that patients have good short-term outcomes after extended arthroscopic capsular release for idiopathic adhesive capsulitis, studies reporting results of isolated anteroinferior capsular release are scarce

Methods

Thirty-two consecutive patients with idiopathic adhesive capsulitis who did not respond to conservative physiotherapy were included in the study. Arthroscopic anteroinferior capsular release was performed in all cases. The primary outcome was improvement in range of motion in the short- and midterm follow-up. We also evaluated pain relief with the visual analog scale, functional outcomes with the ConstanteMurley score, and we registered postoperative complications.

Results

The mean age was 49.6 years (range, 33-68 years) and the mean follow-up was 63 months (range, 18-84). Overall, there was significant improvement in the ConstanteMurley score from 42.4 to 86 points ($P < .001$). The visual analog scale decreased by approximately 6.3 points compared with the preoperative value ($P < .001$). All parameters improved significantly the first 6 months and then remained stable until the end of follow-up ($P < .001$).

Conclusions

In patients who don't respond to conservative treatment for primary adhesive capsulitis, isolated anteroinferior capsular release provides a reliable improvement in pain and range of motion that is maintained in the mid-term follow-up.



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197 Reverse Shoulder Arthroplasty For Three And Four-Part Proximal Humeral Fractures In The Elderly

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Aim

The aim of this study was to review the survivorship, radiologic and clinical outcomes of RSA used for the treatment of 3-part and 4-part proximal humeral fractures in patients older than 70 years.

Background

Traditionally, Hemiarthroplasty (HA) has been the preferred mode of treatment of complex proximal humerus fractures in the elderly. However, HA success depends on proper height, retroversion, and tuberosity healing, making this operation technically demanding. Reverse shoulder arthroplasty has been proposed as an alternative option for acute complex proximal humeral fractures.

Methods

We retrospectively reviewed 42 patients who had undergone a primary reverse total shoulder arthroplasty for displaced three- or four-part proximal humerus fractures at our institution between June 2008 and January 2015.

Results

Mean age was 77 years (range, 71-88 years). Minimum followup was 24 months (mean, 57 months; range, 24-96 months). The mean anterior elevation was 136° (90°-170°) and external rotation was 25° (0-45). The mean Constant Score was 65 (30-84) points. The mean American Shoulder and Elbow Surgeons score was 76 (36-88) points. The mean postoperative visual analog scale score was 1.1 (0-5) points. Complications were identified in 3 of 32 patients (7.5%).

Conclusions

In the short term, satisfactory clinical outcomes and a low complication rate can be expected in patients older than 70 years with acute displaced three- and four-part proximal humerus fractures treated with reverse shoulder arthroplasty.



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**201 Arthroscopic Stabilization In Anterior Shoulder Instability:
Contact Versus Collision Athletes**

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Aim

The aim of this study was to compare the functional outcomes, return to sports and recurrences in a series of contact and collision athletes with a first time anterior shoulder dislocation treated with arthroscopic stabilization with suture anchors.

Background

There is no universally accepted definition of "contact" or "collision" sports in the literature. In collision sports athletes purposely hit or collide with each other or with inanimate objects with greater force and frequency than in contact sports, which could jeopardize functional outcomes.

Methods

A total of 56 athletes were enrolled in this study, including 22 contact athletes and 34 collision athletes. All shoulders underwent arthroscopic stabilization with suture anchors. Range of Motion (ROM), the Rowe score, the visual analog scale (VAS) and the Athletic Shoulder Outcome Scoring System (ASOSS) were utilized to assess functional outcomes. Return to sports and recurrence rate were also evaluated.

Results

Mean age at the time of operation was 22.2 years, and mean follow-up period was 62.4 months (range, 36 to 94 months). Patients in the contact group returned to sports significantly faster than those in the collision group 5.2 and 6.9 respectively ($P = .01$). In all, 43 athletes (76.8%) returned to near preinjury sports activity levels (90% or greater recovery) after operation, 86.4% of patients in the contact group and 70.6% (24/34) in the collision group. ($P = .04$). The total recurrence rate was 8.9%. There were 5 recurrences (14.7%) in the collision group and no recurrences in the contact group. ($P < .01$)

Conclusions

Compared with the contact group (0%), the collision group yielded a higher failure rate (14.7%). Moreover patients in the contact group returned significantly faster (5.2 and 6.9 respectively) and to higher levels of preinjury sports activity (86.4% and 70.6% respectively) than patients in the collision group.



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198 Return To Sports After Arthroscopic Treatment Of Rotator Cuff Calcifications In Athletes

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Aim

To analyze the time to return to sport, clinical outcomes, and complications of complete arthroscopic removal of intratendinous calcific deposits and repair of the tendon lesion without acromioplasty in athletes.

Background

Despite the high frequency of this condition, there is no information in the literature regarding arthroscopic treatment of rotator cuff calcifications in athletes.

Methods

This study retrospectively evaluated 24 consecutive patients with a mean age of 36.2 years. The mean follow-up was 59 months (range, 24-108 months). Patients completed a questionnaire focused on the time to return to sport and treatment course. Pre- and postoperative functional assessment was performed using the Constant score and (UCLA) score. Pain was assessed by visual analog scale (VAS). Recurrence of calcifications and the indemnity of the supraspinatus tendon repair.

Results

Of the 24 patients, 23 (95.8%) were able to return to sports; 91.3% returned to the same level. The mean time to return to play was 5.3 months (range, 3-9 months): The mean Constant score increased from 26.9 preoperatively to 89.7 postoperatively ($P < .001$), and the UCLA score increased from 17.3 preoperatively to 33.2 postoperatively ($P < .001$). Significant improvement was obtained for pain (mean VAS, 8.4 [before surgery] vs 0.6 [after]; $P < .001$). The overall majority (91.6%) of patients were satisfied with their result. MRI examination at last follow-up (79% of patients) showed no tendon tears.

Conclusions

In athletes complete arthroscopic removal of calcific deposits and tendon repair without acromioplasty results in significant pain relief and improvement in functional outcomes. Most patients return to the same level of proficiency regardless of the type of sport and the level of competition before injury, with 91.6% of patients satisfied with their results.



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726 Methods Of Biometric Measuring Of Glenoid: Scan Study Of 200 Glenoids.

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Aim

Glenoid measurements of dimensions and morphology.

Background

Few wide-ranging studies exist concerning scanned glenoid measurements.

Methods

100 consecutive thoracic CT scans including the two non-pathological glenoids were analysed by 3 surgeons. There were 54 women and 46 men with an average age of 64.8 years (20-92) of average size 167.4 cm (147-192). Each glenoid was evaluated as a 2D reconstruction, with several cross-section views, using CARESTREAM software. Different axis, surface of the glenoid, depth, rule of 12 mm, and the bony stock of the glenoid were measured at 9 points of this circle, divided into four faces, corresponding to the screw positions of a baseplate. An intra and inter-observation evaluation was carried out.

Results

The measurements (200 glenoids) found: Large vertical axis = 38.5mm (25-51), large horizontal axis = 27.9mm (20-56), surface of the tangent circle at the lower end of the glenoid diameter 624.5mm² (324-983) which was the most representative measurement. The analytical study allowed us to classify the glenoids by size into 3 groups: small (circle surface =420mm²), medium (525mm²) and large (685mm²). The rule of 12 mm was redemonstrated : (most bone at 12 mm from the inferior bord of glenoid). The glenoid dimensions were correlated with the size of the patients. With regard to the depth of the glenoid, the risk of lesion to the suprascapular nerve in the upper-posterior face exists beyond 10.7mm. The measurement method is reliable and reproducible with an average difference of 2.7mm over all the measurements compared.

Conclusions

These results are close to those already presented in literature. The large number of patients included in this cohort linked to the reliability and reproducibility of the measurements allow us to adapt this method for pre-operative planning of glenoid implant placements for prostheses. The principal limit remains the two-dimensional character of our study.



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928 Quantification Of Deltoid Strength By The Test Of Abduction Force (TOAF) In 40 Somsak Procedure At One Year Follow-Up.Takaakira Kishi¹, Zoubir Belkheyr²

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Aim

We studied the outcome of axillary nerve palsy reanimation after an injury by the Somsak procedure

Background

Our serie is the largest ever described. No publications measured the deltoid abduction force in kilograms.

Methods

During 5 years, we included 40 patients with deltoid paralysis due to an radicular or truncular axillary nerve injury. We exclude truncular paralysis delayed over 6 month without EMG activity. There are 38 men and 2 women. The mean age is 34.2 years. 26 patients have radicular lesion. 14 have truncular lesion whose 3 associate suprascapular palsy . Average time to surgery is 7.9 month. 8 patients have an average delayed surgery of 12 month. The average follow up is 17 month. Our main judgment criteria is the shoulder abduction range of motion (aROM). Secondary judgment criterias are strength of deltoid contraction against resistance, age, time delay to surgery and the triceps's extension strength. We use the British Medical Research Council scale to quantify the deltoid muscle recovery. For M4 grade we perform a test of abduction force (TOAF) which is the maximum weight lift at 90° abduction, arm straight. For triceps morbidity, we record the strength in kilograms of elbow strength compared with the healthy side by pushing on a bathroom scale with the hand in neutral postion, elbow flexed at 90°, on chest

Results

At one year follow-up, 82.5% of patients have M3 or M4 grade deltoid contraction. Time delay to surgery or age are not risk factors. A non symptomatic loss of 28% extension strength is shown

Conclusions

Somsak procedure is reliable at more than one year follow up. For isolated axillary nerve paralysis, we have better results than nerve grafting or other neurotization techniques, especially intercostals to axillary. Results are better for suprascapular nerve reanimation if associated with the Somsak procedure.



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822 The Double Layer Lasso Loop – A Novel Technique For The Repair Of Delaminated Rotator Cuff Tears

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Aim

To describe and present the medium-term results of a novel technique using a lasso-loop suture for the fixation of delaminated double-layer rotator cuff tears.

Background

The arthroscopic repair of rotator cuff tears is a safe and reproducible proven technique. Delamination of the superficial and deep layers of the postero-superior rotator cuff, representing a horizontal lesion between the two layers, is a common finding however traditional repair techniques for such lesions are related to a high re-tear rate. We present here a novel technique using a lasso-loop configuration for the anatomical reduction and repair of such delaminated tears.

Methods

Between January 2010 and November 2013 32 patients (Mean age 64yr) underwent arthroscopic rotator cuff repair using the Double Layer Lasso Loop technique. Functional outcomes were assessed pre- and post-operatively using the Constant Score, UCLA Functional Score, Simple Shoulder Test (SST), Subjective Shoulder Score (SSV) and with objective cuff strength testing. Post-operative ultrasound scans and radiographs were also performed to assess repair integrity and arthropathy.

Results

At a mean follow-up of 3 years, of 32 patients, only one had an recurrent complete rupture (3.1%), and 5 patients a partial rupture (15.6%) on ultrasound assessment. The mean pre-operative Constant Score was 55, and 82 post-operatively ($p < 0.001$). The mean pre-operative UCLA score was 6.4, and 9.3 post-operatively ($p < 0,001$). Both pain and power improved on jobe, bear-hug, belly-press, lift-off, and external rotation testing ($p < 0,001$). No significant difference was observed post-operatively in power between the operated and contralateral sides

Conclusions

The arthroscopic Double Layer Lasso Loop technique for delaminated rotator cuff tears is an effective technique. In our series, at a mean follow-up of 3 years, we observed a low re-rupture rate of 3.1%, with post-operative return of function comparable with the non-operated contralateral side. Outcomes in terms of function, pain and patient satisfaction are good to excellent.



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798 What Is The Best Glenoid Configuration In Onlay Reverse Shoulder Arthroplasty?

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Aim

The purpose of this study was to analyze the effect of different glenoid designs on arm position and range of motion (ROM) following RSA.

Background

The impacts of different glenoid implant after reverse shoulder arthroplasty (RSA) have not been well-studied, particularly with regard to flexion/extension and to internal/external rotation which have been demonstrated to be the cause for scapular notching.

Methods

Using a three-dimensional computer model of RSA, a short curved onlay stem with a 145° inclination was combined to five different glenoid design varying by glenoid sphere diameter and glenoid sphere center of rotation location. Glenoid offset, the acromiohumeral distance (AHD), ROM and muscle length were evaluated for each configuration.

Results

Altering glenoid design led to up to 10 mm change in glenoid offset and 3 mm in the AHD. There was a 7° improvement in abduction and flexion between the different glenoid design. Only 2 of them, the 36mm centered and the Bio-RSA, did not reach native adduction. In extension and external rotation arm at side, the eccentric 36 mm sphere was the best configuration while the centered 36mm sphere is the worst configuration. The 42 mm sphere was the only configuration presenting a limited external rotation at 90° of abduction.

Conclusions

With varying glenoid prostheses, dramatic change could be observed on extension, external rotation arm at side and at 90° of abduction. Taking particular attention to a low placement of the glenoid implant, which could be increase by using eccentric sphere, is important as this directly improvement ROM.



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638 Three Dimensional Finite Element Analysis Of A Notched Insert Design For Reverse Shoulder Arthroplasty To Prevent Scapular Notching

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Aim

This study aims to clarify the effect of a new design reverse shoulder arthroplasty (RSA) with a notched insert on range of motion, scapular notching and stress variation of its insert component using 3-dimensional (3D) finite element analysis (FEA).

Background

RSA is an effective treatment option for cuff tear arthropathy. Scapular notching remains a major concern and has a reported incidence as high as 44-96%. This FEA study provides future reference for the optimal design of the insert component of RSA.

Methods

3D nominal Grammont type monobloc RSA implant components are modeled on the sawbone glenohumeral joint. The polyethylene insert is redesigned with notching of the inferior part. The comparison of standard and notched designs was performed by FEA for stress pressure of scapular notching and the degree of adduction. 3D mesh models are created for stress analysis to compare the results between standard and notched inserts for the adduction.

Results

The redesign notched inserts had an additional $\sim 11.2^\circ$ on adduction and also prevented the scapular notching. The stress analysis results for notched insert design were lower than standard ones (4.7 vs 22.4 Kpa).

Conclusions

Notched insert design of Grammont type RSA could provide additional adduction with lower stress on the glenoid which might lead to less scapular notching. Further experimental and clinical studies on different RSA types are needed to verify this effect.



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398 RTSA With Uncemented Locked Stem In Complex Fractures Of The Proximal Humerus: Prospective Multi-Center Continuous Evaluation, With A Minimum Follow-Up Of 1 Year

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Aim

The purpose of this study was to evaluate the functional and radiological outcomes of a cementless, trauma-specific reverse shoulder arthroplasty with locked stem for 3- and 4-part proximal humeral fractures.

Background

Forty five 3 & 4 part fractures in forty five patients of mean age 79 yo (68-94) have been treated by reversed prosthesis with locked stem.

Methods

The length of the stem was 15 cm with a proximal coating of HA automatic locking system (2 screws) and 4 different diameters. Preliminary cadaver study allowed us to validate the system (22 shoulders, no injuries of nerves, locking system efficient). The patients were operated at a mean of 7.1 days (1-17) after the fracture event by delto pectoral approach in 69% of cases. All patients have been reviewed by an surgeon not involved in the treatment.

Results

All patients have been reviewed with a mean FU of 23 months (12-72). Active flexion reached 115,5° (35°-160°), active abduction 105,2° (35°-150°) and active external rotation 24° (-10°-80°). Adjusted Constant score reached 81,4 (33-127) and QuickDash 36,2 (2-84). Gleno metaphyseal angle reached 36,8°(18-63) and inferior Offset reached 4,4 (0-6). No complications related to stem locking were observed except 5 cases of screw removal without revision of implant. 3 complications occurred : 1 infection, 1 capsulitis and 1 axillary nerve palsy pre-operative. 6 cases of notch of grade 1 and 1 case of grade 3 was pointed.

Conclusions

In this population of elderly patient, new fall with periprosthetic fracture or infection led the surgeon to remove the stem. At shoulder level, the removal of a cemented stem remains a highly demanding procedure with sometimes bad functional results and elevated level of complications. This serie is the first one of locked stem without significant complications. Locked stem remains a new but logical tool in trauma.



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404 Cementless And Locked Prosthesis For The Treatment Of 3-Part And 4-Part Proximal Humerus Fractures: Prospective Clinical Evaluation Of Hemi And Reverse Arthroplasty

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Aim

Cemented stem remain the gold standard for prosthesis in trauma.

The purpose of this study was to evaluate the functional and radiological outcomes of a cementless, trauma-specific locked stem (hemi and reverse) for 3- and 4-part proximal humeral fractures.

Background

One hundred and thirty four 3 & 4 part fractures have been treated by locked stem. 69 patients (mean age 68 yo (50-90)) with hemiarthroplasty (HA) and 65 others (mean age : 78 yo (66-91)) with reversed arthroplasty (RSA).

Methods

The length of the stem was 15 cm with a proximal coating of HA automatic locking system (2 screws) and 4 different diameters. Preliminary cadaver study allowed us to validate the system (22 shoulders, no injuries of nerves, locking system efficient).

The evaluation was clinical with Constant score, QuickDASH score and radiological.

Results

In the group of HA, adjusted Constant score reached 72 (11-120) and QuickDash 31,2 (4,5-77,27) with a mean FU of 25 months (6-96).

In the group of RSA, Constant score with ponderation reached 77,6 (28,8-119) and QDash 36,2 (2-84) with a mean FU of 15 months (6-41). Specific complications due to locking system reached 3 % but without reoperation. Other complications were Capsulitis and infection.

Conclusions

In this population of elderly patient, new fall with periprosthetic fracture or infection led the surgeon to remove the stem. At shoulder level, the removal of a cemented stem remains a highly demanding procedure with sometimes bad functional results and elevated level of complications. This serie is the first one of locked stem without significant complications. Locked stem remains a new but logical tool in trauma.



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607 Radiographic Parameters Following Reverse Total Shoulder Arthroplasty Predict Clinical Outcomes

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Aim

The goal of the present study was to evaluate glenoid and humeral component position on radiographs following reverse total shoulder arthroplasty (RTSA) and to correlate various radiographic parameters with range of motion and clinical outcomes to help define the ideal component positioning.

Background

The optimal glenoid and humeral component positioning in RTSA is unknown, and different implant designs strive for different component positions.

Methods

Patients who underwent RTSA with a minimum clinical follow-up of 2 years were retrospectively reviewed. Pre- and post-operative radiographs were analyzed for the supraspinatus fossa β angle, glenoid index, critical shoulder angle (CSA), lateral offset, and acromiohumeral distance (AHD). Linear regression analyses were performed to assess the relationships between the above radiographic parameters and various clinical outcomes measures including post-operative range of motion, Shoulder and Elbow Surgeons (ASES) score, visual analog scale (VAS) for pain, single assessment numeric evaluation (SANE), simple shoulder test (SST), Functional Score and Western Ontario Osteoarthritis Score (WOOS).

Results

One hundred forty-four patients with a mean age of 70.3 years were retrospectively reviewed. Post-operative ASES ($p=0.002$), SST ($p<0.001$), Functional Score ($p=0.001$), and WOOS ($p=0.008$) scores significantly improved depending on patient's final post-operative CSA. Significant improvements were also observed in post-operative survey outcome scores [ASES ($p=0.002$), SST ($p=0.03$), Functional Score ($p=0.001$), and WOOS ($p=0.004$)] based on patient's post-operative Glenoid Index. Lateral offset, β angle, and AHD did not reliably predict clinical outcome scores.

Conclusions

Both final CSA and glenoid index, a measure of glenoid component inferior placement, are predictive of improved clinical outcome scores. Surgeons should strive for smaller CSA and a larger glenoid index when placing RTSA glenoid components.



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490 Arthroscopic Bankart Repair With Remplissage For Non-Engaging Hill-Sachs Lesion In Professional Collision Athletes

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Aim

The aim of this study was to determine whether arthroscopic remplissage with Bankart repair is effective to improve outcomes for collision athletes with Bankart and non-engaging Hill-Sachs (HS) lesions.

Background

Several studies have already confirmed that the simultaneous Bankart repair with remplissage of engaging HS can reduce recurrence rates however there is no clear consensus on how to deal with non-engaging HS especially in high risk athletes.

Methods

All patients had traumatic anterior shoulder instability with Bankart and non-engaging Hill-Sachs lesions, but without substantial glenoid bone loss. 20 collision athletes underwent arthroscopic Bankart repair with posterior capsulodesis (B&R group) and were evaluated retrospectively, using pre- and postoperative WOSI, EQ-5D, EQ-VAS scores and postoperative Subjective Shoulder Value (SSV). The recurrence and reoperation rates, return to play (RTP) were compared to a matched group of 20 collision athletes, with isolated arthroscopic Bankart repair (B group).

Results

The mean age was 25 years old (15-40), with an average follow up of 26 months. The mean WOSI, EQ-5D and EQ-VAS scores improved from 41.7% to 86.5%, 0.75 to 0.92 and 72.7 to 84.5, respectively, with SSV of 90%. There was a mean deficit in external rotation at the side of 10° (5-15°). 1 patient was treated with hydrodilatation for frozen shoulder. 1 patient had residual posterior discomfort but no apprehension in the B&R group, compared with 5% persistent apprehension in the B group. In comparison, the recurrence and reoperation rates were 5% and 30% ($p=0.015$), 5% and 35% ($p=0.005$) in the B&R and B groups, respectively. RTP averaged 13 weeks in both groups.

Conclusions

This technique demonstrated good outcomes, with lower recurrence rates. The slight restriction in ER does not significantly affect any clinical outcomes and RTP. This method may be considered as alternative technique in high-risk collision athletes.



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386 Reverse Shoulder Arthroplasty With A New Convertible Short Stem: Preliminary 2- To 4-Year Follow Up ResultsFrancesco Ascione¹, Giulia Bugelli², **Peter Domos**³, Lionel Neyton⁴, Arnaud Godeneche⁴, Gilles Walch⁴

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Aim

Our hypothesis was that the humeral complications of new design has comparable results to the traditional long stemmed design. We also investigated that a lower neck shaft angle (145°) would reduce the rate of notching without creating instability.

Background

Reverse Shoulder Arthroplasty (RSA) implies changes to the joint biomechanics, leading to complications. These are common on the humeral side thus a short curved convertible stem with lower inclination angle was designed.

Methods

Between November 2012 and June 2014, a consecutive series of 120 RSAs with the short Aequalis Ascend Flex stem were implanted for different etiologies. All the outcomes were collected retrospectively, 99 patients had complete pre- and postoperative clinical and radiological data, assessing range of motion, Constant-Murley score (CS) and postoperative Subjective Shoulder value (SSV)

Results

The mean age of patients was 73 years (range 55-91). The mean follow-up duration was 32.6 months (24-44). Active anterior active elevation, external and internal rotation improved statistically significant ($p < 0.00001$) from preoperative status. The mean CS improved from 25.5 preoperatively to 69.7 postoperatively ($p < 0.0001$). The mean SSV increased from 28% to 76% ($p < 0.0001$). Scapular notching was found in 36.4% of cases, with only 8.1% of notching were higher than grade 1. 18 complications (14.5%) with a mean delay of 11 months were observed without any humeral postoperative fracture, loosening, migration or subsidence. 5 revisions (4.2%) and 5 reinterventions (4.2%) were reported.

Conclusions

Our results suggest that the concept of a short uncemented convertible, lateralized stem can be safely used in RSA for different etiologies, without observing higher risk of complications or reoperation rates. It also improves the internal and external rotations, sacrificing less native host bone and allowing an easier revision. However, our clinical results and especially the radiological outcomes require further long-term studies.



654 Glenoid Bone Grafting In Total Shoulder Arthroplasty

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Aim

The purpose of this study was to evaluate clinical and radiological outcomes in patients who underwent bone grafting for glenoid deficiency during total shoulder arthroplasty

Background

The presence of glenoid bone defects creates a difficult reconstructive problem during shoulder arthroplasty. Glenoid deficiency typically occurs following loosening of glenoid prostheses, progressive glenoid erosion following resurfacing arthroplasty and secondary to destructive rheumatoid disease.

Methods

Between Aug 2014 and Dec 2016 there were 16 patients treated with bone grafting of the glenoid during total shoulder arthroplasty. The indications for surgery were severe glenoid erosion following previous resurfacing hemiarthroplasty, glenoid bone loss from previous loose glenoid component and severe bone loss from rheumatoid disease. Autologous humeral head was used in primary procedures and femoral head allograft was used in revision. Six patients underwent anatomical total shoulder replacement and 10 patients underwent reverse total shoulder replacement. The new generation dual platform total shoulder replacement system was used in all cases. Radiological assessment was performed to look for any graft resorption and implant malposition. All patients were assessed using Oxford Shoulder Score.

Results

There were 12 women and 4 men with a mean age of 66.7 (range 43 -81) in this series. The procedures were carried out using a standard deltopectoral approach in 13 and extensile delto-pectoral approach with clavicular osteotomy in the other three. There were no postoperative infections or dislocations. The average range of movements improved from 43 preoperatively to 105 post operatively. The average post operative Oxford Shoulder Score was 33.6 (20 - 48). One patient with severe osteoporosis developed acromial fracture which settled with non surgical symptomatic treatment.

Conclusions

Bone grafting of the glenoid defect during shoulder arthroplasty is successful in relieving pain and improving clinical outcomes. The new generation shoulder replacement systems enable use of bone graft to facilitate glenoid reconstruction.



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241 The Learning Curve Of Reverse Shoulder Arthroplasty

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Aim

The purpose of this study was to evaluate learning curve of reverse shoulder arthroplasty (RSA).

Background

RSA is a well-established, reliable treatment for cuff tear arthropathy and irreparable rotator cuff tear. However, the procedure is technically demanding and requires a certain level of technical proficiency.

Methods

We retrospectively evaluated 50 shoulders in 49 patients who had undergone RSA by the same surgeon. Average age at the surgery was 78 years old. 50 shoulders were divided into consecutive blocks of 10 shoulders. We evaluated operation time, intraoperative blood loss and the numbers of complication.

Results

The mean operation time was 108minutes, 94minutes, 99minutes, 85minutes and 79minutes in each block. The standard deviation of operation time was 31 minutes, 15 minutes, 20 minutes, 8 minutes and 9 minutes in each block. The mean operation time was gradually decreased and the standard deviation of operation time was also decreased in 31 shoulders or more. However, intraoperative blood loss was not decreased. The numbers of complication was 1 shoulder, 2 shoulders, 1 shoulder, 2 shoulders and no shoulder in each block.

Conclusions

The mean operation time by the same surgeon was gradually decreased and the standard deviation of operation time was also decreased in 31 shoulders or more.



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239 Postoperative Clinical Result And MRI Evaluation After Trans-Osseous Arthroscopic Rotator Cuff Repair With Lateral Protect Implant

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Aim

The purpose of this study was to analyse postoperative clinical result and MRI evaluation after trans-osseous arthroscopic rotator cuff repair with lateral protect implant.

Background

We reported good clinical results and cuff integrity by trans-osseous arthroscopic rotator cuff repair. However, we pointed out the problems of bone tunnel cracks and variation of the postoperative bone tunnel morphology. So we devised a new way to trans-osseous arthroscopic rotator cuff repair with lateral protect implant.

Methods

We retrospectively evaluated 86 shoulders in 85 patients who had arthroscopic rotator cuff repair by Arthro-tunneler™ combined with lateral protect implant. Average age at the surgery was 67.2 years old and average follow-up period was 17 months. Eighty six shoulders were divided into 4 groups: 4 small size tears, 32 medium size tears, 17 large size tears and 33 massive size tears. We evaluated active ROM in flexion, active ROM in abduction and JOA score at preoperative, 6 and 12 months follow up. Postoperative MRI was examined at 6 or 12 months follow up in all the cases. Repair integrity was evaluated by MRI findings according to Sugaya's classification and the bone tunnel morphology was also evaluated.

Results

Average active ROM in flexion, abduction and average JOA score were significantly increased at 6 and 12 months follow up compared to preoperative score. Postoperative MRI revealed that 14 shoulders of type 1, 30 shoulders of type 2, 30 shoulders of type 3, 4 shoulders of type 4 and 8 shoulders of type 5. Re-tear rate was 14.0% in all cases. Re-tear rate of large and massive size tears was 24%. The morphology of bone tunnel was L-shaped type in all cases.

Conclusions

Good clinical results and cuff integrity were observed by trans-osseous arthroscopic rotator cuff repair with lateral protect implant.



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238 Functional And Structural Outcomes Of Suture Bridge Technique Compared With Transosseous Technique In Arthroscopic Rotator Cuff Repair

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Aim

The purpose of this study was to compare the functional and structural outcomes after arthroscopic rotator cuff repair (ARCR) between suture bridge (SB) technique and transosseous (TO) technique.

Background

Numerous rotator cuff repair techniques have been introduced in recent years. However, there are a few reports of comparing SB technique with TO technique.

Methods

We retrospectively evaluated 36 shoulders who had ARCR (SB group: 16 shoulders, TO group: 20 shoulders). All patients were operated on the same surgeon. The average age at the surgery was 66 years old in SB group and 67 years old in TO group. The size of rotator cuff tear was 1 small, 6 medium, 4 large and 5 massive in SB group and 7 medium, 7 large and 6 massive in TO group. We compared operation time, implant cost, clinical outcomes and cuff repair integrity between two groups.

Results

Operation time of TO group was significantly shorter than that of SB group (109 minutes vs 166 minutes). Implant cost of TO group was significantly lower than that of SB group (143,643 yens vs 246,281 yens). Average active ROM in flexion was improved from 116 degrees to 139 degrees in SB group and from 113 degrees to 139 degrees in BR group. Average active ROM in abduction improved from 116 degrees to 139 degrees in SB group and from 105 degrees to 134 degrees in BR group. The rate of successful repair evaluated by postoperative MRI was 87% in SB group and 81% in TO group. No significant differences in functional and structural outcomes were observed between two groups.

Conclusions

Our study showed that TO group had equal functional and structural outcomes to SB group. TO group was shorter operation time and lower implant cost than SB group.



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48 Reverse Shoulder Arthroplasty In Rheumatoid Arthritis Patients

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Aim

To investigate the results of Reverse Shoulder Arthroplasty In Rheumatoid Arthritis Patients

Background

The structural changes of the shoulder depend on severity of rheumatoid arthritis (RA), activity of disease, efficacy of disease-modifying antirheumatic drugs (DMARDs), duration of disease etc. Quite often the functional and quality of life limitations are happens because of pain, joint and bone destruction, rotator cuff tears. In most cases arthroscopic treatment or anatomical shoulder replacement are ineffective. Reverse shoulder arthroplasty (RSA) is alternative.

Methods

We identified 37 patients with RA who underwent reverse shoulder arthroplasty in Federal State Budget Research Institution "Nasonova Research Institute of Rheumatology" between 2008 and 2015. Patient-reported outcome was obtained using ASES Shoulder Score, the Disabilities of the Arm, Shoulder and Hand (DASH) Score, VAS score, HAQ and EQ-5D questionnaire. The mean follow up was 53 months (range 24 to 84 months).

Results

Pain, poor quality of life, massive rotator cuff tear, glenoid erosion, superior migration of the humeral head where the main indication for reverse shoulder arthroplasty. Consistent improvements were noted. Ninety five percent of patients described excellent to satisfactory outcomes ($p < 0,01$). The cumulative 5-year revision rate was 2,7% (deltoid detachment with shoulder dislocation).

Conclusions

reverse shoulder arthroplasty has good results in terms of reducing pain and improving function in patients with RA.



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126 External Rotation Deficit Of The Reverse Shoulder Arthroplasty: Muscle Transfer Or Humeral Lateralization.

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Aim

a reverse shoulder arthroplasty (RSA), with medialized humeral component, can restore active elevation in patients with pseudoparalytic shoulder but, if there is the lesion of the infraspinatus and the teres minor, cannot restore active external rotation because there are no other external rotator cuff muscles. Aim of the study is identify the better procedure for recover the external rotation during the prosthetic procedure.

Background

a RSA with lateralized humeral component and without subscapularis reattachment can restore active elevation and the external rotation (ER). Even a RSA with medialized humeral component and muscular transfer with Latissimus Dorsi (LD) and Teres Maior (TM) can restore the same function.

Methods

we have operated 34 patients (26 female, 8 men); mean average was 71 years. Clinically they had: ER lag sign positive, hornblower sign positive and active flexion less of 90°. Radiologically there was severe arthrosis (Hamada 3,4,5) and there was a severe fat infiltration (Goutallier 3-4) of shoulder external rotator. Follow up was: 24 months till 100 months.

We have used two different kind of RSA: group 1) 13 prosthesis with medialized humeral component associated to LD and TM transfer; group 2) 21 prosthesis with lateralized humeral component.

Results

On average, the pre-operative results are been: UCLA score: 5; Constant shoulder score: 16; DASH score: 81.7. Active elevation: 61.5°; ER1: -20°, ER2: 0°, IR D10.

On average, in group 1 post-operative results are been, UCLA score: 30; Constant Shoulder score: 72; DASH score: 8.3. Active elevation: 140°, ER1: 0°, ER2: 40°, IR: L1.

On average, in group 2 post-operative results are been, UCLA score: 33; Constant Shoulder score: 74; DASH score: 4.2. Active elevation: 140°, ER1: 10°, ER2: 80°, IR: buttock

Conclusions

we have observed impairment of active flexion and of external rotation of shoulder in all RSA but mostly in RSA with lateralized humeral component.



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31 Early Outcomes Of Reverse Total Shoulder Arthroplasty According To Gender

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Aim

We report on gender specific early outcomes of RSA in a large cohort of patients who were followed for a minimum of 2 years

Background

Reverse total shoulder arthroplasty (RSA) is an accepted treatment that provides reproducible results. While the same implant is used with males and females, there is limited data in the literature with regard to differences in outcomes between genders.

Methods

A multi-center prospective cohort of 495 patients (258 females, 237 males) treated with RSA was retrospectively analyzed. Mean follow-up was 38 months. Outcomes were assessed using ASES, SPADI, Constant, UCLA, and SST scores; ROM was also measured to quantify function.

Results

Females underwent RSA at a significantly older age (73.6 years) than males (70.8 years); $p < 0.001$. Females had starting lower pre-operative outcome scores when compared to males in ASES (33.3 versus 42.2; $p < 0.001$), Constant (30.9 versus 37.6; $p < 0.001$), UCLA (12.4 versus 14.3; $p < 0.001$), SST (2.6 versus 4.3; $p < 0.001$) and VAS (6.1 versus 5.4; $p < 0.001$).

Post-op females maintained lower overall outcome scores with regards to ASES (81.1 versus 86.1; $p < 0.001$), Constant (67.3 versus 72.4; $p < 0.001$), UCLA (29.3 versus 30.2; $p = .03$) and SST (9.4 versus 10.5; $p < 0.001$). There were no clinically significant differences in post-operative range of motion (ROM). When evaluating overall improvement from pre-operative values females had significant improvements internal rotation (1.75 levels versus 1.1 levels; $p < 0.01$) compared to males. Otherwise, both had equal improvement of function and outcomes scores when compared to their pre-operative values.

Conclusions

While females have lower final outcome scores compared to males, there is no significant difference in absolute improvement from pre-operative to post-operative function and outcome scores. This suggests that there is no difference in functional improvement or outcomes based on gender.



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30 Early Outcomes Of Anatomic Total Shoulder Arthroplasty According To Sex

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Aim

We report on gender specific early outcomes of aTSA in a large cohort of patients who were followed for a minimum of 3.5 yrs.

Background

Anatomic Total shoulder arthroplasty (aTSA) provides reproducible results in treating osteoarthritis and has seen increased rates of usage recently. While the same implant is used with males and females, there is limited data in the literature with regard to differences in outcomes between genders.

Methods

A multicenter prospective cohort of 660 patients treated with aTSA was retrospectively analyzed. Mean follow up was 44 months. Outcomes were assessed using ASES, SPADI, Constant, UCLA, and SST. Range of motion were also measured.

Results

Female patients underwent aTSA at a significantly older age (68.1) than males (64.7); $p < 0.05$. Females started with lower pre-operative outcome scores compared to males; ASES (33.8 vs 39.2; $p < 0.05$), SPADI (88.9 vs 79.5; $p < 0.05$) Constant (35.0 vs 38.7; $p < 0.05$), UCLA (13.2 vs 14.8; $p < 0.05$), SST (3.0 vs 4.3; $p < 0.05$) and VAS (6.5 vs 6.0; $p < 0.05$). The only difference in pre-operative function was found in abduction (males 84 degrees vs females 79 degrees; $p < 0.05$).

Females maintained lower overall outcomes scores with regards to ASES (82.1 vs 87.2; $p < 0.05$), SPADI (21.2 vs 12.7; $p < 0.05$), Constant (68.4 vs 73.7; $p < 0.05$), UCLA (29.8 vs 30.9; $p < 0.05$), and SST (10.0 vs 10.8; $p < 0.05$).

There were no significant differences in postoperative ROM. Both had equal overall improvement of function and outcomes with compared to pre-operative levels.

Conclusions

Females undergo aTSA at a later age than males, and begin with worse shoulder abduction and outcome scores. Although females maintain lower post-operative outcomes scores, there was no significant difference in absolute improvement. This suggests that there is no difference in functional improvement or outcomes. Patients can be informed to expect equal improvements in function and outcomes regardless of their gender when undergoing aTSA.



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467 Reverse Total Shoulder Arthroplasty For Treatment For Acute Fractures Of The Proximal Humerus – Is A Fracture Specific Stem Design Really Necessary To Guarantee Healing Of The Tuberosities?**Jan-Philipp Imiolczyk**, Arad Alikhah, Anna Krukenberg, Philipp Moroder, Markus Scheibel

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Aim

This retrospective study aims to evaluate the healing of the tuberosities using a fracture non-specific stem.

Background

In hemiarthroplastic treatment, fracture specific stems show a high correlation with healing of the tuberosities. The healing of tuberosities in reverse total shoulder arthroplasty (TSA) for fractures is discussed controversially.

Methods

25 consecutive patients (m=6, f=19) have been treated with a reverse TSA due to an acute proximal humerus fracture. All patients have been supplied with the exact same arthroplasty (Grammont design with a non-specific fracture stem) with the same technique of tuberosity refixation by the same surgeon. After two weeks of immobilization, only passive movement of the shoulder was recommended until sixth week after surgery. Three patients needed a humeral extension of the stem due to intraoperative tension adjustment. The healing of the tuberosities and glenoid notching were evaluated radiologically via true a/p, y- and axial radiographs. Clinically patients were evaluated with Constant Score (CS) and Subjective Shoulder Value (SSV).

Results

All in all 14 patients (mean age 72.0) could be included in this study with a mean FU of 32.9 months – 4 patients died, 4 were not able to be contacted and 3 were not able to show for FU due to comorbidity. The average CS was 67.9 points and SSV was 73.1%. Patients with no metaphyseal extension showed a healing of the greater and lesser tuberosity in 90.9% and 81.8% respectively. Patients treated with extension indicated a consolidation of both tuberosities in 33%. Notching was found in 36.4% patients without and in 66.7% patients with extension –all first degree.

Conclusions

Patients treated with the non-specific fracture stem show a high rate of tuberosity healing and good clinical results when a reverse TSA is implanted in the correct height and position. In patients with metaphyseal extension the rate of tuberosity healing is reduced.



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629 Subscapularis Repair Using Subscapularis Peel And A Novel Through-Implant Suture Technique Achieves Equivalent Biomechanical Strength To Traditional Lesser Tuberosity Osteotomy Fixation

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Aim

Compare cyclic displacement, load to failure (LTF), and method of failure of an uncemented short-stemmed humeral implant using two different subscapularis repair techniques.

Background

The integrity of the subscapularis tendon repair is a primary concern after total shoulder arthroplasty (TSA). The subscapularis peel (SP) technique has been shown to be biomechanically inferior to the lesser tuberosity osteotomy (LTO) in studies that do not incorporate the suture through the prosthesis.

Methods

Sixteen matched pairs of cadaveric shoulders underwent the LTO (control) or SP suture/implant technique using a short stemmed prosthesis (Univers Apex, Arthrex, Naples, FL). Each specimen was tested using a hydraulic system and cycled at 10-100N for 500 cycles, and then pulled to failure.

Results

The mean +/- SD displacement of the LTO group was 0.54 mm +/- 0.42 mm at 10 cycles, 1.26 mm +/- 0.82 mm at 500 cycles, and LTF was 575N +/- 188N. The SP group had a mean displacement of 0.40 mm +/- 0.17 mm at 10 cycles (p=0.44), 1.38 mm +/- 0.70 mm at 500 cycles (p=0.80), and LTF of 801N +/- 351N (p=0.11). Mode to failure occurred most commonly at the suture or tendon, with bone fracture being the least common (4 LTO, 1 SP).

Conclusions

Subscapularis repair using the SP technique achieved biomechanically equivalent results to LTO, and may therefore serve as an alternative technique while minimizing the incidence of bone fracture.



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173 Glenoid Vault Perforation In Total Shoulder Arthroplasty: What Are The Outcomes?

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Aim

We aimed to evaluate the clinical and radiology outcomes of patients in whom glenoid peg perforation occurred using an anchor peg all poly prosthesis.

Background

Perforation of the glenoid vault by the glenoid peg is reported to be of clinical concern due to the theoretical increased risk of subsequent glenoid component loosening and arthroplasty failure.

Methods

A total of 83 shoulders in 77 patients underwent total shoulder arthroplasty with a pegged hybrid fixation (bone-ingrowth glenoid and cemented peg) component. Outcomes were determined by the American Shoulder and Elbow Society Score (ASES) and the Oxford Shoulder Score (OSS). Fine slice CT was performed to determine the presence of glenoid vault perforation and the extent of lucent lines at the prosthesis-bone interface as well as the bony morphology of remodeling of the vault perforation site. Comparison of outcomes was performed between shoulders with and without glenoid perforation.

Results

The mean duration of clinical and radiographic follow-up was 46.7 months (range 24-99). A total of 7 shoulders demonstrated perforation of the glenoid vault. Bony ingrowth and/or overgrowth still occurred despite perforation. There were no clinically significant differences in clinical or radiology outcomes in those shoulders with and without glenoid vault perforation. A total of 3 shoulders underwent revision surgery (3.6%) at an average (range) of 8.5 (0.2 - 16.1) months post index surgery at an average (range) of 5.7 (3.5-9.9) years of follow up. No revision surgery occurred in those shoulders with documented glenoid vault perforation.

Conclusions

Glenoid vault perforation in an all-polyethylene, pegged glenoid component, utilizing hybrid fixation correlates with excellent clinical and radiological outcomes. There is no increased risk



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340 Shoulder Resurfacing Arthroplasty: What Is The Indication Nowadays?

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Aim

Our goal was to assess the mid-term clinical and functional outcomes on patients that underwent shoulder-resurfacing arthroplasty in our center.

Background

The reported results in the literature about humeral resurfacing prostheses are controversial achieving good functional results but with a wide range in the revision rate.

Methods

Retrospective study of 19 cases in 18 patients that underwent shoulder-resurfacing arthroplasty in our center. Mean age was 56 (range, 25-80) years and mean follow-up 31 (12-61) months. The technique was indicated in primary (11 cases) and secondary osteoarthritis (8 cases). Demographic data, normalized Constant, DASH, complications and each patient satisfaction were assessed. Three patients were lost to follow-up due to death not related to surgery during the follow-up.

Results

The mean Constant was 73 (range, 23-104) points, and DASH was 31 (range, 7-84) points. 62.5% of patients had no pain or mild pain at end of follow-up. 94% resumed their recreational activities and 81% their sports activities. An inferior conflict in the glenoid with the implant in a varus position was observed in 7 cases. There was one adhesive capsulitis resolved with physical therapy. Two reinterventions due to symptomatic inferior glenoid usury (due to instability and cuff tear with implant lift). In patients with no rotator cuff injury, Constant was higher (79 for 55 points, $p=0.07$) and DASH lower (27 for 49 points, $p=0.09$). No differences in the outcome according to sex or age were found. All patients were satisfied with the improvement over the previous status and would go under surgery again if necessary.

Conclusions

Shoulder-resurfacing arthroplasty is a good choice in primary or secondary osteoarthritis when there is no rotator cuff tear. We believe that the high rate of complications in our series, not so far from others, might be related to an inadequate indication (cuff injuries) or technical errors during the implantation.



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449 Are Preoperative Pain Catastrophizing And Psychological State Predict Postoperative Outcomes After Shoulder Arthroplasty? A Prospective Study With 1-Year Follow-Up.

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Aim

To investigate if preoperative psychological variables are related to the outcome in pain and function after shoulder arthroplasty (SA).

Background

Pain catastrophizing and psychologic disorders (depression, anxiety) are associated with poor outcome after hip and knee arthroplasty. According to literature, about one third of these patients experience chronic postoperative pain associated with catastrophizing. No data exist after shoulder arthroplasty.

Methods

A prospective study included all patients which underwent SA for osteoarthritis in our department during 2014-2015. Exclusion criteria were new surgery on the same shoulder and patient refusal. All protocols were standardized (general anesthesia with interscalene block, and multimodal analgesia). The main evaluation criterion was correlation between preoperative pain catastrophizing score (PCS, 0-52) and postoperative shoulder pain at rest at 1-year follow-up. Secondary criteria were depression score [Beck Depression Inventory (BDI) before 75years and Geriatric Depression Scale15 (GDS15) after 75years], anxiety score [State Trait Anxiety Inventory A and B (STAI-A and STAI-B)] and functional Oxford Shoulder Score (OSS) preoperatively, at 6-month and 1-year follow-up. Correlations were determined by the Pearson coefficient (r) and threshold value by the receiver operating characteristic (ROC) .

Results

During 2014-2015, 80 patients were screened and 60 were available for final analysis. These consecutive patients included 38 women 22 men, mean age 72.3±9.1years. At 1-year follow-up, 21 (35%) patients experienced chronic postoperative shoulder pain at rest (>3/10). Preoperative PC score was significantly correlated to shoulder pain ($r=0.26$, $p=0.04$) with threshold value of 23 (66.7% correctly classified subjects) but not correlated to OSS ($p=0.13$). Preoperative STAI-A was significantly correlated to shoulder pain ($r=0.36$, $p=0.009$) with threshold value of 57 (70% correctly classified subjects) and OSS ($r=0.41$, $p=0.001$) at 1-year follow-up. No significant correlation was found for preoperative depression score ($p=0.08$).

Conclusions

Preoperative pain catastrophizing and state anxiety were significantly correlated with shoulder pain 1-year after arthroplasty.



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156 Arthroscopic Subscapularis Augmentation Of Bankart Repair In Chronic Anterior Shoulder Instability With Bone Loss: Clinical Multicenter Study

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Aim

The purpose of this multicenter study is to assess the short-term outcomes of A.S.A. technique consisting of a tenodesis of the upper third of the subscapularis tendon and a Bankart repair, and its effect on the external rotation in young active patients with chronic anterior shoulder instability, glenoid bone loss (GBL), and capsular deficiency.

Background

The treatment of chronic shoulder instability with poor quality of the anterior capsulolabral tissue is still controversial in presence of bone defects and poor soft-tissue quality.

Methods

This is a retrospective multicenter case series. Inclusion criteria were: patients with GBL ranging from 5% to 25%, anterior capsular deficiency and Hill-Sachs lesion who underwent ASA technique. Exclusion criteria were: GBL >25%, multidirectional instability, pre-existing osteoarthritis and overhead sports activities. VAS scale for pain, Rowe score, American Shoulder and Elbow Surgeons (ASES) scores were used to assess results. Loss of shoulder external rotation was measured with the arm at the side (ER1 position) or 90° in abduction (ER2 position). Analysis-of-variance and Fisher tests were used for data evaluation.

Results

110 patients (84 men and 26 women, mean age 27 years) were evaluated with a mean follow-up of 40.5 months (range: 24 to 65 months). No specific complications related to this procedure occurred. Three patients (2.7%) had a post-traumatic re-dislocation. At final follow-up, the mean scores were as follows: VAS scale significantly decreased from a mean of 3.5 to 0.5 ($P=.015$), Rowe score significantly raised from 57.4 to 95.3 ($P=.035$), ASES score significantly raised from 66.5 to 96.5 ($P=.021$). The mean deficit of external rotation was 8° in ER1 position and 4° in ER2 position.

Conclusions

This procedure has been demonstrated effective to restore joint stability in patients practicing sports, affected by chronic anterior shoulder instability associated with anterior GBL (<25%), capsular deficiency and Hill-Sachs lesions, without compromising external rotation.



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116 Return To Sport After Traumatic Shoulder Instability: Validation Of The SIRSI (Shoulder Instability - Return To Sport After Injury) Scale

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Aim

The main goal of this study was to propose and validate a tool to quantify the psychological readiness of athletes to return to sports following shoulder instability whatever the medical-surgical management.

Background

The incidence of shoulder instability is twice as high in athletes as in the general population. After a serious injury the athlete must be psychologically and physically ready to begin playing his/her sport again. However psychological factors cannot be evaluated by traditional tools.

Methods

«Knee» was replaced by the term «shoulder» in the ACL-RSI (Anterior Cruciate Ligament Return-to-Sport after Injury) scale. This beta test of the SIRSI (Shoulder Instability Return-to-Sport after Injury) scale was performed in a group of athletes who underwent surgery for post-traumatic chronic anterior shoulder instability. The final version was then validated according to the international COSMIN methodology. A retrospective study was performed including all rugby players who had declared an episode of instability during 2012-2013. The WOSI and the Walch-Duplay scales were used as reference questionnaires.

Results

62 patients were included, mean age 26 ± 5.2 years, 5 women/57 men, 70.9% professional or competitive athletes, with a follow-up of 4.6 ± 1.6 years after the first episode of shoulder instability. 30/62 (48.4%) patients underwent shoulder surgery a mean 1.6 ± 1.2 years after this episode. The SIRSI was strongly correlated with the reference questionnaires ($r=0.80$, $p<10^{-5}$). The mean SIRSI score was significantly higher in patients who returned to rugby ($60.9 \pm 26.6\%$ vs $38.1 \pm 25.6\%$, $p=0.001$). The internal consistency of the scale was high ($\alpha=0.96$). Reproducibility of the test-retest was excellent ($\rho=0.93$, CI95% [0.89–0.96], $p<10^{-5}$). No ceiling/floor effects were found.

Conclusions

The SIRSI score is a valid, reproducible scale that identifies patients who are ready to return to their usual sport after an episode of shoulder instability, whether they undergo surgery or not.



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577 Management Of Failed Latarjet Surgery

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Aim

The aim of this study was to assess outcomes of revision following Latarjet surgery, to recognise why they failed and to identify correlations between patient history and surgical outcome.

Background

Latarjet surgery is an effective procedure for the management of anterior shoulder instability. Failure rate ranges from 5 to 20% in the literature and failed Latarjet surgery can be challenging. There is very little published on the management of these cases.

Methods

A retrospective analysis was conducted on patients undergoing revision after Latarjet stabilisation. Revision was defined as any procedure occurring post-Latarjet. Data was collected over a five year period.

Results

Sixteen patients were identified as undergoing revision surgery after a Latarjet stabilisation. Twelve were male and four were female. Eleven were athletes: nine were professionals and two were amateurs. Mean age at revision was 29.9 (± 8.9 ; range 17 to 50). Indications for revision were anterior instability in 11 patients, posterior instability in two and multi-directional instability in three. 54.5% of anterior instabilities were due to coracoid non-union and 36.4% were due to capsular failure (retear). 80% of posterior and multi-directional had posterior labral tears and the mean Beighton score in this group was 6 (± 1.0 ; range 5 to 7).

Conclusions

This study found anterior instability due to coracoid non-union to be the leading cause of recurrence following Latarjet stabilisation. Posterior multi-directional instability had a high incidence of posterior labral tears and hyperlaxity.



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553 Outcomes Of Arthroscopic Capsulolabral Reconstruction In Anterior Instability With Glenoid Bone Defect More Than 20% -Is Latarjet Procedure Absolute Indication For These Patients?-

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Aim

To verify the necessity of bony procedure in anterior instabilities with over 20% glenoid bone defect by way of evaluating the failure rate of arthroscopic soft tissue procedure in such patients.

Background

Recent suggestion is that shoulder anterior instabilities with over 20% glenoid bone defect are not candidates for arthroscopic capsulolabral reconstruction. Current guideline is bony procedure, typically Latarjet procedure, in significant glenoid bone loss.

Methods

Glenoid defects were measured by glenoid defects ratio method by best-fit circle and 32 cases (30 males and 2 females) with more than 20% were included. Bony fragment was observed in detached labrum in 12 cases (37.5%) and the fragment was incorporated in labral repair in all cases. Remplissage procedure was done in 3 patients. Concomitant SLAP lesion was observed in 14 patients (43.8%) and SLAP repair was performed in 9 cases. Interval closure was done in 3 cases.

Results

Mean age at the time of operation was 27.4 ± 10.3 (14-57) years. Mean follow up duration was 35.0 ± 23.5 (12-86) months. Dominant side involvement was observed in 18 (56.3%). Percentage of mean defect size was $25.6\% \pm 4.1\%$. In 18 cases (56.3%), glenoid defect was more than 25%. No case developed obvious recurrence of dislocation, however, sense of subluxation was positive in 4 cases. Return to sports in preinjured level was possible in 26 cases (81.3%). Satisfaction visual analogue scale showed 9.2 ± 1.0 . Postoperative imaging for evaluation of labral healing was done in 21 cases (65.6%) and showed satisfactory healing in all cases.

Conclusions

The current data showed that arthroscopic soft tissue procedure in over 20% glenoid defects could lead to satisfactory outcome. Knowing that bony procedure, such as Latarjet procedure, is more invasive and has higher complication rate, current indication should be reevaluated for the threshold of glenoid bone defect.



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353 Atraumatic Shoulder Instability - A Long-Time Follow-Up Of Open Capsular Shift And Arthroscopic Thermal Capsular Shrinkage Treatment

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Aim

This study compare the long-term results of treatment with arthroscopic thermal capsular shrinking (TCS) or open capsular shift (OCS) in patients with atraumatic glenohumeral instability without structural lesions.

Background

Stability in the glenohumeral joint is created through a complex cooperation between static and dynamic factors. Atraumatic instability is primarily treated with physiotherapy. Two possible surgical treatment options for atraumatic shoulder instability are TCS and OCS. These methods have not changed during the last 20 years, mainly reducing capsular redundancy to provide a better condition for rehabilitation. Western Ontario Shoulder Instability Index (WOSI) is a validated questionnaire evaluating quality of life in patients with glenohumeral instability.

Methods

74 patients treated for atraumatic glenohumeral instability without structural lesions treated with OCS or TCS were identified. These patients had been treated during 1992-2014, and were identified through medical records. The median follow up was 177 months (range 35-287). There were two main types of symptoms, instability with dislocation or subluxation, and pain from secondary impingement. Follow up questionnaires including WOSI were sent via mail.

Results

Answers from 44 patients with 46 treated shoulders were retrieved from returned questionnaires. We found no statistically significant differences in mean WOSI% total score between the groups, TCS=65% (SD=23.2) OCS=69% (SD=23.5) $p=0.692$. Nor between the instability and pain group. We found a negative correlation between months of completed physiotherapy and WOSI% total score Spearman's $\rho=-0.541$, $p<0.001$, where patients that had reported a longer rehabilitation period after surgery had a lower WOSI% total score.

Conclusions

This study provides insight to how patients with atraumatic shoulder instability function after minimum 3, up to 24, years after surgical treatment. When treated according to our local treatment algorithm, there is no significant difference in results between TCS and OCS. The patients with longer rehabilitation might have had a worse outcome as the reason for longer rehabilitation.



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864 Clinical And Biomechanical Recovery Following Shoulder Instability And Labral Repair

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Aim

The aim of the study was to evaluate the recovery of range of motion (ROM) and isokinetic parameters following surgical treatment for shoulder instability.

Background

Clinical and biomechanical testing help in objective evaluation and decision making of the patients' return to sport or heavy labour following shoulder surgery. The recovery may run differently in various instability cases (anterior vs posterior) and procedures (labral repair vs Latarjet procedure).

Methods

Study was based on 67 patients operated in 2014-2017 for shoulder instability and having both clinical and isokinetic testing. Anterior instability was addressed by labral repair in 38 and by Latarjet procedure in 11 patients. Posterior instability was addressed by labral repair in 18 patients. ROM was evaluated preoperatively, at 8, 14 and 24 weeks postoperatively and isokinetic testing at 14 and 24 weeks postoperatively.

Results

Full range of flexion and abduction was achieved at 14 weeks following operation. External rotation (ER) was regained at 24 weeks, however it was significantly lower in Latarjet group. Isokinetic parameters improved over time, however some deficits in ER measures remained (8-12% at lowest, 33-55% at highest velocities). Posterior instability group had significantly better results comparing to other groups, especially to Latarjet. Lowest values were recorded for Latarjet patients, especially for internal rotation movement (larger deficits, lower peak tork/body weight- $p < 0,05$). All groups, except Latarjet patients improved internal rotation isokinetic parameters between 3 and 6 months follow-up.

Conclusions

Full strength and ROM recovery is possible within 6 months for posterior labral repair. Patients treated for anterior instability with both labral repair and coracoid transfer take longer to fully recover. Latarjet procedure provided lowest parameters in ER and strength/endurance testing.



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474 The Concept And Value Of Biceps Relocation In Diagnosis Of Shoulder Instability

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Aim

The purpose of the study was to evaluate the reliability of active and passive biceps relocation test (BRT) in detection of shoulder instability.

Background

The biceps tension may have important role in mechanism of shoulder stability not only by compressing forces but mainly by controlling the intraarticular pressure. Originally active BRT was described as biceps load test for the diagnosing SLAP tears in recurrent shoulder instability. We have found that both passive and active tensioning of the biceps tested in apprehension position (ABER) acts as relocation, giving the patient relief from instability symptoms.

Methods

Study was based on 37 patients with anterior recurrent shoulder instability and confirmed labral lesion and 35 age matched patients as control (no instability, no labral lesions). Clinical test was performed in active and passive manner and evaluated by 2 independent examiners. Diagnosis of anterior labral tear was confirmed with arthroMR and/or shoulder arthroscopy. Cohen's Kappa coefficient was used to evaluate the intrarater and interrater reliability and agreement with relocation test. Sensitivity, specificity and predictive values were calculated.

Results

Passive BRT revealed perfect agreement when compared between the raters, examinations and relocation test. Active BRT was slightly less valuable showed moderate to very good agreement. Both test were perfectly specific and sensitive ranged from 0,89 to 0,97. Positive predictive value ranged from 0,88 to 0,97, and negative value was 1.

Conclusions

Both active and passive biceps relocation test proved to be highly valuable in clinical diagnosis of anterior shoulder instability, with high level reliability, sensitivity and specificity. We suppose that its main mechanism is by increasing the intraarticular vacuum effect.



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263 The ISIS Score Does Not Predict Recurrence In The Medium Term In Our Patients. A Review Of 145 Cases.

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Aim

To evaluate the efficacy of the ISIS score in predicting recurrence in a large group of patients with a minimum follow-up of 3 years.

Background

The ISIS score was developed by Balg and Boileau in 2007; it helps to identify patients with recurrent anterior shoulder instability that have an increased risk of recurrence after arthroscopic Bankart repair. It is being increasingly used to stratify patients into risk groups and guide surgical decision making

Methods

Retrospective review of a prospectively evaluated cohort of patients operated in three different centers between 2009 and 2012. The inclusion criteria (recurrent anterior instability [dislocation or subluxation] with or without hyperlaxity, an arthroscopic Bankart repair, and a minimum of 24 months follow up) and the exclusion criteria (concomitant rotator cuff lesion, an acute first-time dislocation surgery for recurrent instability after a previous anterior stabilization, surgery for a painful, unstable shoulder without true dislocation or subluxation; multidirectional instability) were those defined by Balg. The medical records were reviewed to identify the six variables that define the ISIS score; the patients were contacted telephonically to complete the data and identify recurrences.

Results

163 shoulders met the inclusion and exclusion criteria. Of these, 141 subjects (23 females/118 males; mean age 29,6+/-7,75) with 145(89.0%) shoulders were available for follow-up 5,3+/-1.06(range:3,3-7,3) years after the surgical procedure. The subjects were operated in three different centers by 21 different surgeons. There were 23 recurrences (15.8%). The mean ISIS score was 1.94+/-1.67 in the patients without recurrence and 1.56+/-1.80 in the patients with recurrence (differences not significant). In the 117 subjects with ISIS scores between 0 and 3 the recurrence rate was 15.4%; in the subjects with ISIS 4 to 6 the rate was 17.9%(differences not significant). There were no patients with ISIS>6.

Conclusions

The ISIS score does not predict recurrence when used in patients with values ≤6.



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729 Less Than 60% Return To Preinjury Sports Activities After Primary Anterior Shoulder Dislocation Treated With Immobilisation Only

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Aim

The aim of this systematic review is to investigate the return to preinjury sporting activities in patients who have undergone a conservative treatment with immobilisation after a primary anterior shoulder dislocation.

Background

Shoulder dislocation is a common injury among young athletes, especially those who play contact sports.

Methods

We conducted electronic searches without restriction of language on the EMBASE and PUBMED databases, using the term 'shoulder dislocation' for each database. Study selection All prospective studies that have evaluated the role of immobilisation for first-time shoulder dislocation were included in this review.

Synthesis methods and risk of bias Author's name, year of publication, design of study, population, sample size, follow-up times, immobilisation method, and the rate of patients' return to preinjury sporting activities were extracted from the selected articles. The instrument used for assessing the risk of bias of the included articles was the PEDro scale.

Results

A total of 7397 studies were found. From the four studies included in this review four of them used external rotation (ER) as treatment for three weeks. A total of 214 participants were recruited for ER and 169 for internal rotation (IR). On average, 58.9% (95% CI 51.1% to 64.7%) for immobilisation in ER and 42.6% (95% CI 34.5% to 49.8%) for immobilisation in IR returned to preinjury sports activities. PEDro scores for the included studies ranged from 3 to 6.

Conclusions

On the basis of the best available evidence that the studies reported, on average <60% return to preinjury sports activity level.



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781 Relation Of Graft Positioning With The Functional And Radiological Outcomes, And Graft Osteolysis Analysis For Arthroscopic And Open Latarjet Procedures

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Aim

Assessment of the relation between the medio-lateral and supero-inferior graft positioning and functional outcomes and graft osteolysis after open and arthroscopic Latarjet procedures.

Background

In the surgical treatment of shoulder instability, good functional results are obtained after both open and arthroscopic Latarjet surgery for glenohumeral bone loss. However, graft positioning and its osteolysis are still at issue.

Methods

Forty-eight patients (mean age 29.5 years) who underwent open (n=15; group A) or arthroscopic (n=33; group B) Latarjet procedures, between 2009-2015, were retrospectively evaluated. At the final follow-ups, the ranges of shoulder flexions (F), external rotations (ER) and internal rotations (IR), Rowe, The Western Ontario Shoulder Instability Index (WOSI) and Visual Analogue Scale (VAS) scores were evaluated, bilaterally. Computerized tomography (CT) scans assessed for bone loss size, preoperatively, and graft positioning, screw orientations, and graft lysis, postoperatively.

Results

The mean follow-up was 30.5 (range, 12-62) months. Mean supero-inferior position of the coracoid bone graft, using a validated method, was found between 1:55:00 and 04:49:00 o'clock (02:05:00-04:55:00 for group A; 01:51:00-04:47:00 for group B) in en-face views. The grafts were placed laterally in 13.3%(group A) and 9.1%(group B) of patients. The mean α angles of the screws were 19.2° and 11°, respectively (p=0.004). The mean osteolysis rates were 21.3% and 34.3% (p=0.087), respectively and were found to be correlated with the Gerber index (rs=0.336, p=0.019) and defect percentage (rs=0.297, p=0.041). There were significant differences in the mean IR loss (p=0.017) and WOSI (p=0.017) scores although no significant differences were observed in the mean ranges of F(p=0.918) and ER(p=0.883), and Rowe(p=0.429) and VAS(p=0.208) scores.

Conclusions

Medio-lateral and supero-inferior positioning of the graft did not affect the functional outcomes. In patients underwent open surgery IR ranges were less restricted and screw positioning were more appropriate. However, WOSI functional scores were better after arthroscopic Latarjet procedures.



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115 Should We Stabilizing Surgically The Shoulder Of The Athlete After The First Episode Of Instability? Outcomes In 138 Rugby Players

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Aim

To assess the benefit of surgical stabilization of the shoulder in rugby players after a first episode of instability in a large cohort.

Background

The current trend is to propose an early surgical treatment to patients with a first episode of glenohumeral dislocation, especially among young people and sportsmen. However, studies on the subject are few and published series include few patients.

Methods

In this retrospective study, all rugby players reporting a shoulder instability episode during the sporting season 2012-2013 were contacted. Patients completed a questionnaire online at least 2-year follow-up. The primary outcome was return to rugby in match.

Results

138 patients filled in all data at 3.9 ± 2.6 (2 to 21.3 years) of mean follow-up after the first episode of shoulder instability, either dislocation (78.3%) or subluxation (21.7%). This series included 132 men and 6 women, mean age at first episode 22 ± 5.9 years, all rugby players whom 66% of professional players or competitors. After this first episode, 68.8% had a recurrence. Shoulder stabilization was performed in 70 (50.7%) patients whom 72.8% with a bone block. The rate of the return to rugby was similar between the operated and non-operated patients (70.6% vs 73.5%, $p=1$). At last follow-up, the level of sport and functional scores were comparable. The group "bone block" resumed their sport significantly more often than patients "soft tissues surgery" (76.5% vs 42.1%, $p=0.01$) and at a higher or same level as before the first instability episode (53% vs 26.3%, $p=0.01$).

Conclusions

Surgical stabilization of the shoulder in an athlete after a first episode of instability is not indicated in all patients. This decision must be adapted to the patient's profile such as age and recurrence despite a well conducted conservative treatment. In rugby players, the bone block provides better postoperative outcomes than surgery on the soft tissues.



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691 Medial Buttress Plating For The Comminuted Proximal Humerus Fractures : A Short Term Outcome

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Aim

To evaluate a short term outcome (>6 months) functional results and to analyze the clinical and radiological outcomes in patients with comminuted proximal humeral fractures treated with medial buttress and lateral locking compression plate.

Background

For management of the comminuted proximal humeral fractures with lateral locking compression plate fixation, restoration of the stable medial column is critical to avoid serious complications such as screw cutout or loss of reduction. However, medial restoration is demanding if the fractures are accompanied by metaphyseal bone defect and medial cortical comminution. We hypothesized a novel technique using the medial buttress and lateral locking compression plate could provide rigid and effective internal fixation.

Methods

The operative technique involves after lateral locking plating on the lateral proximal humerus with locking screws, if there was instability we planned to use additional medial buttress plate. Patients were assessed at 6 months after surgery with radiologically plain radiographs, clinically active range of motion, the American Shoulder and Elbow Surgeons (ASES), the Disabilities of the Arm, Shoulder and Hand (DASH), and the Constant shoulder scores.

Results

We treated 12 patients with this method. At a mean follow-up of 21.8 months, all patients achieved complete union of the comminuted proximal humeral fracture without humeral head osteonecrosis and minimal change ($2.8^\circ \pm 2.0$) in neck-shaft angles ($135.6^\circ \pm 3.7$) were observed. Clinical results (ASES score : 73.5 ± 10.7 , DASH score : 33.1 ± 16.9 , Constant score : 62.4 ± 11.9) were satisfactory with a functional range of motion (forward flexion : 128.3 ± 25.5 , abduction : 133.3 ± 37.4 , internal rotation : 48.3 ± 20.4 , external rotation : 63.3 ± 20.3) was achieved at 6 months after surgery.

Conclusions

The medial buttress and lateral locking compression plate fixations could be considered to achieve more effective fixation for the proximal humeral fractures with unstable medial column.



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476 Treatment Of Complex Proximal Humeral Fractures: Locking Plate Vs Non Locking Plate.

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Aim

The aim of this study was to compare the use of locking and non-locking plates as a treatment for proximal humeral fractures in order to understand if there are significant differences in clinical and radiographic outcomes using these two different devices, considering locked plates are more expansive than non-locked plates.

Background

There is no consensus on treatment of proximal humerus fractures, even though fixation with plate and screws is the most frequently used method. Many studies have compared different approaches to fixation, pointing out similar outcome results. No recent clinical studies have compared locking plates and non-locking plates for treatment of PHF, even if the biomechanical advantage of the locking plates has been already proved.

Methods

We conducted a retrospective study, starting in 2014, comparing 64 patients; 28 were treated with a locking plate (group A) and 36 with a non-locking plate (group B). Both groups, homogeneous for mean age and rehabilitation protocol, had the same fracture according to Neer classification (2 – 3 fragments). A clinical shoulder's assessment was performed at a minimum of 2 years of follow up, using DASH SCORE, CONSTANT SCORE, UCLA SCORE, and supplemented by a new radiological assessment compared with the postoperative one.

Results

Both groups had the same score at clinical assessment, but they were different in the radiological comparison; in fact 20 patients of group B had shown device's mobilization (56%), and 8 of them (22% of group B) underwent a second surgery for devices removal. Group A didn't show any plates' mobilization. Data collected were supported by a statistical p value inferior to 0.005.

Conclusions

Even if locked plates are more expensive than non-locked plates, our result showed that the overall treatment in the first case could be safer and cheaper, as it reduces the risk of incurring the cost of a second surgery.



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936 Structural And Functional Outcome Following Subacute Arthroscopic Repair Of Acute Full-Thickness Rotator Cuff Tears. A Prospective Outcome Study

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Aim

To study the structural integrity and the clinical outcome after subacute repair of acute full-thickness rotator cuff tears (FTRCTs).

Background

Previous reports have suggested that time to surgery is important, when treating acute FTRCT. The time-threshold when to expect inferior outcome is unknown. Superior functional outcome is seen in patients with intact repairs. We hypothesized that subacute repair trauma would result in a high healing rate.

Methods

63 consecutive previously shoulder healthy patients (13 women) with a median age of 61 years (range, 42-75), were after an acute and MRI verified FTRCT prospectively studied. Arthroscopic repair was performed within 6 weeks of the injury. A single-row repair was utilized, followed by a standardized rehabilitation protocol. MRI scans were assessed at 12 months for tendon integrity analyzes. Patient-reported outcome using WORC, EQ VAS at 3,6,12,24 months, and Constant-Murley score (CMS) at 3,6,12 months were studied for clinical outcome.

Results

Four patients were excluded due to new medical conditions in the early postoperative phase. Of the study population of 59 patients, 56 completed the 1-year MRI investigation and 58 (98% completion rate) completed the 2-year WORC and EQ VAS evaluation. 80% of the tears included 2 or more tendons. Complete healing of all repaired tendons was found in 35 of the 56 patients (63%). Healing of 1 or 2 of the repaired tendons was found in 13 patients (23%). The median WORC increased from baseline 30.9 (IQR 21.0-39.2) to 83.8 (IQR 61.6-95.4) at final follow-up. The normalized CMS increased from 27.6 (IQR 22.2-37.8) to 83.2 (IQR 71.9-97.5) at 12 months after surgery.

Conclusions

We failed to show that subacute repair results in superior healing rates compared with previous reports. Despite the healing rate of 63%, the clinical outcome improvement was excellent. Other factors than time to surgery seem to have greater impact on tendon healing.



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872 Tendon Degeneration And Healing Properties In Acute Rotator Cuff Tears

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Aim

To investigate the correlation between tendon degeneration and healing in subacute repairs of traumatic full-thickness rotator cuff tears.

Background

After decades of advancement in rotator cuff surgery, we are still facing the challenge of non-healing or re-tearing. The number of publication of biomechanics, different repair techniques, and biologic augmentation are raising. Less attention has been given the presumed underlying histopathology in the rotator cuff tendons.

Methods

In a prospective cohort study, we consecutively included 62 previously shoulder healthy patients (14 women, median age 61 years (range, 42-75)) with traumatic MRI verified full-thickness rotator cuff tears. Arthroscopic repair was performed within 6 weeks of the injury. Biopsies were taken per-operative from the most lateral edge of the supraspinatus tendon in all patients with cuff tears including the supraspinatus tendon (n=54). Each sample was examined under light microscope after standard staining (H/E, alcian blue, and Masson's trichrome). Tendon degeneration was determined using the updated Bonar score. MRI was obtained in 47 patients one year after surgery and structural integrity was determined according to the validated Sugaya classification.

Results

MRI one year after surgery diagnosed 32 patients (68%) with a healed, intact rotator cuff (Sugaya 1-3) whereas 15 patients (32%) were diagnosed with a defect rotator cuff (Sugaya 4-5). There were no correlations between postoperative healing according to Sugaya and any the investigated histopathological features. The median Bonar score was 8.3 (IQR 6.4) for healed and 9.0 (IQR 7.0) for non-healed tendons (p=0.38).

Conclusions

Acute rotator cuff tears undergoing surgical repair within 6 weeks of injury displayed healing in 68% one year after surgery. We failed to identify any correlation between tendon degeneration, as determined histopathologically on biopsies, and repair integrity. Future studies on other histopathological changes like inflammation, proliferation, and apoptosis might shed light into the topic of rotator cuff healing properties.



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107 Is The Transfer Of The Latissimus Dorsi Really Efficient To Treat Massive Irreparable Posterior-Superior Rotator Cuff Tear?Jean Kany¹, Jean David Werthel², Philippe Valenti², Jean Grimberg³, Bassem Elhassan⁴

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Aim

The main objective of this study was to analyze precisely the rupture rate after transfer of the Latissimus Dorsi (TLD) on standard radiographs using metal clips. The secondary objective was to evaluate whether a rupture of the transfer was associated with a worse outcome.

Background

TLD is the most common transfer described for irreparable posterior-superior cuff tear, with variable outcome reported depending on patient selection. We hypothesized that these variable results could be due to a high rate of rupture of the transfer. Precise analysis by ultrasound or MRI of the healing of the transfer is difficult and not reproducible.

Methods

Between 1/1/2014 and 31/12/2015, 79 consecutive TLDs for irreparable posterior-superior cuff tears were performed by a single surgeon. All transfers were arthroscopically-assisted and fixed transosseously. Three metal clips were placed systematically intraoperatively in the intubulated tendon at a fixed distance of 2, 4 and 6 cm from its insertion on the humerus. Immediate postoperative standard anteroposterior radiographs were performed and the position of the metal clips was compared to their position on radiographs performed on the 3rd and 12th postoperative months. Constant and SSV scores on the 3rd and 12th postoperative months were compared between patients who had a rupture of the transfer and those who did not.

Results

At a mean 15.8 months, there were 16 cases of rupture (27.6%). Constant and SSV scores were significantly lower ($p < 0.05$) for patients who had a rupture of the transfer: 57.18 (± 17.92) versus 66.65 (± 16.6) and 56.8 (± 23.7) versus 70.7 (± 18.7) respectively.

Conclusions

The high rate of rupture could be responsible for the variability of the results reported in the literature. Proper healing of the tendon was associated with better functional scores showing that TLD is efficient. These results could be improved by modifying the technique of fixation.



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313 The Effect Of Tendon-To-Bone Remodeling With The Use Of Recombinant Human Bone Morphogenetic Protein-2 Delivered By β -Tricalcium Phosphate In Rabbit Rotator Cuff Repair Model

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Aim

The purpose of this study was to investigate the effect of tendon-to-bone remodeling with the use of bone morphogenetic protein-2 (BMP-2) delivered by beta-tricalcium phosphate (beta-TCP) in rabbit rotator cuff repair model.

Background

BMP-2 plays an important role in tendon-to-bone remodeling. However, there was no previous literature about tendon-to-bone remodeling accelerated with the use of BMP-2 delivered by beta-TCP.

Methods

The infraspinatus tendon of retired female Japanese white rabbits was detached from its insertion on the humerus. The bone tunnel (4.2 mm) was created at the original insertion of infraspinatus tendon. Infraspinatus tendon was repaired by McLaughlin procedure after filling in beta-TCP (porosity 75%) without recombinant human BMP-2 (rhBMP-2) (Control group) or with 10 ug rhBMP-2 (BMP group). The rabbits were sacrificed at the 2nd, 4th, or 8th weeks after surgery for histological assessment and biomechanical testing. We also evaluated the maturity of tendon-to-bone insertion with use of tendon-to-bone maturing score.

Results

Histologic analysis revealed no significant difference between both groups at 2 and 8 weeks, but more abundant organized fibrocartilage at the tendon-to-bone interface in BMP group at 4 weeks. The tendon-to-bone maturing score was improved sequentially. The BMP group at 4 weeks had significantly better biomechanical properties than the Control group.

Conclusions

The tendon-to-bone remodeling was facilitated with the use of BMP-2 delivered by beta-TCP at 4 weeks in rabbit rotator cuff repair model.



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314 Short Term Clinical Results Of Arthroscopic Rotator Cuff Repair With Jugger Knot Suture Anchors

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Aim

The purpose of this study was to evaluate short term clinical results of ARCR with Jugger Knot suture anchors for rotator cuff tears.

Background

Conventional rotator anchors with more than 4.5mm in diameter were often used in arthroscopic rotator cuff repair(ARCR). Recently Jugger Knot 1.4mm all-soft suture anchors have been introduced. These volumes are substantially less than those of conventional rotator cuff anchors.

Methods

We evaluated 28 shoulders in 28 consecutive patients who had ARCR with Jugger Knot suture anchors with minimum six months follow up. Average age at the surgery was 60.5 years. 28 shoulders were divided into 4 groups: 6 partial tears, 4 small size tears, 10 middle size tears and 8 large or massive size tears. Clinical evaluation was composed of intra-operative Jugger knot anchor condition, number of used anchors, active ROM in flexion and abduction; clinical assessment with the JOA shoulder scoring system at 3 and 6 months follow up.

Results

Intraoperative Jugger knot anchor failure was observed only in one case with middle size tear and they worked well in other cases. In partial and small size tear cases, 3.2 Jugger knot anchors were used in average. In middle and large or massive size tear cases, 3.6 Jugger knot anchors were used in average combined with 1.6 conventional metal anchors. Preoperative active ROM in flexion and abduction significantly improved postoperatively. Average preoperative JOA score (63.0 points) was significantly increased at 3 and 6 months follow up (84.0 and 91.8 points respectively).

Conclusions

Jugger knot suture anchors were useful instruments in partial and small size tears; were also useful if combined with conventional anchors in middle and large or massive size tears.



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582 Increase In Shoulder Muscle Strength After Arthroscopic Superior Capsule Reconstruction

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Aim

The objective of this study was to investigate if shoulder muscle strength increases after arthroscopic superior capsule reconstruction (SCR).

Background

Arthroscopic SCR, which is a new surgical treatment for irreparable rotator cuff tears, restores shoulder function.

Methods

Sixteen patients with irreparable rotator cuff tears underwent arthroscopic SCR using autograft of fascia lata. Average follow-up was 12 months (4-27 months) after surgery. Muscle strength was evaluated with digital handheld dynamometer (microFET[®]) before surgery and at the final follow up after surgery. Shoulder abduction, external rotation, and internal rotation strengths were measured at 0 and 90 degrees shoulder abduction positions. Wilcoxon signed-rank test was used to compare muscle strength before and after arthroscopic SCR.

Results

All muscle strength significantly increased after arthroscopic SCR ($p=0.001-0.0001$). Shoulder abduction and internal rotation strengths at 0 degrees abduction were completely restored after arthroscopic SCR (abduction strength: 6.5kg preoperatively to 10.9kg postoperatively, 10.7kg in the contralateral side, and internal rotation strength: 6.3kg preoperatively to 8.5kg postoperatively, 8.5kg in the contralateral side). At 90 degrees abduction position, shoulder abduction and internal rotation strengths partially restored after arthroscopic SCR (abduction strength: 2.2kg preoperatively to 5.0kg postoperatively, 71% of 7.0kg in the contralateral side, and internal rotation strength: 3.5kg preoperatively to 7.2kg postoperatively, 87% of 8.4kg in the contralateral side). External rotation strength at both 0 and 90 degrees abduction positions partially restored after Arthroscopic SCR (0 degrees abduction: 3.3kg preoperatively to 5.6kg postoperatively, 82% of 6.9kg in the contralateral side, and 90 degrees abduction: 2.5kg preoperatively to 5.0kg postoperatively, 67% of 7.5kg in the contralateral side).

Conclusions

Arthroscopic SCR significantly increased shoulder muscle strength in abduction, internal rotation and external rotation although any rotator cuff muscles were not reattached to the greater tuberosity. This result suggests that shoulder muscle strength increases by restoring shoulder stability after arthroscopic SCR.



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73 Arthroscopic Subacromial Spacer Implantation In Patients With Massive Irreparable Rotator Cuff Tears: Clinical And Radiographic Results Of 39 Retrospectives Cases.

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Aim

The purpose of this retrospective study was to evaluate the clinical and radiographic outcome of a biodegradable subacromial spacer in the treatment of massive irreparable rotator cuff tear.

Background

The treatment of massive irreparable cuff tear remains a surgical challenge. The arthroscopic implantation of a subacromial spacer could be a simple, low morbidity therapeutic option to restore shoulder function in these patients.

Methods

Between January 2011 and December 2014, 39 consecutive shoulders in 37 patients with symptomatic massive irreparable rotator cuff tears were treated at our institution with arthroscopic implantation of a biodegradable subacromial spacer. All shoulders were followed up for a minimum of 1 year (mean 32.8 ±12.4 months). The mean age of patients was 69,8. Outcome measures included pre- and postoperative, range of motion, Constant score, acromio-humeral distance and Hamada classification on anteroposterior and lateral radiographs.

Results

At most recent follow-up, active range of motion was significantly improved in anterior elevation, abduction and external rotation. The mean Constant score was also significantly improved from 44.8 (±15.2) preoperatively to 76.0 (±17.1) at the last follow-up. The mean acromio-humeral distance significantly decreased from 8.2 mm (± 3.4) to 6.2 (+3.1) at the last follow-up. Hamada score progressed of 1 radiographic stage in 4 shoulders (14.8%) and progressed of 3 stages in 2 (3.7%) while the other 32 shoulders remained stable. No intra- or postoperative complications were found.

Conclusions

Arthroscopic implantation of subacromial spacer for irreparable rotator cuff tear is a low-risk and simple procedure associated with significant improvement in shoulder function.



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168 Clinical Outcome Of Arthroscopic-Assisted Pectoralis Minor Tendon Transfer In Irreparable Anterosuperior Rotator Cuff Tear.**Kotaro Yamakado**

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Aim

The purpose of this study was to evaluate the results of an arthroscopic-assisted pectoralis minor tendon transfer for irreparable cuff tears.

Background

Surgical treatment options for irreparable anterosuperior cuff tears are limited and highly challenging.

Methods

Thirteen patients (12 men and 1 women) with a mean age of 70.3 (range, 65 to 77) years underwent arthroscopic pectoralis minor tendon transfer and were available for follow-up evaluation. All patients had irreparable anterosuperior massive cuff tear and an arthroscopic partial repair was attempted. The pectoralis minor tendon was harvested via mini-open incision over the coracoid process with a flake bone and fixed at the lesser tuberosity with a knotless anchor (VersaLok) arthroscopically. All patients were evaluated preoperatively and postoperatively using a modified University of California Los Angeles (UCLA) scoring system, active range of motion (elevation and external rotation) and the visual analogue pain scale (VAS).

Results

At a mean of 18.8 months (range, 12 to 36 months) after arthroscopic pectoralis minor transfer, the mean UCLA score increased from 15.2 (sd, 5.6) preoperatively to 30.8 (sd, 5.0) postoperatively ($P < 0.001$). The mean active forward elevation increased from 87 (sd, 19) preoperatively to 145 (sd, 23) postoperatively ($P < 0.001$). The mean active external rotation did not change significantly from 48 (sd, 19) preoperatively to 53 (sd, 22) postoperatively ($P = 0.52$). The VAS improved from 57 mm to 16 mm ($P = 0.0023$). One shoulder was revised with the reverse shoulder arthroplasty at 15 months postoperatively due to ongoing pain and re-tear of the repaired cuff. Postoperative MRI was evaluated in 11 or 13 cases (85%) showing continuity of the transferred tendon in 10 cases (91%).

Conclusions

Arthroscopic-assisted pectoralis minor tendon is a technically demanding procedure, however, can lead to significant improvements in overall shoulder pain and function.



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797 Correlation Between Rotator Cuff Tear, Scapula Morphology And Constant Score: 60 Tears Vs 30 Healthy ControlsPatrice Tétreault¹, Sophie Jeandel², Nicola Hagemeister²

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Aim

Is there a correlation between rotator cuff tear, scapula morphology and shoulder function?
Do symptomatic patients have more distinctive morphologic features?

Background

20% of patients with rotator cuff tears show neither pain nor reduced shoulder function. Identification of morphologic parameters that could provide clues about a worsening shoulder function may guide clinicians and patients toward proper care or proper work environment. Among the published parameters, there is still no clear correlation with good or poor shoulder function.

Methods

90 patients were included in this study: 60 patients with degenerative rotator cuff tears and 30 controls. Shoulder function was measured by the relative Constant score (Constant et al 2008). Five morphological parameters were measured on standard MRI views, as described in the literature. The glenoid version was measured on axial MRI (Poon et al 2012). The remaining parameters were all measured on coronal MRI: Glenohumeral index (Balke et al 2013), glenoacromial angle (Tétreault et al 2004), glenoid inclination and critical shoulder angle were adapted on MRI from Maurer et al (2012) and Moor et al (2014) respectively.

Results

Patients' Constant scores were well distributed: low (25%), moderate (24%), good (31%) and high (20%). Significant difference were found between patients and controls for both glenoacromial angle and glenoid inclination ($p \leq 0.01$ and $p \leq 0.03$ respectively). No correlation was found neither between relative Constant score nor Constant score categories and morphological parameters.

Conclusions

Patients with rotator cuff tears showed a significantly smaller glenoacromial angle, decreasing the volume available for the supraspinatus and a significantly higher glenoid inclination. None of the studied morphological parameters were linearly correlated to shoulder function.



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76 The Biodegradable Spacer As A Novel Treatment Modality For Massive Rotator Cuff Tears: A Prospective Study With 5-Year Follow-Up

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Aim

This study was designed to confirm the long-term safety and efficacy of the biodegradable inflatable InSpace™ system in patients with massive repairable or irreparable RCT's.

Background

The management of massive, irreparable rotator cuff tears (RCT) is challenging and associated with a high failure rates. There is no current consensus or definitive guidelines concerning the optimal surgical treatment for this devastating condition.

Methods

In this open-label, single arm, prospective study, subjects with massive RCT underwent sub-acromial implantation with the biodegradable spacer. Follow-up visits were scheduled according to routine clinical practice. Shoulder function was evaluated using Total Constant Score (TCS).

Results

Twenty-four patients were treated and assessed. Four patients had partial tears, and in three of them RC repair was performed. These patients were not included in the efficacy analyses. Of the participating subjects who reached the 5-year follow-up, 84.6% of the patients showed a clinically significant improvement of at least 15 points in their score, whilst 61.54% showed at least 25 points of improvement. Only 10% of the treated patients showed no improvement or worsening in the shoulder score comparing to their baseline. An overall improvement in the total CS commencing at 3 months and sustained by 6 months through to 5 years of follow-up ($P < .0001$) was demonstrated.

Conclusions

We conclude that in this initial cohort, arthroscopic implantation of InSpace™ system represented an effective alternative to the existing arthroscopic procedures in patients with painful massive RCTs refractory to conservative management. Further randomized controlled trials comparing the clinical and functional outcomes after implantation of the InSpace™ device are warranted.



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**371 Postoperatively New-Onset Pseudoparalysis
- Retrospective Analysis Of 652 Consecutive Arthroscopic Repairs
For Large-To-Massive Rotator Cuff Tear -**

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Aim

To evaluate risk factors for postoperatively new-onset pseudoparalysis (PNOP) and its reversal.

Background

Authors experienced patients of PNOP after successful repair of large-to-massive rotator cuff tear.

Methods

Between March 2010 and May 2016, 652 consecutive arthroscopic repairs for large-to-massive tear were retrospectively analyzed and 26 PNOP patients (4.0%) were included. To determine the risk factors of PNOP, PNOP group was compared with remaining control group.

Results

The mean age was 69.2 years (53-80) in PNOP group and 63.8 years (43-83) in control ($p < 0.001$), however the gender distribution was not different ($p = 0.09$). Preoperative electromyogram was normal in all patients of PNOP group, whereas, 17 abnormalities without neurological symptom observed in control. Retear rate was not different between groups (42.3% vs. 28.9%, $p = 0.183$). In multivariate regression analysis, older age (≥ 65 years), more retracted supraspinatus (≥ 30 mm), preoperative stiffness, and torn subscapularis were risk factors for PNOP (Odds ratio, OR=3.522, 5.017, 3.149, 7.106; $p = 0.011, 0.005, 0.012, 0.002$). The scoring system with a score of 10 was created based on the OR of risk factors (AUC=0.800) and cutoff-value was 8 out of 10 points, with sensitivity of 69.2% and specificity of 85.0%.

PNOP was reversed in 13 patients (50.0%) with mean duration of 9.2 (6.5-13.0) months. Retear rates of entire rotator cuff and/or solely subscapularis were not different between reversed and remained patients of PNOP (38.5% vs. 46.2%, 0.0% vs. 15.4%; $p = 1.000, 0.480$). In multivariate regression analysis, fatty infiltration of supraspinatus less than grade 3 was the only predictor for reversal for pseudoparalysis (OR=24.000; $p = 0.011$).

Conclusions

PNOP can be occurred after successful arthroscopic repair of large-to-massive rotator cuff tear, though the incidence was low (4.0%). Therefore, surgeons would better to notice possible PNOP before surgery in high risk patients whose probability increased with older age, larger supraspinatus tear and the presence of preoperative stiffness and torn subscapularis.



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547 Hemodynamic Changes And Affecting Factors After Shoulder Arthroplasties In Asian Population

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Aim

To compare different hemodynamics depending on the types of shoulder arthroplasties, and to evaluate predictors for transfusion in Asian population.

Background

Previous hemodynamics studies in shoulder arthroplasty only evaluated Western population and mainly focused on risk factors of transfusion. However, Asians are relatively small, and have higher bleeding risk due to prothrombin-clotting-factor polymorphisms. Therefore, previous reported Western data is hard to apply to Asians.

Methods

Total 212 shoulder arthroplasties (26 fracture hemiarthroplasty (fHA), 49 anatomical total shoulder arthroplasty (aTSA), 132 reverse total shoulder arthroplasty (rTSA), and 5 revision surgery) from August 2004 to January 2016 were retrospectively reviewed. Demographics, surgical factors and perioperative hemodynamic factors were compared for each type of arthroplasty. Regression analysis was conducted to determine predictors for transfusion.

Results

Preoperative Hb and Hct level were lower in fHA group (11.9 ± 1.8 g/dL, $35.4 \pm 5.4\%$; $p=0.001$, 0.001), and Hb drop of postoperative first day was also lower in fHA group (1.4 ± 1.3 g/dL, $p=0.03$). Total drain output was higher in rTSA and revision (349.1 ± 191.7 mL, 408 ± 125.8 mL, $p<0.001$, <0.001), however, there was no significant difference of estimated blood loss ($p=0.324$). There was significant, but very weak correlation between drain output with Hb drop ($r=0.224$, $p=0.002$). The overall transfusion rate was 11.3% (24/212); fHA 30.8% (8/26), aTSA 10.2% (5/49), rTSA 7.6% (10/132), revision 20% (1/5). In multiple regression analysis, lower Hb level of preoperative period and postoperative first day were predictors for transfusion (OR=0.481, 0.499; $p=0.002$, 0.017) and cutoff-value in ROC curve were 12.15g/dL and 10.0g/dL, respectively (Sensitivity=80%, 70%; Specificity=80%, 84%).

Conclusions

In Asian, overall transfusion rate after shoulder arthroplasties was 11.3%, varied by type of arthroplasty. And lower Hb level of preoperative period (<12.15 g/dL) and postoperative first day (<10.0 g/dL) were predictors for transfusion. Surgeons should consider different hemodynamics depending on different types of shoulder arthroplasty and close monitoring of perioperative Hb level is essential to decrease hemorrhage-related complications, because drain output could not represent perioperative hemorrhage.



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446 Does Coracohumeral Ligament (CHL) Release In Concomitant With Arthroscopic Rotator Cuff Repair Prevent Postoperative Stiffness?**- A Retrospective Case Control Study -**

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Aim

This study examined whether coracohumeral ligament (CHL) release in-continuity from bony coracoid base prevents the postoperative stiffness in patients with rotator cuff repair.

Background

The thickened CHL has been understood to be the primary restraint in stiff shoulder. However, there has been no report regarding the effectiveness of CHL release preventing postoperative stiffness.

Methods

Patients who underwent arthroscopic rotator cuff repair between Jan. 2014 and Jan. 2016 were collected. A propensity score matching (1-to-1) was performed between groups with releasing CHL in-continuity from bony coracoid base and no release group. Finally, 76 patients in each group were matched using the following variables: age, gender, arm dominance, number of tendon involved, and retraction size. Authors assessed passive range of motion (ROM) at 3 months after surgery, and recorded visual analog scale for pain, Constant score, ASES score as well as ROM at postoperative 6 months in both groups.

Results

There were no significant differences in preoperative demographic data and preoperative ROM between two groups. For external rotation (ER) at side at postoperative 3 month, CHL-release group demonstrated better ranges (48.3° vs. 41.6° , $P=0.005$), but no statistical difference in forward flexion and internal rotation. Considering changes between the pre- and postoperative range of ER at side, there was a significant difference between groups in patients with small-to-medium sized tear ($P=0.029$), but not significant with large-to-massive tear ($P=0.352$). There were no differences of ROM, pain VAS, and functional score recorded at postoperative 6 months. There were no postoperative complications regarding to procedure of CHL release.

Conclusions

Based on the current retrospective data, prophylactic CHL release in-continuity from bony coracoid base could be effective and safe method to prevent early postoperative stiffness, especially ER at side in patients with small-to-medium tear. Long-term follow-up and further prospective study should be needed.



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550 The Principles And Methods From Pilates Machines Using To Recovery The Complicated Case After Elbow Fracture Treated Surgically.

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Aim

To present our experience and results to restore elbow joint movements after complicated fracture, treated surgically.

Background

50% of the limits of the elbow joint, leads to 80% of limitations in the entire upper limb. Elbow joint is prone to stiffness. The main reasons are: prolonged immobilization, hematoma, swelling, soft tissues injuries, and fat -pad sign etc. The frequent problems are presented with extension limitations accompanied with pain.

Methods

Material: 29 y. old patient with fracture and dislocations of the elbow. Non-displacement fracture of the radial head, capitulum humeri fracture, multi fragments fractures on the both epicondyle and joint instability. Treated surgically with open reduction and internal fixation. Method: Pilates machines, cryotherapy, muscle facilitation's, kinesiotaping applications. The methods start 2 weeks post surgically.

Results

Analysis of the latest results of the 3rd postoperative month showed full recovery for flexion and pronation-supination. While extension lagged behind and up to 3rd months does not make progress. The pain was 1,5 from pain scale. Mayo performance score test reached 80 points.

Conclusions

The unique principles and methods of Pilate's machines relies on: control, smoothness, lack of pain and precision of the movements. The special accent was to restore the extension as far as possible in this complex trauma.



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504 A New Clinical Pathway For Acute Traumatic Shoulder Dislocations In A Teaching Hospital Setting: Quality Improvement Project.

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Aim

To evaluate the quality improvement effect of the introduction of our newly introduced pathway for first-time traumatic shoulder dislocations.

Background

Evidence indicates that acute first time shoulder dislocations have been historically managed quite variably. Furthermore specific groups have improved outcomes with acute investigation and treatment.

Methods

We have developed a pathway for first time traumatic shoulder dislocations in our hospital adopting principles from the BESS (British Elbow and Shoulder Society) guidelines. Patients are either seen in a general or upper limb specific fracture clinic or a physiotherapist-led soft tissue shoulder clinic run in parallel with the upper limb clinic. From here our guidelines signpost a specific pattern of referral and investigation. Two changes were MR Arthrograms for all patients age 18-25 and ultrasound for all patients over 40 years eligible for surgery. All patients attending our hospital with a first-time shoulder dislocation in 2013 were retrospectively reviewed for investigations performed and referral patterns. Intervention in the form of surgeon education and clinic posters was performed in September 2016 and the same data was prospectively collected until January 2017.

Results

Before intervention, 6% of patients age 18-25 with first time traumatic shoulder dislocation underwent an MR arthrogram; after intervention 100% of eligible patients were correctly referred. Before intervention 39% of eligible patients over 40 years old were referred for ultrasound; 62% of these scans were positive for rotator cuff tears. After intervention 92% of eligible patients underwent ultrasound; 83% of these demonstrated cuff tears and these patients have had informed consultations regarding early surgery.

Conclusions

Our intervention has changed referral patterns in a manner which evidence suggests will improve long term outcomes. Long term follow up of this cohort will confirm this. This intervention has improved the quality of our service and is applicable in other centres.



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120 Shoulder Instability Treatment And Return To Play Protocols In Rugby Union Players

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Aim

To assess the use of different treatments among healthcare professionals for both primary and recurrent shoulder dislocations.

Background

The incidence of shoulder instability in rugby union players is rising. There remains controversy over the most suitable management of patients with a primary dislocation, and those with recurrent dislocations or instability. Return to play protocols post treatment also vary.

Methods

Clinical scenarios of shoulder instability in 15, 20 and 25 year old rugby union players were presented to UK based and US based healthcare providers. Treatment options including conservative and surgical (arthroscopic stabilization, open Bankart and Latarjet) were proposed. There were also a number of questions in relation to safety aspects of current rugby union regulations.

Results

Conservative treatment was the method of choice in first time dislocations in younger players, but as players reached 20 years surgery was the most utilized treatment method. Duration in a sling following conservative treatment was 4 weeks (range 2-6). Following arthroscopic stabilization, the period of immobilization was 4 weeks (range 2-6), with the same duration post open Bankart and Latarjet. Following conservative treatment, return to play was a mean of 12.6 weeks. Return to play post arthroscopic stabilization was a mean of 13.8 weeks, 17.7 weeks following open Bankart, and 16.7 weeks post Latarjet.

Conclusions

There remains mixed opinion on the management of shoulder instability in rugby union players among healthcare providers from both the United States and the United Kingdom. A trend appears to be present in favour of early surgical intervention but there is no universal agreement regarding when return to play is advised. There is a significant concern among doctors that contact levels should be regulated in order to protect player safety, whilst also restricting contact levels in the younger age-groups.



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378 An Effective Technique Of Arthroscopic Subscapularis Repair In The Asian Population With 2 Year OutcomesJeremy Keng Meng Goh¹, Jerry Yong Qiang Chen¹, Denny Tjiauw Tjoen Lie¹, **Edwin Tan**²

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Aim

The purpose of this study is to evaluate the clinical outcomes in patients undergoing arthroscopic subscapularis repairs using a technique devised by the senior author of this study.

Background

Tears of the subscapularis are not as common as the other rotator cuff muscles and hence not as many arthroscopic repair techniques have been previously described in the literature.

Methods

A retrospective study of 40 patients who have had undergone arthroscopic subscapularis repair at a single centre, by a single surgeon from 2009 to 2014. All patients were assessed pre-operatively and post-operatively at 3, 6, 12 and 24 months. The Visual Analogue Scale (VAS), Constant-Murley Shoulder Score (CMSS), University of California at Los Angeles Shoulder Score (UCLA Shoulder score) and Oxford Shoulder Score (OSS) were recorded used.

Results

At 24 months follow up the VAS improved from 6 (+/-2) points preoperation to 0 (+/-1) points. The CMSS improved from 41 (+/-18) points pre-operation to 71 (+/-15). The relative CMSS improved from 55 (+/- 24%) pre-operation to 96 (+/- 22%)(% of the uninjured side). The UCLA Shoulder Score improved from 15 (+/-5) points pre-operation to 30 (+/-4). The OSS improved from 28 (+/-12) points pre-operation to 45 (+/- 5). P<0.001 for all outcomes measured.

Conclusions

Overall clinical outcomes are favourable at 2 years post-operatively. The described technique is an effective method for arthroscopic subscapularis repair in the Asian population.



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316 Best Practice In Arthroscopic Rotator Cuff Repair - A Systematic Review Of Overlapping Meta-Analyses

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Aim

The purpose of this study was to systematically review the results in the current meta-analyses in arthroscopic rotator-cuff repair, comparing double-row repair (DRR) vs. single-row repair (SRR), whether platelet-rich plasma (PRP) should be used adjunctively at the time of surgery, and the effects of early-motion (EM) vs. late-motion (LM) rehabilitation post-operatively.

Background

Currently there are a multitude of meta-analyses on arthroscopic rotator cuff repair, and while meta-analyses should theoretically offer the same results, these results can offer conflicting information due to differences in author's methodologies. The discordance in the literature has led to ongoing controversy as to the optimal treatment in rotator cuff tears.

Methods

MEDLINE, EMBASE and The Cochrane Library were screened for meta-analyses on arthroscopic rotator-cuff repair. The levels of evidence (LOE) were assessed, and the clinical outcomes were evaluated.

Results

Twenty-three meta-analyses were identified, with 10 meta-analyses on DRR vs. SRR (LOE I: 4, LOE II: 6), six meta-analyses on PRP vs. a control (LOE I: 1, LOE II: 5), and seven meta-analysis on EM vs. LM (LOE I: 1, LOE II: 5). Studies found a statistically significant result in favour of reduced retear rates/increased tendon-healing rate for DRR (6/10 studies), without a clinically significant improvement in functional outcomes (0/10 studies). There was a favourable outcome when using PRP in small-medium sized tears for reduced rate of retear (3/3 studies) however no study showed a statistically significant result in terms of reduced retear rate for PRP in larger tears (0/6). Range of motion was shown to be statistically significantly better with EM (5/6 studies) in the majority of the meta-analyses without an increased risk of retear (6/6 studies).

Conclusions

The highest level of evidence and the strongest quality studies all support the use of DRR, adjunctive PRP in small-medium tears, and EM rehabilitation post-operatively in arthroscopic rotator-cuff repair.



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712 An Association Between Developmental Milestones And The Presentation Of Atraumatic Shoulder Instability.**Tania Louise Douglas**, Debbie Williams, Anthony Gilbert

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Aim

To investigate whether there is an association between whether an infant crawls as their first mode of mobilisation and the later presentation of atraumatic shoulder instability.

Background

The aetiology of atraumatic shoulder instability is not fully understood. Classification of shoulder instability using the Stanmore classification triangle is based largely on patient history. It has been shown that there is a relationship between age of independent walking and scapular position and rhomboid strength (Nof, L. & Rosenthal, R. 2005). This has led to the hypothesis that there may be a relationship between developmental milestones and the later onset of atraumatic shoulder instability.

Methods

A retrospective cohort of 50 consecutive patients who had presented to a national specialist centre for shoulder instability between February 2012 and February 2014 classified as a type III, II/III or III/II on the Stanmore Classification triangle (Lewis et al. 2004) were compared with a cohort of 50 members of staff who did not have shoulder instability. Primary outcomes were presence of atraumatic shoulder instability and whether or not the subject crawled as their first mode of mobility. A Pearson chi-squared test was used to evaluate associations.

Results

There was a significant association between crawling and shoulder instability ($\chi^2(1) \geq 11.93$, $p=0.001$) with a higher prevalence of non-crawlers in the group with shoulder instability compared to the group of normals.

Conclusions

There is an association between developmental milestones and atraumatic shoulder instability. It cannot be concluded from this study that this association is a causal one and additional research would be needed to investigate this relationship further. Asking patients presenting with shoulder instability about their developmental milestones as part of a full subjective history could assist in the classification of type III instability and therefore in selecting the appropriate management.

