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- No upper extremity arthroscopy abstracts available

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JBJS

August - September 2017, volume 99, issue 14-15

- No lower extremity arthroscopy abstracts available

CORR

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Volume 99, issue 8

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Upper extremity

Arthroscopy

Volume 33, Issue 8 / Volume 33, Issue 9

Influence of the Labrum on Version and Diameter of the Glenoid: A Morphometric Study Using Magnetic Resonance Images

Joyce Anthony, M.B.B.S., Ibin Varughese, M.B.B.S., Vaida Glatt, Ph.D., Kevin Tetsworth, M.D., F.R.A.C.S., Erik Hohmann, M.D., Ph.D., F.R.C.S

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Purpose

To use magnetic resonance imaging to determine the influence of the labrum on both the osseous version and effective diameter of the glenoid.

Methods

This was a retrospective, cross-sectional study of patients with shoulder pain who underwent MRI between February 2014 and February 2015. The morphology of the glenoid labrum and glenoid was scanned with a 3-T magnetic resonance imaging scanner, and variables were measured by use of IntelliSpace PACS Enterprise. Patients were included if they were aged between 18 and 40 years and the radiologist reported a normal glenohumeral joint or if they were young patients aged less than 30 years with acute traumatic isolated partial- or full-thickness tears of the rotator cuff with a history of symptoms of less than 3 months. A pilot study was conducted with 3 observers and 3 repeated measurements at intervals to determine the interobserver and intraobserver reliability. Data analysis included descriptive statistics of measured variables, as well as paired Student *t* tests to determine the relative difference between labral and osseous morphometric variables.

Results

Excellent inter-rater reliability (0.95-0.96) and intrarater reliability (0.93-0.98) were obtained in the pilot study of 20 patients. The study population was composed of 100 patients with a mean age of 37.3 years (standard deviation [SD], 11.8 years), having a gender distribution of 56 male and 44 female patients; there were 53 right and 47 left shoulders. The glenoid osseous version measured -5.7° (SD, 5.3°), and the labral version measured -10° (SD, 5.5°); the glenoid osseous diameter measured 28.0 mm (SD, 3.3 mm), and the labral diameter measured 31.9 mm (SD, 3.2 mm). The labrum significantly increased the version by 4.3° ($P = .001$) and significantly increased the diameter by 3.9 mm ($P = .001$).

Conclusions

The results of this study showed that the labrum increased the effective glenoid version by 75% (4.3° of retroversion) and the effective glenoid diameter by 14% (3.9 mm).

Level of Evidence

Level IV, prognostic case series.

[BACK](#)

Arthroscopic-Assisted Coracoclavicular Ligament Reconstruction for Acute Acromioclavicular Dislocation Using 2 Clavicular and 1 Coracoid Cortical Fixation Buttons With Suture Tapes

Sang-Jin Shin, M.D., Ph.D. , Yoon Sang Jeon, M.D., Rag Gyu Kim, M.D.

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Purpose

To introduce an arthroscopically assisted coracoclavicular (CC) fixation technique using a cortical fixation button device and to evaluate the clinical and radiologic outcomes in patients with acute acromioclavicular (AC) dislocation who were treated with the technique.

Methods

Twenty-one consecutive patients with grade III and V acute AC dislocation who underwent arthroscopically assisted CC ligament reconstruction using a cortical fixation button device were prospectively enrolled. Our fixation technique involved using a cortical fixation button device consisting of 1 coracoid button and 2 clavicular buttons connected with 2 suture tapes to reconstruct the conoid and trapezoid ligaments, respectively. Clinical outcomes were evaluated and CC distance and horizontal displacement of the AC joint were measured.

Results

The mean follow-up period was 27.2 months (range, 24-32 months). The average CC distance of the injured shoulder was 17.2 ± 5.2 mm preoperatively, which represented an increase of $103\% \pm 42\%$ compared with the uninjured shoulder. The CC distance was significantly reduced to 8.5 ± 1.5 mm after surgery ($P < .001$). At the final follow-up, the CC distance was maintained in 20 patients (95%) without loss of reduction. No significant radiologic difference was found in horizontal displacement of the AC joint immediately after the operation and at the final follow-up ($P = .422$). The average American Shoulder and Elbow Surgeons and Constant scores were 95.7 ± 3.6 and 95.4 ± 3.4 , respectively. There were 3 complications, including 1 reduction loss, 1 coracoid process fracture, and 1 CC interval ossification.

Conclusions

Satisfactory clinical and radiologic outcomes were obtained simultaneously by arthroscopically assisted CC reconstruction using cortical fixation buttons. This reconstruction technique provided sufficient stability of the AC joint by using 2 clavicular holes to reconstruct the conoid and trapezoid ligaments separately. Therefore, arthroscopically assisted CC ligament reconstruction using a cortical fixation button device for management of acute AC dislocation is considered a viable treatment option for restoring stability to the AC joint.

Level of Evidence

Level IV, therapeutic case series.

[BACK](#)

Opioid Consumption After Rotator Cuff Repair

Robert W. Westermann, M.D., Chris A. Anthony, M.D., Nic Bedard, M.D., Natalie Glass, Ph.D., Matt Bollier, M.D., Carolyn M. Hettrich, M.D., M.P.H., Brian R. Wolf, M.D., M.S.

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Purpose

Rising perioperative opioid use in the United States is of increasing concern. The purposes of this study were (1) to define opioid consumption after rotator cuff repair (RCR) in the United States and (2) to evaluate patient factors that may be associated with prolonged opioid use after arthroscopic RCR.

Methods

All arthroscopic RCRs performed between 2007 and 2014 were identified by use of Current Procedural Terminology code (29,827). Patients who filled opioid prescriptions preoperatively were divided into those who filled prescriptions at 1 to 3 months preceding RCR and those who filled opioid prescriptions only in the 1 month preceding RCR. Risk ratios (RRs) were calculated by dividing the cumulative incidence of opioid prescriptions in patients with each patient factor by the cumulative incidence in those without each patient factor.

Results

During the study period, 35,155 arthroscopic RCRs were performed. Of the patients, approximately 43% had filled an opioid prescription in the 3 months before RCR. At 3 months after RCR, patients who filled opioid prescriptions at 1 to 3 months before RCR were 7.45 (95% confidence interval [CI], 6.95-7.98) times more likely to be filling opioid medication prescriptions than those who had not been prescribed opioid medications before surgery; patients who filled opioid prescriptions in the month before RCR were 3.04 (95% CI, 2.8-3.29) times more likely to be filling opioid prescriptions at 3 months after RCR. Patients with psychiatric diagnoses (RR, 1.94; 95% CI, 1.85-2.04), myalgia (RR, 1.67; 95% CI, 1.6-1.75), and low-back pain (RR, 2.09; 95% CI, 2-2.2) were also found to be at risk of filling opioid prescriptions at 3 months postoperatively.

Conclusions

We found approximately 43% of patients undergoing RCR received opioid medications before RCR. Patients who are prescribed narcotics before RCR are at increased risk of postoperative opioid demand. Patients with psychiatric diagnoses, myalgia, and low-back pain may be at increased risk of prolonged opioid use after surgery.

Level of Evidence

Level III, retrospective case-control study.

[BACK](#)

Knotless Transosseous-Equivalent Rotator Cuff Repair Improves Biomechanical Self-reinforcement Without Diminishing Footprint Contact Compared With Medial Knotted Repair

Maxwell C. Park, M.D., Alexander B. Peterson, B.A., Michelle H. McGarry, M.S., Chong J. Park, Ph.D., Thay Q. Lee, Ph.D.

Arthroscopy, August 2017, Volume 33, Issue 8, Pages 1473–1481

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Purpose

To assess the effect of medial-row knots on self-reinforcement and footprint contact characteristics for transosseous-equivalent repair compared with the same construct without knots.

Methods

In 8 fresh-frozen human shoulders, transosseous-equivalent repairs with and without medial-row mattress knots were performed in each specimen. A pressure sensor was fixed at the tendon-footprint interface for all repairs. Parameters measured included footprint contact area, force, and pressure. The supraspinatus tendon was loaded sequentially from 0 to 60 N at 0° and 30° of abduction.

Results

Both repairs provided a linear progression (slope) of footprint force and pressure as increasing tendon loads were applied. However, the knotless repair had a significantly higher progression (“self-reinforcement” effect) than the knotted repair at both abduction angles ($P = .006$ at 0° and $P = .021$ at 30°). The addition of medial-row knots did not significantly change the footprint contact area (in square millimeters), contact force (in newtons), contact pressure (in kilopascals), or peak pressure (in kilopascals) at each load tested, as well as at both abduction angles. For a given repair, only the knotless repair had significant decreases in contact area, contact force, contact pressure, and peak pressure with increasing abduction angles from 0° to 30° ($P = .004$ and $P = .048$).

Conclusions

Knotless transosseous-equivalent repair shows an improved self-reinforcement effect, without diminishing footprint contact, compared with the same repair with medial knots. Although knotless repair itself can show diminished footprint contact with abduction, medial knots show an adverse biomechanical effect by inhibiting self-reinforcement, without improving contact characteristics compared with knotless repair at each abduction angle tested. Clinical outcomes with specific indications, on the basis of these findings, require further investigation.

Clinical Relevance

This study biomechanically helps to validate studies that have shown clinical success with knotless transosseous-equivalent repair. The inhibition of self-reinforcement may provide a quantified biomechanical rationale for medial tear patterns seen with knotted repairs.

[BACK](#)

Effect of Footprint Preparation on Tendon-to-Bone Healing: A Histologic and Biomechanical Study in a Rat Rotator Cuff Repair Model

Haruhiko Nakagawa, M.D., Toru Morihara, M.D., Hiroyoshi Fujiwara, M.D., Yukichi Kabuto, M.D., Tsuyoshi Sukenari, M.D., Yoshikazu Kida, M.D., Ryuhei Furukawa, M.D., Yuji Arai, M.D., Ken-ichi Matsuda, Ph.D., Mitsuhiro Kawata, M.D., Masaki Tanaka, M.D., Toshikazu Kubo, M.D.

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Purpose

To compare the histologic and biomechanical effects of 3 different footprint preparations for repair of tendon-to-bone insertions and to assess the behavior of bone marrow–derived cells in each method of insertion repair.

Methods

We randomized 81 male Sprague-Dawley rats and green fluorescent protein–bone marrow chimeric rats into 3 groups. In group A, we performed rotator cuff repair after separating the supraspinatus tendon from the greater tuberosity and removing the residual tendon tissue. In group B, we also drilled 3 holes into the footprint. The native fibrocartilage was preserved in groups A and B. In group C, we excavated the footprint until the cancellous bone was exposed. Histologic repair of the tendon-to-bone insertion, behavior of the bone marrow–derived cells, and ultimate force to failure were examined postoperatively.

Results

The areas of metachromasia in groups A, B, and C were 0.033 ± 0.019 , 0.089 ± 0.022 , and 0.002 ± 0.001 mm²/mm², respectively, at 4 weeks and 0.029 ± 0.022 , 0.090 ± 0.039 , and 0.003 ± 0.001 mm²/mm², respectively, at 8 weeks. At 4 and 8 weeks postoperatively, significantly higher cartilage matrix production was observed in group B than in group C (4 weeks, $P = .002$; 8 weeks, $P < .001$). In green fluorescent protein–bone marrow chimeric rats in group B, bone marrow–derived chondrogenic cells infiltrated the fibrocartilage layer. Ultimate force to failure was significantly higher in group B (19.7 ± 3.4 N) than in group C (16.7 ± 2.0 N) at 8 weeks ($P = .031$).

Conclusions

Drilling into the footprint and preserving the fibrocartilage improved the quality of repair tissue and biomechanical strength at the tendon-to-bone insertion after rotator cuff repair in an animal model.

Clinical Relevance

Drilling into the footprint and preserving the fibrocartilage can enhance repair of tendon-to-bone insertions. This method may be clinically useful in rotator cuff repair.

[BACK](#)

In Vivo Analysis of Biceps Tendon Characteristics in Subpectoral Tenodesis

Raffy Mirzayan, M.D., Tadashi Takara, M.D., Michael Batech, Dr.P.H., Christopher L. McCrum, M.D.

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Purpose

To report the in vivo characteristics of the long head of the biceps tendon (LHBT); to evaluate the relation of age, gender, height, weight, and body mass index to the length and sutured and tubularized diameter of the LHBT; and to determine the smallest possible tunnel diameter for a subpectoral biceps tenodesis (SPBT) that can accommodate most patients.

Methods

The study included 66 patients (33 men and 33 women) with an average age of 54 years (range, 29-73 years) undergoing SPBT. After tenotomy, the length from the biceps musculotendinous junction to the released end was measured. The tendon was transected 3 cm proximal to the musculotendinous junction and sutured, and the diameter was measured. The depth of the reamed tunnel was recorded.

Results

The average tendon length was 84.0 mm, measuring 91.9 mm in men and 76.2 mm in women ($P < .001$), and the average tendon diameter was 4.4 mm, varying slightly between men (4.5 mm) and women (4.3 mm) ($P < .001$). Mean bone tunnel depth was 17.5 mm, with 19 mm in men and 16.1 mm in women ($P < .001$). Patient height showed a significant relation to both tendon length and tendon diameter. Weight was not correlated with tendon diameter but did show a significant relation to tendon length.

Conclusions

We have characterized the in vivo length and diameter of the LHBT at the time of an SPBT. Our findings have shown that there was a statistically significant gender difference in tendon length and diameter, but the diameter of the sutured tendon, which was placed into the tunnel, averaged 4.4 mm and ranged from 3.5 to 5 mm for all ages, both genders, all heights, and all weights. This finding is clinically relevant in that a small tunnel measuring 5.5 mm or less is sufficient to perform an SPBT.

Level of Evidence

Level IV, case series, anatomic study.

[BACK](#)

Retrospective Comparative Analysis of Elbow Arthroscopy Used to Treat Primary Osteoarthritis With and Without Release of the Posterior Band of the Medial Collateral Ligament

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Purpose

To evaluate the clinical and functional outcomes of arthroscopic debridement arthroplasty with the release of the posterior band of the medial collateral ligament in patients with primary osteoarthritis.

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. The mean follow-up period in groups A and B was 55.4 months (range, 24-100 months) and 62.2 months (range, 24-103 months), respectively. Clinical results were evaluated by measuring the preoperative and postoperative range of motion (ROM) of the elbow, visual analog scale score, and Mayo Elbow Performance Score.

Results

Both groups showed significant improvement in clinical outcome (visual analog scale and Mayo Elbow Performance Score) at the final follow-up compared with preoperative evaluation (group A, $P = .009$ and $.013$, respectively; group B, $P = .015$ and $.008$, respectively). Group A showed significant improvement in increased flexion at 6 months of follow-up ($P = .043$). However, there was no statistically significant difference in postoperative ROM and clinical results between the 2 groups at the final follow-up ($P = .482$).

Conclusions

Arthroscopic debridement arthroplasty with the 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 the final follow-up. Therefore, the additional release of the posterior band of the medial collateral ligament may be unnecessary for improving postoperative ROM.

Level of Evidence

Level IV, therapeutic case series.

[BACK](#)

Abduction Brace Versus Antirotation Sling After Arthroscopic Cuff Repair: The Effects on Pain and Function

Freek Hollman, M.D., Nienke Wolterbeek, Ph.D., Jacco A.C. Zijl, M.D., Sjoerd P.M. van Egeraat, M.D., Ronald N. Wessel, M.D.

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Purpose

To study the effects on pain as the main outcome parameter and on function and cuff integrity as the secondary outcome parameters after arthroscopic rotator cuff repair in the short term comparing the abduction brace with an antirotation sling for postoperative shoulder immobilization.

Methods

Eligible patients were between the ages of 18 and 75 years who were diagnosed with a traumatic or degenerative tear of the supraspinatus and/or infraspinatus tendon, confirmed by magnetic resonance imaging, for which an arthroscopic footprint repair was indicated and performed. Patients were randomly allocated to the antirotation sling or abduction brace group. Postoperative pain and use of analgesics were accurately registered up to 3 months after surgery using a patient diary. Follow-up examinations including the Constant-Murley score, Western Ontario Rotator Cuff index, and glenohumeral range of motion were scheduled 6 weeks, 3 and 6 months, and 1 year after surgery.

Results

The average level of pain measured directly postoperation up to 1 year after surgery was not significantly different between groups. Postoperatively, function scores and glenohumeral range of motion improved significantly for both groups; however, no differences were observed between groups. No retears were observed on ultrasonograph 3 months after surgery.

Conclusions

In the short term, the level of pain, function, and quality of life were not significantly different between the use of an abduction brace and that of an antirotation sling after arthroscopic rotator cuff repair. Based on these findings, the abduction brace used in this study does not seem to be the solution for decreasing the pain experienced in the first postoperative weeks after arthroscopic rotator cuff repair, and both are recommendable.

Level of Evidence

Level I, randomized controlled trial.

[BACK](#)

Arthroscopic Subacromial Spacer Implantation in Patients With Massive Irreparable Rotator Cuff Tears: Clinical and Radiographic Results of 39 Retrospectives Cases

Julien Deranlot, M.D., Olivier Herisson, M.D., Geoffroy Nourissat, M.D., Ph.D., David Zbili, M.D., Jean David Werthel, M.D., M.S., Marie Vigan, Ph.D., Francois Bruchou, M.D.

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Purpose

To evaluate the clinical and radiographic outcome of a biodegradable subacromial spacer in the treatment of massive irreparable rotator cuff tear.

Methods

Between January 2011 and December 2014, all shoulders with symptomatic massive irreparable rotator cuff tears treated at our institution with arthroscopic implantation of a biodegradable subacromial spacer followed for at least 1 year were included in our series. Patients with osteoarthritis \geq grade 3 in the Hamada classification were excluded. Outcome measures included pre- and postoperative, range of motion, Constant score, acromiohumeral distance, and Hamada classification on anteroposterior and lateral radiographs.

Results

Thirty-nine consecutive shoulders (37 patients) met the inclusion criteria. The mean age of patients was 69.8 (53-84) years. At the last follow-up (mean 32.8 ± 12.4 months), range of motion was significantly increased for all patients in anterior elevation (from 130° to 160° , $P = .02$), abduction (from 100° to 160° , $P = .01$), and external rotation (from 30° to 45° , $P = .0001$). The mean Constant score was also significantly ($P < .001$) improved from 44.8 (± 15.2) preoperatively to 76.0 (± 17.1) at the last follow-up. The mean acromiohumeral distance significantly ($P = .002$) decreased from 8.2 mm (± 3.4) to 6.2 mm (± 3.1) at the last follow-up. The Hamada score progressed of 1 radiographic stage in 4 shoulders (15%) and progressed of 3 stages in 2 (4%), whereas the other 32 shoulders remained stable. No intra- or postoperative complications were found except for 1 patient who required a revision for spacer migration.

Conclusions

Arthroscopic implantation of a subacromial spacer for irreparable rotator cuff tear leads to significant improvement in shoulder function at a minimum of 1 year postoperatively.

Level of Evidence

Level IV, therapeutic case series; treatment study.

[BACK](#)

Biomechanical Analysis of Latarjet Screw Fixation: Comparison of Screw Types and Fixation Methods

Jason J. Shin, M.D., Jason T. Hamamoto, M.D., Timothy S. Leroux, M.D., Maristella F. Saccomanno, M.D., Akshay Jain, M.D., Mahmoud M. Khair, M.D., Christen R. Mellano, M.D., Elizabeth F. Shewman, M.S., Gregory P. Nicholson, M.D., Anthony A. Romeo, M.D., Brian J. Cole, M.D., M.B.A., Nikhil N. Verma, M.D.

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Purpose

To compare the initial fixation stability, failure strength, and mode of failure of 5 different screw types and fixation methods commonly used for the classic Latarjet procedure.

Methods

Thirty-five fresh-frozen cadaveric shoulder specimens were allocated into 5 groups. A 25% anteroinferior glenoid defect was created, and a classic Latarjet coracoid transfer procedure was performed. All grafts were fixed with 2 screws, differing by screw type and/or fixation method. The groups included partially threaded solid 4.0-mm cancellous screws with bicortical fixation, partially threaded solid 4.0-mm cancellous screws with unicortical fixation, fully threaded solid 3.5-mm cortical screws with bicortical fixation, partially threaded cannulated 4.0-mm cancellous screws with bicortical fixation, and partially threaded cannulated 4.0-mm captured screws with bicortical fixation. All screws were stainless steel. Outcomes included cyclic creep and secant stiffness during cyclic loading, as well as load and work to failure during the failure test. Intergroup comparisons were made by a 1-way analysis of variance.

Results

There were no significant differences among different screw types or fixation methods in cyclic creep or secant stiffness after cyclic loading or in load to failure or work to failure during the failure test. Post-failure radiographs showed evidence of screw bending in only 1 specimen that underwent the Latarjet procedure with partially threaded solid cancellous screws with bicortical fixation. The mode of failure for all specimens analyzed was screw cutout.

Conclusions

In this biomechanical study, screw type and fixation method did not significantly influence biomechanical performance in a classic Latarjet procedure. When performing this procedure, surgeons may continue to select the screw type and method of fixation (unicortical or bicortical) based on preference; however, further studies are required to determine the optimal method of treatment.

Clinical Relevance

Surgeons may choose the screw type and fixation method based on preference when performing the Latarjet procedure.

[BACK](#)

Functional Outcome and Healing of Large and Massive Rotator Cuff Tears Repaired With a Load-Sharing Rip-Stop Construct

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Purpose

To prospectively review functional outcomes and healing rates of large and massive rotator cuff tears repaired with a load-sharing rip-stop (LSRS) technique.

Methods

Twenty-one consecutive patients underwent arthroscopic rotator cuff repair with an LSRS construct between January and December 2014. Seventeen patients with a minimum of 2 years' follow-up were included. Four patients did not complete clinical evaluations and functional outcome scores at a minimum of 2 years' follow-up and were lost to follow-up. Ultrasound imaging was used to assess for rotator cuff healing at a minimum of 6 months postoperatively. Range of motion, strength, and functional outcome scores were evaluated at final follow-up.

Results

Mean active forward elevation improved from 109° preoperatively to 153° postoperatively, and mean supraspinatus strength improved by 1 strength grade, from 3.5 preoperatively to 4.4 postoperatively. When we compared preoperative and postoperative values, the American Shoulder and Elbow Surgeons score improved from 40.8 to 89.5, the Single Assessment Numeric Evaluation score improved from 32.8 to 83.1, the Simple Shoulder Test score improved from 3.8 to 10.3, and the pain score on a visual analog scale decreased from 4.8 to 0.8 ($P < .001$). Of 17 patients, 13 (82%) were satisfied with their outcomes. Ultrasound evaluation 6 months after surgery showed complete healing in 53%, partial healing in 29%, and no healing in 18%.

Conclusions

The LSRS construct showed satisfactory functional outcomes with reasonable healing rates in an otherwise challenging subset of rotator cuff tears. This construct may be an alternative for tears not amenable to double-row repair.

Level of Evidence

Level IV, therapeutic case series.

[BACK](#)

Journal of Shoulder and Elbow Surgery

Volume 26, issue 8 / Volume 26, issue 9

Accuracy of infraspinatus isometric testing in predicting tear size and tendon reparability: comparison with imaging and arthroscopy

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Background

The purpose of this study was to examine the accuracy of external rotation in neutral (0° external position) and in shortened position (45° external position) in relation to rotator cuff tear size, tendon reparability, and other clinical, surgical, and imaging findings.

Methods

This was a prospective blinded diagnostic study of consecutive surgical candidates for rotator cuff repair using magnetic resonance imaging and arthroscopic surgery as the “gold standards.” The area under a receiver operating characteristic (AUROC) curve was calculated for each position.

Results

Eighty-five patients (35 female [41%] and 50 male [59%]; age, 65 years [standard deviation = 10]) were included. Sixty patients (71%) had a minor tear (4 small, 56 moderate), and 25 patients (29%) had a major tear (17 large and 8 massive). Seventy patients (82%) had a full repair, and 15 (18%) patients underwent a partial repair. There were 26 (31%) associated full-thickness tears of the infraspinatus. The isometric strength testing in both positions had good to excellent accuracy (range, 0.80-0.90) for detecting reparability, tear retraction, infraspinatus atrophic changes observed by the clinician, and infraspinatus fatty infiltration on magnetic resonance images. The shortened position had an overall higher accuracy than the neutral position and was more clinically useful for detecting an infraspinatus full-thickness tear (AUROC = 0.84 vs 0.78) and rotator cuff tear size (AUROC = 0.80 vs. 0.75).

Conclusions

The isometric external rotation is an accurate test in diagnosing different aspects of rotator cuff disease and specifically of the infraspinatus muscle. The isometric strength at the shortened position was a better predictor of clinical, surgical, and imaging findings.

[BACK](#)

Does acromioplasty result in favorable clinical and radiologic outcomes in the management of chronic subacromial pain syndrome? A double-blinded randomized clinical trial with 9 to 14 years' follow-up

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Background

The treatment effect of acromioplasty for chronic subacromial pain syndrome (SAPS) on long-term shoulder function and rotator cuff deterioration has still to be determined. This study aimed to determine the long-term clinical and radiologic treatment effect of arthroscopic acromioplasty in patients with chronic SAPS.

Methods

In this double-blind, randomized clinical trial, 56 patients with chronic SAPS (median age, 47 years; age range, 31-60 years) were randomly allocated to arthroscopic bursectomy alone or to bursectomy combined with acromioplasty and were followed up for a median of 12 years. The primary outcome was the Constant score. Secondary outcomes included the Simple Shoulder Test, visual analog scale (VAS) for pain, VAS for shoulder functionality, and rotator cuff integrity assessed with magnetic resonance imaging or ultrasound.

Results

A total of 43 patients (77%) were examined at a median of 12 years' follow-up. Intention-to-treat analysis at 12 years' follow-up did not show a significant additional treatment effect of acromioplasty on bursectomy alone in improvement in Constant score (5 points; 95% confidence interval, -5.1 to 15.6), Simple Shoulder Test score, VAS score for pain, or VAS score for shoulder function. The prevalence of rotator cuff tears was not significantly different between the bursectomy group (17%) and acromioplasty group (10%).

Conclusions

There were no relevant additional effects of arthroscopic acromioplasty on bursectomy alone with respect to clinical outcomes and rotator cuff integrity at 12 years' follow-up. These findings bring the effectiveness of acromioplasty into question and may support the idea of a more conservative approach in the initial treatment of SAPS.

[BACK](#)

Refuting the lipstick sign

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Background

Arthroscopic examination of the tendon has been described as the “gold standard” for diagnosis of tendinitis of the long head of the biceps (LHB). An arthroscopic finding of an inflamed and hyperemic LHB within the bicipital groove has been described as the “lipstick sign.” Studies evaluating direct visualization in diagnosis of LHB tendinitis are lacking.

Methods

During a 1-year period, 363 arthroscopic shoulder procedures were performed, with 16 and 39 patients prospectively selected as positive cases and negative controls, respectively. All positive controls had groove tenderness, positive Speed maneuver, and diagnostic ultrasound-guided bicipital injection. Negative controls had none of these findings. Six surgeons reviewed randomized deidentified arthroscopic pictures of enrolled patients. The surgeons were asked whether the images demonstrated LHB tendinitis and if the lipstick sign was present.

Results

Overall sensitivity and specificity were 49% and 66%, respectively, for detecting LHB tendinitis and 64% and 31%, respectively, for erythema. The nonweighted κ score for interobserver reliability ranged from 0.042 to 0.419 (mean, 0.215 ± 0.116) for tendinitis and from 0.486 to 0.835 (mean, 0.680 ± 0.102) for erythema. The nonweighted κ score for intraobserver reliability ranged from 0.264 to 0.854 (mean, 0.615) for tendinitis and from 0.641 to 0.951 (mean, 0.783) for erythema.

Conclusions

The presence of the lipstick sign performed only moderately well in a rigorously designed level III study to evaluate its sensitivity and specificity. There is only fair agreement among participating surgeons in diagnosing LHB tendinitis arthroscopically. Consequently, LHB tendinitis requiring tenodesis remains a clinical diagnosis that should be made before arthroscopic examination.

[BACK](#)

Medialized repair for retracted rotator cuff tears

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Background

The purpose of this study was to evaluate the functional outcomes of medialized rotator cuff repair and the continuity of repaired tendon in chronic retracted rotator cuff tears.

Methods

Thirty-five consecutive patients were selected from 153 cases that underwent arthroscopic rotator cuff repair for more than medium-sized posterosuperior rotator cuff tears between July 2009 and July 2012 performed with the medialized repair. All cases were available for at least 2 years of postoperative follow-up. The visual analog scale of pain, muscle strength, Constant score, American Shoulder and Elbow Surgeons (ASES) score, and University of California–Los Angeles score were evaluated.

Results

At the final follow-up, all clinical outcomes were significantly improved. The visual analog scale score for pain improved from 6 ± 1 preoperatively to 2 ± 1 postoperatively. The range of motion increased from preoperatively to postoperatively: active forward elevation, from $134^\circ \pm 49^\circ$ to $150^\circ \pm 16^\circ$; active external rotation at the side, from $47^\circ \pm 15^\circ$ to $55^\circ \pm 10^\circ$; and active internal rotation, from L3 to L1. The shoulder score also improved: Constant score, from 53.5 ± 16.7 to 79 ± 10 ; American Shoulder and Elbow Surgeons score, from 51 ± 15 to 82 ± 8 ; and University of California–Los Angeles score, from 14 ± 4 to 28 ± 4 . The retear cases at the final follow-up were 6 (17%).

Conclusions

Medialized repair may be useful in cases in which anatomic bone-to-tendon repair would be difficult because of the excessive tension of the repaired tendon and a torn tendon that does not reach the anatomic insertion.

[**BACK**](#)

Preoperative doxycycline does not decolonize *Propionibacterium acnes* from the skin of the shoulder: a randomized controlled trial

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Background

Propionibacterium acnes is frequently cultured in patients undergoing both primary and revision shoulder surgery. The purpose of this study was to evaluate the efficacy and safety of preoperative oral administration of doxycycline in decreasing the colonization of skin around the shoulder by *P. acnes*.

Methods

This was a single-institution, prospective, randomized controlled trial of male patients undergoing shoulder arthroscopy. Patients were randomized to receive oral doxycycline (100 mg twice a day) for 7 days or to the standard of care (no drug). Before skin incision, 2 separate 3-mm punch biopsy specimens were obtained from the sites of the anterior and posterior arthroscopic portals and were sent for culture in anaerobic and aerobic medium held for 13 days.

Results

There were 22 of 37 (59.5%) patients in the no-drug group and 16 of 37 (43.2%) patients in the doxycycline group who had at least 1 dermal culture positive for *P. acnes* ($P = .245$). In the no-drug group, 10 patients (45.5%) had 1 positive culture and 12 (54.5%) had 2 positive cultures (34 total positive cultures [45.9%]). In the doxycycline group, 6 (37.5%) patients had 1 positive culture and 10 (62.5%) had 2 positive cultures (26 total positive cultures [35.1%]; $P = .774$).

Discussion

Administration of oral doxycycline for 7 days before surgery did not reduce colonization of *P. acnes* significantly. Given the potential risk for emergence of bacterial resistance and the adverse effects associated with administration of antibiotics, we do not recommend routine use of oral doxycycline for preoperative decolonization of the shoulder.

[**BACK**](#)

Transcutaneous electrical nerve stimulation for postoperative pain relief after arthroscopic rotator cuff repair: a prospective double-blinded randomized trial

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Background

Arthroscopic rotator cuff repair (ARCR) can be associated with significant postoperative pain. Concern for opioid abuse has led surgeons to identify alternative, efficacious methods of postoperative analgesia. To determine whether transcutaneous electrical nerve stimulation (TENS) can have a similarly beneficial effect after shoulder procedures, we conducted a prospective double-blinded randomized trial in patients undergoing outpatient ARCR.

Methods

All patients undergoing ARCR of a full-thickness rotator cuff tear by the senior authors were identified. Patients with a history of recent narcotic use or prior narcotic abuse and those under management of a pain control specialist were excluded. Patients were randomized into 2 groups, active or placebo TENS, and used the device for 4 sessions/day for 45 minutes/session for the first postoperative week. All patients received Percocet 5/325 mg (oxycodone/acetaminophen) for use as rescue pain pills. One-week narcotic consumption and visual analog scale pain scores were compared between groups.

Results

The final analysis included 37 patients (21 active, 16 placebo). Baseline and procedural differences were not different between groups. At 1 week postoperatively, patients in the active group had significantly lower pain scores (3.6 ± 2.1 vs. 5.8 ± 1.2 ; $P = .008$). Postoperative Percocet consumption during the initial 48 hours (12.8 ± 4.7 vs. 17.2 ± 6.3 ; $P = .020$) and during the first week (25.2 ± 9.9 vs. 33.8 ± 14.3 ; $P = .037$) was also significantly lower in the active group.

Conclusion

Results from this prospective double-blinded randomized trial demonstrate that compared with placebo TENS, active TENS can result in significantly less pain and reduced opioid use in the immediate postoperative period after ARCR, suggesting that TENS may be potentially useful in a multimodal approach to managing postoperative pain.

[BACK](#)

Low-grade infections in nonarthroplasty shoulder surgery

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Background

Recent studies have identified the diagnostic challenge of low-grade infections after shoulder arthroplasty surgery. Infections after nonarthroplasty procedures have not been reported. This study assessed patient-related risk factors, outcomes, and clinical presentation of low-grade infection after open and arthroscopic nonarthroplasty shoulder surgery.

Methods

The cases of 35 patients presenting with suspected low-grade infection were reviewed. Biopsy specimens 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 orthopedic microbiology laboratory. Patient-related factors (age, occupation, injection), index surgery, and infection characteristics (onset of symptoms, duration to diagnosis, treatment) were analyzed.

Results

Positive cultures were identified in 21 cases (60.0%), of which 15 were male patients (71%). Of all patients with low-grade infection, 47.6% were male patients between 16 and 35 years of age. *Propionibacterium acnes* and coagulase-negative staphylococcus were the most common organisms isolated (81.1% [n = 17] and 23.8% [n = 5], respectively). Of 14 negative culture cases, 9 were treated with early empirical antibiotics (64.3%); 7 patients reported symptomatic improvement (77.8%). Of 5 patients treated with late empirical antibiotics, 4 stated improvement. Patients presented with symptoms akin to resistant postoperative frozen shoulder (persistent pain and stiffness, unresponsive to usual treatments).

Conclusion

Young male patients are at greatest risk for low-grade infections after arthroscopic and open nonarthroplasty shoulder surgery. *P. acnes* was the most prevalent organism. Patients presented with classic postoperative frozen shoulder symptoms, resistant to usual treatments. Interestingly, 78.6% of patients with negative cultures responded positively to empirical treatment.

[**BACK**](#)

The effect of the beach-chair position angle on cerebral oxygenation during shoulder surgery

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Background

Although the safety of the beach-chair position (BCP) is widely accepted, rare devastating neurologic complications have been reported and attributed to cerebral hypoperfusion. Cerebral oxygenation (regional oxygen saturation [rSO₂]) can be monitored noninvasively using near-infrared spectroscopy. The purpose of this study was to determine the effect of BCP angle on cerebral oxygenation in patients undergoing shoulder surgery in the BCP.

Methods

Fifty patients undergoing shoulder arthroscopy were prospectively enrolled to participate. Following induction of general anesthesia, each patient's rSO₂ was recorded at 0° of elevation and again at 30°, 45°, 60°, and 80° of elevation. Mean rSO₂ values and mean differences in rSO₂ were reported.

Results

An average total decrease of 5% in rSO₂ was seen when comparing 0° with 80° ($P < .001$). There were statistically significant differences in rSO₂ values at beach-chair angles of 0° versus 30° ($P < .001$), 30° versus 45° ($P = .007$), and 45° versus 60° ($P < .001$) but not between 60° and 80° ($P = .12$). The decrease in rSO₂ was similar between each progressive increase in the beach-chair angle, leading to a linear decline in rSO₂ as the BCP increased (regression slope of $-0.060\%/^\circ$, $P < .001$). No patient's cerebral oxygenation dropped greater than 20% from baseline. Neither body mass index nor American Society of Anesthesiologists score had a significant impact on the relation of rSO₂ to BCP angle.

Conclusions

The average drop in rSO₂ is significantly less than the threshold of 20% used as an identifier for a cerebral deoxygenation event. This study illustrates the direct effect the BCP angle has on cerebral oxygenation.

[**BACK**](#)

Does early motion lead to a higher failure rate or better outcomes after arthroscopic rotator cuff repair? A systematic review of overlapping meta-analyses

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Background

The aims of the study were as follows: to perform a systematic review of meta-analyses comparing “early motion” and “delayed motion” after arthroscopic rotator cuff repair; to provide a framework to analyze the best available evidence to develop recommendations; and to identify gaps where suggestions could be made for future investigations.

Methods

Literature searches were performed to identify meta-analyses examining arthroscopic rotator cuff repair with early-motion vs. delayed-motion rehabilitation protocols. Clinical data were extracted, and meta-analysis quality was assessed using the Quality of Reporting of Meta-analyses and Oxman-Guyatt scales.

Results

Nine meta-analyses met inclusion criteria. No clear superiority was noted in clinical outcome scores for early-motion or delayed-motion rehabilitation. Results of tendon healing were found to be either no different or in favor of delayed motion, but no differences were noted in rotator cuff tear recurrence rates postoperatively. The majority of meta-analyses found significantly better range of motion with early motion up to a year postoperatively for forward elevation and up to 6 months for external rotation, but significant differences were not reported for functional improvements and strength at 12 months postoperatively. Subgroup analyses suggested that larger preoperative tear sizes have significantly greater retear rates with early-motion rehabilitation.

Conclusions

The current highest level of evidence suggests that early-motion rehabilitation after rotator cuff repair results in superior postoperative range of motion up to 1 year. Whereas early motion and delayed motion after cuff repair may lead to comparable functional outcomes and retear rates, concern exists that early motion may result in greater retear rates, particularly with larger tear sizes.

[**BACK**](#)

AJSM

Volume 45, Issue 9 / Volume 45, Issue 11

Clinical Outcome After Arthroscopic Debridement and Microfracture for Osteochondritis Dissecans of the Capitellum

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Background: Various surgical treatment techniques have been developed to treat capitellar osteochondritis dissecans; however, the optimal technique remains the subject of ongoing debate.

Purpose: To evaluate clinical outcomes after arthroscopic debridement and microfracture for advanced capitellar osteochondritis dissecans.

Study Design: Case series; Level of evidence, 4.

Methods: Between 2008 and 2015, the authors followed 77 consecutive patients (81 elbows) who underwent arthroscopic debridement and microfracture, and loose body removal if needed, for advanced capitellar osteochondritis dissecans. Seventy-one patients (75 elbows) with a minimum follow-up of 1 year were included. The mean age was 16 years (SD, ± 3.3 years; range, 11-26 years) and the mean follow-up length was 3.5 years (SD, ± 1.9 years; range, 1-8.2 years). Based on CT and/or MRI results, 71 lesions were classified as unstable and 4 as stable. Clinical elbow outcome (pain, function, and social-psychological effect) was assessed using the Oxford Elbow Score (OES) at final follow-up (OES range, 0-48). Range of motion and return to sports were recorded. Multivariable linear regression analysis was performed to determine predictors of postoperative OES.

Results: Intraoperatively, there were 3 grade 1 lesions, 2 grade 2 lesions, 10 grade 3 lesions, 1 grade 4 lesion, and 59 grade 5 lesions. The mean postoperative OES was 40.8 (SD, ± 8.0). An open capitellar physis was a predictor of better elbow outcome (5.8-point increase; $P = .025$), as well as loose body removal/grade 4-5 lesions (6.9-point increase; $P = .0020$) and shorter duration of preoperative symptoms (1.4-point increase per year; $P = .029$). Flexion slightly improved from 134° to 139° ($P < .001$); extension deficit slightly improved from 8° to 3° ($P < .001$). Pronation ($P = .47$) and supination did not improve ($P = .065$). Thirty-seven patients (55%) returned to their primary sport at the same level, and 5 patients (7%) returned to a lower level. Seventeen patients (25%) did not return to sport due to elbow-related symptoms, and 10 patients (13%) did not return due to non-elbow-related reasons. No complications were recorded.

Conclusion: Arthroscopic debridement and microfracture for advanced capitellar osteochondritis dissecans provide good clinical results, especially in patients with open growth plate, loose body removal, and shorter duration of symptoms. However, only 62% of patients in this study returned to sports.

[BACK](#)

A Long Preoperative Duration of Symptoms Is Associated With Worse Functional Outcomes After 1-Stage Arthroscopic Treatment of Rotator Cuff Tears With Shoulder Stiffness

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Background: Rotator cuff tears with shoulder stiffness remain a difficult issue. Despite the reported satisfactory results of 1-stage surgery, little information is available regarding the factors that affect clinical outcomes.

Purpose/Hypothesis: To evaluate the 1-stage arthroscopic treatment of rotator cuff tears with shoulder stiffness and to present the influence of duration of symptoms (DOS) on postoperative functional outcomes. The hypothesis was that a long preoperative DOS is related to worse functional outcomes.

Hypothesis: A long preoperative DOS is related to worse functional outcomes.

Study Design: Cohort study; Level of evidence, 2.

Methods: A cohort study was performed with consecutive patients who underwent 1-stage surgery between January 2012 and July 2014. Forty-four patients were enrolled in the long DOS group (DOS \geq 6 months or LDOS), and 38 were enrolled in the short DOS group (DOS <6 months or SDOS). There were no significant differences in the other variables between the groups. The patients were followed for a mean of 33.8 months, and the functional and radiographic outcomes were compared.

Results: Both groups achieved apparent functional postoperative improvements in terms of range of motion, pain, strength, and functional scores ($P < .001$ for all). Despite the overall improvements, the patients in the SDOS group had significantly better outcomes according to all functional instruments. The mean postoperative abduction and external rotation at the side in the SDOS group were higher than in the LDOS group (abduction: 162.2° vs 152.8°, respectively [$P = .002$]; external rotation: 64.7° vs 56.9°, respectively [$P = .004$]). The mean postoperative functional scores in the SDOS group were all higher than in the LDOS group (American Shoulder and Elbow Surgeons [ASES] score: 91.1 vs 81.9, respectively; Constant-Murley score: 76.9 vs 71.8, respectively; Fudan University Shoulder Score [FUSS], 90.6 vs 81.1, respectively), and the mean postoperative visual analog scale (VAS) score for pain in the SDOS group was lower (0.7 vs 1.8, respectively) ($P < .001$ for all). The difference in the retear rates was not significant, with 7 retears in the SDOS group and 4 in the LDOS group ($P = .216$).

Conclusion: One-stage surgery effectively achieved overall improvements. A preoperative DOS of \geq 6 months led to poorer functional outcomes, which suggests that surgeons should propose a surgical treatment for this condition before symptoms persist for 6 months.

[BACK](#)

Serial Changes in 3-Dimensional Supraspinatus Muscle Volume After Rotator Cuff Repair

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Background: There is considerable debate on the recovery of rotator cuff muscle atrophy after rotator cuff repair.

Purpose: To evaluate the serial changes in supraspinatus muscle volume after rotator cuff repair by using semiautomatic segmentation software and to determine the relationship with functional outcomes.

Study Design: Case series; Level of evidence, 4.

Methods: Seventy-four patients (mean age, 62.8 ± 8.8 years) who underwent arthroscopic rotator cuff repair and obtained 3 consecutive (preoperatively, immediately postoperatively, and later postoperatively [≥ 1 year postoperatively]) magnetic resonance imaging (MRI) scans having complete Y-views were included. We generated a 3-dimensional (3D) reconstructed model of the supraspinatus muscle by using in-house semiautomatic segmentation software (ITK-SNAP) and calculated both the 2-dimensional (2D) cross-sectional area and 3D volume of the muscle in 3 different views (Y-view, 1 cm medial to the Y-view [Y+1 view], and 2 cm medial to the Y-view [Y+2 view]) at the 3 time points. The area and volume changes at each time point were evaluated according to repair integrity. Later postoperative volumes were compared with immediately postoperative volumes, and their relationship with various clinical factors and the effect of higher volume increases on range of motion, muscle power, and visual analog scale pain and American Shoulder and Elbow Surgeons scores were evaluated.

Results: The interrater reliabilities were excellent for all measurements. Areas and volumes increased immediately postoperatively as compared with preoperatively; however, only volumes on the Y+1 view and Y+2 view significantly increased later postoperatively as compared with immediately postoperatively ($P < .05$). There were 9 patients with healing failure, and area and volume changes were significantly less later postoperatively compared with immediately postoperatively at all measurement points in these patients ($P < .05$). After omitting the patients with healing failure, volume increases later postoperatively became more prominent ($P < .05$) in the order of the Y+2 view, Y+1 view, and Y-view. Volume increases were higher in patients who healed successfully with larger tears ($P = .040$). Higher volume increases were associated only with an increase in abduction power ($P = .029$) and not with other outcomes.

Conclusion: The supraspinatus muscle volume increased immediately postoperatively and continuously for at least 1 year after surgery. The increase was evident in patients who had larger tears and healed successfully and when measured toward the more medial portion of the supraspinatus muscle. The volume increases were associated with an increase in shoulder abduction power.

[BACK](#)

Comparison of Clinical and Radiological Results in the Arthroscopic Repair of Full-Thickness Rotator Cuff Tears With and Without the Anterior Attachment of the Rotator Cable

Nam Su Cho*†, Seong Cheol Moon†, Se Jung Hong†, Seong Hae Bae†, Yong Gil Rheet

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Background: The anterior rotator 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.

Purpose: To compare the clinical and structural outcomes of the arthroscopic repair of full-thickness rotator cuff tears with and without anterior disruption of the supraspinatus tendon.

Study Design: Cohort study; Level of evidence, 3.

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 shoulders (group B). The mean age at the time of surgery in groups A and B was 59.6 and 59.2 years, respectively, and the mean follow-up period was 24.2 and 25.1 months, respectively.

Results: There were statistically significant differences in the preoperative tear size and pattern and muscle fatty degeneration between the 2 groups ($P = .004$, $P = .008$, and $P < .001$, respectively). At final follow-up, the mean visual analog scale (VAS) for pain score during motion was 1.31 ± 0.98 and 1.24 ± 0.90 in groups A and B, respectively ($P = .587$). The mean Constant score was 77.5 ± 11.2 and 78.0 ± 11.9 points in groups A and B, respectively ($P = .875$). The mean University of California, Los Angeles score was 30.5 ± 4.1 and 31.0 ± 3.0 points in groups A and B, respectively ($P = .652$). In assessing the repair integrity on postoperative MRI, the retear rate was 23.9% and 14.7% in groups A and B, respectively ($P = .029$).

Conclusion: 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, tears 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.

[BACK](#)

Successful Return to Sport After Arthroscopic Shoulder Stabilization Versus Nonoperative Management in Contact Athletes With Anterior Shoulder Instability: A Prospective Multicenter Study

Jonathan F. Dickens*†‡, John-Paul Rue‡§, Kenneth L. Cameron // , John M. Tokish‡¶, Karen Y. Peck // , C. Dain Allred#, Steven J. Svoboda‡ // , Robert Sullivan‡#, Kelly G. Kilcoyne‡**, Brett D. Owens‡††

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Background: The debate continues regarding the optimal treatment of intercollegiate contact athletes with in-season anterior shoulder instability.

Purpose: To examine return to sport and recurrent instability in the season after the index in-season anterior instability event.

Study Design: Cohort study; Level of evidence, 2.

Methods: Forty-five contact intercollegiate athletes treated nonoperatively or with arthroscopic stabilization were prospectively followed in a multicenter observational study to evaluate return to play (RTP) and recurrent instability in the season after an initial in-season anterior glenohumeral instability event. Baseline data collection included sport played, previous instability events, direction of instability, type of instability (subluxation or dislocation), and treatment method (nonoperative management or arthroscopic stabilization). All nonoperatively treated athletes underwent a standardized accelerated rehabilitation program without shoulder immobilization. Surgical stabilization was performed arthroscopically in all cases, and successful RTP was evaluated during the next competitive season after complete rehabilitation.

Results: Thirty-nine of 45 intercollegiate contact athletes had remaining National Collegiate Athletic Association eligibility and were followed through the subsequent competitive season after the index instability event. Of the 10 athletes electing nonoperative treatment, 4 (40%) successfully returned to play without recurrence during the subsequent season. Of the 29 athletes treated surgically, 26 (90%) were able to successfully return to play without recurrence the following season (recurrence: $n = 1$; inadequate function: $n = 2$). Athletes who underwent surgical reconstruction before the next season were 5.8 times (95% CI, 1.77-18.97; $P = .004$) more likely to complete the subsequent season without recurrent instability. Of the 29 athletes electing surgical stabilization, there was no difference (risk ratio, 0.95; 95% CI, 0.10-9.24; $P > .99$) in RTP between the 9 stabilized after a single instability event (90% RTP rate) and the 20 stabilized after multiple in-season recurrent instability events (89% RTP rate).

Conclusion: Collegiate contact and collision athletes with in-season anterior shoulder instability are significantly more likely to successfully return to sport without subsequent instability events the next season if they undergo surgical repair in the off-season.

[BACK](#)

Arthroscopic Knot Removal for Failed Superior Labrum Anterior-Posterior Repair Secondary to Knot-Induced Pain

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Background: Studies on failed superior labrum anterior-posterior (SLAP) repair are increasing. However, the number of reports on treatment options for failed SLAP repair remains quite low, and the clinical results vary between different study groups.

Purpose: To describe the clinical presentation of failed SLAP repair due to knot-induced pain and evaluate the efficacy of arthroscopic knot removal.

Study Design: Case series; Level of evidence, 4.

Methods: The authors retrospectively reviewed records of 11 patients (mean age, 24.6 ± 8.6 years; range, 17-43 years) with stable, healed SLAP lesions with knot-induced pain after arthroscopic fixation of unstable type II SLAP lesions. All patients demonstrated a positive compression-rotation test before knot removal. The mean follow-up duration after knot removal was 48.0 ± 37.4 months (range, 24-156 months). The mean duration between primary fixation and knot removal was 21.2 ± 14.7 months (range, 8-56 months).

Results: Sharp pain (100%) and clicking (64%) were the most common symptoms. The knot was positioned on the glenoid side in 5 patients and the labral side in 6 patients. The knots on the glenoid side had associated humeral head cartilage damage. The mean University of California at Los Angeles score significantly improved from 15.2 points to 31.7 points after knot removal ($P = .003$). Additionally, the mean Constant score greatly improved from a mean of 56.5 points to 89.8 points ($P = .003$). At a mean of 3 weeks after surgery, we observed dramatic pain relief. Six weeks after surgery, the compression-rotation test was negative in all patients.

Conclusion: The most common symptom of knot-induced pain after SLAP repair was persistent sharp pain followed by clicking. The knot appears to be a cause of pain in failed SLAP repairs, and arthroscopic knot removal can provide dramatic pain relief and significant improvement of clinical outcomes.

[BACK](#)

JBJS

August - September 2017, volume 99, issue 14-15

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August - September 2017, Vol 475, Issue 8-9

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August - September 2017, Vol 99-B, Issue 8-9

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Lower extremity

Arthroscopy

Volume 33, Issue 8 / Volume 33, Issue 9

Minimum 2-Year Outcomes of Arthroscopic Management of Symptomatic Hip Labrum Tears in Patients With Global Acetabular Overcoverage

Sivashankar Chandrasekaran, M.B.B.S., F.R.A.C.S., Nader Darwish, B.S., Mary R. Close, B.S., Carlos Suarez-Ahedo, M.D., Parth Lodhia, M.D., F.R.C.S.C., Benjamin G. Domb, M.D.

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Purpose

To report minimum 2-year patient-reported outcomes (PROs) after hip arthroscopy (HA) for symptomatic labral tears in patients with global acetabular overcoverage.

Methods

This study was a retrospective case series of patients who underwent HA from April 2008 to April 2013. The inclusion criteria were patients with global acetabular overcoverage, defined as a lateral center-edge angle greater than 40°, and with coxa profunda, defined radiologically by the ilioischial line lateral to the acetabular floor. Only patients with minimum 2-year follow-up and no history of hip conditions or surgery were included. We recorded demographic, examination, radiologic, and intraoperative findings; intraoperative procedures performed; and the following PROs: modified Harris Hip Score (mHHS), Non-Arthritic Hip Score, Hip Outcome Score–Activities of Daily Living (HOS-ADL), Hip Outcome Score–Sports-Specific Subscale (HOS-SSS), visual analog scale, and patient satisfaction.

Results

The inclusion criteria were met by 39 patients, of whom 35 (89.7%) had 2-year follow-up. There was no distinct pattern of examination findings. The study population had a mean acetabular inclination of -1.19° and an anterior center-edge angle of 35° . There was no association with measures of acetabular retroversion. Intrasubstance tearing of the labrum occurred in 75% of patients (mean tear size, 2.68 hours on acetabular clock face; mean location, 11.5 to 3 on acetabular clock face). There were significant improvements in the mean scores for all PROs: mHHS, 13.5 ± 17.7 points ($P < .01$); Non-Arthritic Hip Score, 14.3 ± 21.3 ($P < .001$); HOS-ADL, 11.6 ± 19.7 ($P < .001$); HOS-SSS, 17.1 ± 35.1 ($P < .001$); and visual analog scale, -2.77 ± 2.58 ($P < .001$). The mean patient satisfaction rating was 6.61. The improvements in mHHS, HOS-ADL, and HOS-SSS did not reach the minimal clinically important difference. The incidence of secondary procedures was 17% (4 patients underwent conversion to total hip arthroplasty and 2 required revision HA).

Conclusions

HA in patients with global acetabular overcoverage was associated with improvements in PROs and pain at minimum 2-year follow-up. However, these improvements did not reach the minimal clinically important difference for the mHHS, HOS-ADL, and HOS-SSS. The incidence of secondary procedures was 17%. The pattern of labral injury is predominantly intrasubstance labral damage with a narrow rim of adjacent chondral injury.

Level of Evidence

Level IV, therapeutic case series.

[BACK](#)

Outcomes of Hip Arthroscopy in Competitive Athletes

Itay Perets, M.D., David E. Hartigan, M.D., Edwin O. Chaharbakhshi, B.S., Lyall Ashberg, M.D., Victor Ortiz-Declet, M.D., Benjamin G. Domb, M.D.

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Purpose

To evaluate the minimum 2-year postoperative clinical outcomes and the rate of return to sports in athletes who underwent capsular plication for the treatment of ligamentous laxity and/or borderline dysplasia during hip arthroscopy for the treatment of femoroacetabular impingement and labral pathology.

Methods

Since 2008, data were prospectively collected on patients who underwent hip arthroscopy for the treatment of femoroacetabular impingement and/or labral tears. Inclusion criteria were as follows: athlete at the high school, collegiate, or professional levels preoperatively, underwent capsular plication, and preoperatively recorded patient-reported outcome scores including modified Harris hip score (mHHS), nonarthritic athletic hip score (NAHS), hip outcome score—sports-specific subscale (HOS-SSS), and visual analog scale (VAS). Exclusion criteria were as follows: <16 years old, preoperative Tönnis grade >1, and previous hip conditions. Sports activity and competitive levels were collected at a minimum of 2 years postoperatively.

Results

Fifty-one hips (49 patients) met the inclusion criteria, and 41 hips (39 patients) had minimum 2-year follow-up (80.4% follow-up). Mean mHHS increased from 67.1 preoperatively to 83.5 ($P < .0001$). Mean NAHS increased from 66.8 to 88.8 ($P < .0001$). Mean HOS-SSS improved from 46.8 to 80.1 ($P < .0001$). Mean VAS decreased from 5.1 to 1.7 ($P < .0001$). Thirty-five (85.4%) hip arthroscopies allowed the patients to return to sports at follow-up. Thirty-four (82.9%) hip arthroscopies allowed the patients to maintain their competitive physical abilities at follow-up.

Conclusions

Patient-reported outcomes and VAS in athletes significantly improved at a minimum of 2 years after capsular plication as a part of hip arthroscopy addressing varying pathologies. In addition, most patients returned to sports at similar or higher competitive levels. These results suggest that capsular plication is a favorable treatment option in athletes with ligamentous laxity and/or borderline dysplasia.

Level of Evidence

Level IV, therapeutic case series.

[BACK](#)

Arthroscopic Treatment of Hip Pain in Adolescent Patients With Borderline Dysplasia of the Hip: Minimum 2-Year Follow-Up

Peter T. Evans, B.A., John M. Redmond, M.D., Jon E. Hammarstedt, B.S., Yuan Liu, B.A., Edwin O. Chaharbakhshi, B.S., Benjamin G. Domb, M.D.

Arthroscopy, August 2017, Volume 33, Issue 8, Pages 1530–1536

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Purpose

To examine arthroscopic treatment of hip pain in patients with borderline hip dysplasia (lateral center edge angle [LCEA] between 20° and 25°).

Methods

From 2008 to 2013, patients below 18 years of age who underwent arthroscopic hip surgery with an LCEA between 20° and 25° were retrospectively matched 1:1 to a control group without dysplasia (LCEA \geq 25°) based on age, gender, femoroplasty, labral treatment, and capsular plication. Indications for surgery included failure to improve with nonoperative treatments and anti-inflammatory medications after 3 months. Patient-reported outcome data were collected using modified Harris hip score, hip outcome score—activities of daily living subscale, hip outcome score—sports-specific subscale, nonarthritic athletic hip score, and visual analog scale.

Results

From 2008 to 2013, 168 patients below the age of 18 underwent arthroscopic hip surgery. Twenty-one patients met inclusion criteria and were matched 1:1 to a control group. Follow-up was achieved for 17 patients in both groups (81%). Mean follow-up time, age, and LCEA were 2.19 years, 15.5 years, and 22.3° for the dysplastic group and 2.16 years, 16.0 years, and 31.2° for the control group, respectively. Preoperative patient-reported outcomes between groups were not statistically different. At the latest follow-up, both groups showed statistically significant improvement over baseline in modified Harris hip score, hip outcome score—activities of daily living subscale, hip outcome score—sports-specific subscale, nonarthritic athletic hip score, and visual analog scale ($P < .001$). Latest follow-up scores were not statistically different between groups.

Conclusions

This study shows favorable 2-year outcomes in adolescent patients with borderline dysplasia undergoing labral treatment and capsular plication. Outcomes in the borderline dysplastic patients were as good as those of a control group. Although adolescents with borderline dysplasia have traditionally been a challenging group of patients to treat, these results suggest that an arthroscopic approach that addresses both labral pathology and instability may be beneficial.

Level of Evidence

Level IV, therapeutic case series.

[BACK](#)

Finite Element Analysis of the Biomechanical Effects of 3 Posterolateral Corner Reconstruction Techniques for the Knee Joint

Kyoung-Tak Kang, Ph.D., Yong-Gon Koh, M.D., Juhyun Son, M.S., Sung-Jae Kim, M.D., Ph.D., Sungryul Choi, M.D., Moonki Jung, Ph.D., Sung-Hwan Kim, M.D., Ph.D.

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Purpose

To compare the forces exerted on the cruciate ligaments and the contact stresses on the tibiofemoral (TF) and patellofemoral (PF) joints with respect to 3 different tibial- and fibular-based posterolateral corner (PLC) reconstructions under dynamic loading conditions.

Methods

A subject-specific finite element knee model was developed by using 3-dimensional anatomic data from motion captures in gait and squat activities, including in vivo knee joint kinematics and muscle forces for the single subject. Cruciate ligament forces and contact stresses on the TF and PF joints under 3 PLC reconstruction techniques (tibial-based, TBR; modified fibular-based, mFBR; conventional fibular-based, cFBR) and PLC-deficient models were compared with those of the intact model in gait and squat loading conditions.

Results

The cruciate ligament forces in the 3 surgical models differed from those in the intact model. The greatest differences in ligament forces from the intact model were found in the cFBR model, whereas there were no remarkable differences between the TBR and mFBR models in both gait and squat loading conditions. Contact stresses on the lateral TF and PF joints of the 3 surgical models were greater than those of the intact model under the squat loading condition.

Conclusions

The biomechanical effects achieved using the anatomic reconstruction technique were found to be improved compared with those using nonanatomic reconstruction techniques. However, the ligament forces and contact stresses under normal conditions could not be restored through any of the 3 techniques.

Clinical Relevance

Anatomic TBR and FBR for grade III PLC injuries could restore better biomechanics in the knee joint compared with nonanatomic reconstruction. However, discrepancy with the normal condition requires further modification of surgical techniques.

[BACK](#)

Anterolateral Ligament Reconstruction Techniques, Biomechanics, and Clinical Outcomes: A Systematic Review

Nicholas N. DePhillipo, M.S., A.T.C., O.T.C., Mark E. Cinque, M.S., B.S., Jorge Chahla, M.D., Ph.D., Andrew G. Geeslin, M.D., Robert F. LaPrade, M.D., Ph.D.

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Purpose

To perform a systematic review of the described anterolateral ligament (ALL) reconstruction techniques, biomechanical performance, and clinical outcomes of ALL reconstruction in the setting of concurrent anterior cruciate ligament (ACL) reconstruction.

Methods

A systematic review was performed according to PRISMA guidelines using the Cochrane Database of Systematic Reviews, the Cochrane Central Register of Controlled Trials, PubMed, MEDLINE, and Embase, from 1980 to present. Inclusion criteria were as follows: ALL reconstruction techniques, ALL reconstruction biomechanical studies, ALL surgical outcomes, English language, human studies with at least 2 years of follow-up, and cadaveric studies. Exclusion criteria were lateral extra-articular tenodesis, ALL anatomic studies, ALL radiographic studies, animal studies, clinical studies with <2 years of follow-up, editorial articles, and surveys.

Results

The systematic review identified 12 articles that met the inclusion criteria: 6 techniques, 5 biomechanical studies, and 1 outcome study were available. Five studies described ALL reconstruction in the setting of ACL reconstruction, whereas 1 study described isolated ALL reconstruction. Femoral tunnel location was most commonly placed posterior and proximal to the lateral epicondyle, whereas 2 studies reported a distal tunnel location. There was little variability in tibial tunnel location. The most common ALL reconstruction graft used was the gracilis tendon. Review of the biomechanical studies revealed internal rotation overconstraint with the posterior/proximal femoral tunnel position but not anterior/distal, although fixation angle and graft tension were inconsistent. Only 1 clinical study with 2 years' follow-up was available and reported improvement in the majority of cases. Complications occurred in 15 patients, including a residual pivot shift in 8% of patients at 2 years after a combined ACL and ALL reconstruction.

Conclusions

There is inconsistency in the selection of ALL graft femoral attachment location as well as in the biomechanical performance of ALL reconstruction techniques.

Level of Evidence

Level IV, systematic review of Level IV studies.

[BACK](#)

Return to Sport and Clinical Outcomes After Hip Arthroscopic Labral Repair in Young Amateur Athletes: Minimum 2-Year Follow-Up

Rohith Mohan, B.A., Nick R. Johnson, B.S., Mario Hevesi, M.D., Christopher M. Gibbs, B.S., Bruce A. Levy, M.D., Aaron J. Krych, M.D.

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Purpose

To determine the rate of return of young amateur athletes to sport after hip arthroscopy, their clinical outcomes, and pathologic risk factors for worse outcomes 2 years after surgery.

Methods

This study included all patients between age 13 and 23 who participated in a sport prior to surgery with intent to return who underwent hip arthroscopy after failure of comprehensive nonoperative management for whom 2-year outcome scores were available. Outcomes collected retrospectively included modified Harris Hip Score (mHHS) and the Hip Outcome Scores (HOS) subscales for activities of daily living (ADL) and sport (HOS Sport). In addition, sport played, return to sport rates, and Tegner Scores were measured preinjury and postoperatively. Descriptive statistics were used to present demographic data. A priori analysis was used to determine the sample size needed to show minimal clinically important differences for mHHS, HOS ADL, and HOS Sport.

Results

The study population included 50 patients with a mean age of 17.8 years. Athletes returned to sport at a rate of 92% (46/50). At a mean follow-up of 34 months, the mean mHHS, HOS ADL, and HOS Sport outcome scores were 85, 91, and 80 for the entire study group; 87, 92, and 84 for the group that returned to sport; and 67, 82, and 41 for the group that did not return to sport, respectively. Median preinjury and postoperative Tegner levels were 8 and 7, respectively. Labral takedown and reattachment was associated with lower HOS ADL ($P = .01$) and HOS Sport scores ($P = .02$).

Conclusions

Athletes returned to sport at a high rate (92%; 46/50) after hip arthroscopy and perform activities at near preinjury levels. In this group of athletes, arthroscopic labral repair with chondrolabral preservation, which reflected less severe chondrolabral pathology, performed better than labral repair with takedown and reattachment.

Level of Evidence

Level IV, therapeutic case series.

[BACK](#)

Arthroscopic Reconstruction of Segmental Defects of the Hip Labrum: Results in 22 Patients With Mean 2-Year Follow-Up

Sivashankar Chandrasekaran, M.B.B.S., F.R.A.C.S., Nader Darwish, M.D., Mary R. Close, B.S., Parth Lodhia, M.D., F.R.C.S.C., Carlos Suarez-Ahedo, M.D., Benjamin G. Domb, M.D.

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Purpose

To report mean 2-year patient-reported outcomes (PROs) and the incidence of revision hip arthroscopy or conversion to total hip arthroplasty (THA) in patients who had undergone arthroscopic reconstruction of the hip labrum for segmental defects.

Methods

Data were prospectively collected and retrospectively reviewed on all patients who had undergone hip arthroscopy from April 2008 to April 2013. All patients who underwent arthroscopic labral reconstruction with either a semitendinosus allograft or a gracilis autograft with mean 2-year follow-up were part of the inclusion criteria. The following outcomes were recorded: modified Harris hip score, nonarthritic athletic hip score, hip outcome score—sports-specific subscale, hip outcome score—activities of daily living subscale, visual analog scale, for pain, patient satisfaction, revision hip arthroscopies, and conversion to THA. A 2-tailed Student's *t*-test was used to assess for statistically significant differences between the mean of preoperative and postoperative PROs. *P* values less than .05 were considered statistically significant.

Results

A total of 22 patients (14 females, 8 males) met the inclusion criteria. There was 100% follow-up. The mean age of the study population was 32.2 years. Twelve patients had reconstruction as part of a revision procedure and 10 patients had a reconstruction at the time of primary arthroscopy. Concomitant arthroscopic procedures included acetabuloplasty and femoroplasty. There was statistically significant improvement in all PROs ($P = .013$ to $< .001$). The mean changes for the modified Harris hip score, nonarthritic athletic hip score, hip outcome score—sports-specific subscale, and hip outcome score—activities of daily living subscale were 11.0 ± 19.5 , 22.2 ± 15.0 , 23.1 ± 30.9 , and 19.1 ± 17.5 points, respectively. The mean improvement in the visual analog scale was 3.33 ± 2.92 points ($P < .001$), and the mean patient satisfaction was 6.73 out of 10 points. One patient required conversion to THA for presumed progression of osteoarthritis and 2 patients required a revision procedure for adhesions.

Conclusions

This arthroscopic technique for labral reconstruction was associated with a significant improvement in PROs and function. Conversion to THA with the procedure was 4.5%.

Level of Evidence

Level IV, therapeutic case series.

[BACK](#)

Single-Step Arthroscopic Repair With Cell-Free Polymer-Based Scaffold in Osteochondral Lesions of the Talus: Clinical and Radiological Results

Ulunay Kanatlı, M.D., Ali Eren, M.D., Toygun Kağan Eren, M.D., Abdurrahman Vural, M.D., Dilan Ece Geylan, M.D., Ali Yusuf Öner, M.D.

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Purpose

To report the clinical and radiological results of patients with talar osteochondral lesions who were treated by microfracture and cell-free scaffold implantation in a single-step arthroscopic surgery.

Methods

Forty patients, treated with a single-step arthroscopic surgery, were evaluated in this single-center-based retrospective study. Patients with degenerative arthritis ($n = 1$), history of ankle fracture ($n = 1$), kissing lesions ($n = 1$), lower extremity deformity ($n = 1$), and lesions $<1.5 \text{ cm}^2$ ($n = 4$) were excluded. Oversized ($>10 \text{ mm}$ depth) bone cysts were additionally treated with bone graft. Patients were evaluated clinically, using the American Orthopedic Foot and Ankle Society (AOFAS) hindfoot score. Radiological assessment was performed with magnetic resonance imaging, using the magnetic resonance observation of cartilage repair tissue (MOCART) score.

Results

Thirty-two patients with a mean age of 38 ± 12 years were evaluated. The mean defect size was $2.5 \pm 0.8 \text{ cm}^2$ and the mean defect volume was $2.4 \pm 1.9 \text{ cm}^3$. The mean preoperative AOFAS score was 52.8 ± 13.9 and increased to 87.1 ± 11.1 postoperatively at the mean follow-up of 33.8 ± 14.0 months ($P = .0001$). A total of 84.4% of patients had good to excellent clinical scores. Clinical scores had no significant relation with age, lesion size, depth, or body mass index. The mean MOCART score was 64.2 ± 12.0 . There was no significant correlation between the total MOCART and AOFAS scores ($P = .123$). A significant relation was found between the defect filling (the subgroup of the MOCART score) and the clinical outcomes ($P = .0001$, $\rho = 0.731$).

Conclusions

The arthroscopic scaffold implantation technique is a single-step, safe, and effective method for the treatment of talar osteochondral lesions with satisfactory clinical and radiological outcomes.

Level of Evidence

Level IV, therapeutic case series.

[BACK](#)

Saucerization Versus Complete Resection of a Symptomatic Discoid Lateral Meniscus at Short- and Long-term Follow-up: A Systematic Review

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Purpose

To evaluate the surgical outcomes of symptomatic discoid menisci after total meniscectomy, saucerization, and suture repair of tears of a discoid meniscus at short- and long-term follow-up.

Methods

A systematic review was conducted using the Pubmed and ScienceDirect databases in adherence with Preferred Reporting Items of Systematic Reviews and Meta-Analysis guidelines. Short- and long-term follow-up were defined as an average follow-up of <4 years and >4 years, respectively. Pooled quantitative synthesis was performed on studies that reported results of total meniscectomy and saucerization in the same study. A systematic review was performed on studies that reported data on saucerization, total meniscectomy, and/or repair.

Results

A total of 19 studies for the short term and 22 for the long term were identified that met inclusion criteria for qualitative review. Of these, 4 short-term and 5 long-term studies were included in the quantitative synthesis. No significant differences in Ikeuchi scores are seen in the short-term studies between saucerization and total meniscectomy; however, the long-term studies did find a statistical difference favoring saucerization ($P < .001$). The differences noted between the preoperative and postoperative Lysholm scores in the short term were 24.1 (95% conflict of interest: 10.25-37.95) in 3 studies and 22.38 (95% conflict of interest: 17.68-27.07) in the 4 long-term studies for saucerization. Suture repair with saucerization versus saucerization without suture repair revealed a statistical difference in only 1 of 5 studies.

Conclusions

Long-term data demonstrate significantly improved patient reported outcomes in favor of saucerization over total meniscectomy. Suture repair of tears of a lateral discoid meniscus does not demonstrate improved outcomes over partial meniscectomy without repair. Considering the cost of repair and lack of demonstrated improvement, based on the limited available data, we do not recommend repair of the abnormal anatomy in a torn lateral discoid meniscus.

Level of Evidence

Level IV, systematic review.

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AJSM

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Outcomes of Hip Arthroscopic Surgery in Patients With Tönnis Grade 1 Osteoarthritis at a Minimum 5-Year Follow-up: A Matched-Pair Comparison With a Tönnis Grade 0 Control Group

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Background: Studies on midterm outcomes of the arthroscopic treatment of femoroacetabular impingement (FAI) and labral tears with mild osteoarthritis (OA) are limited.

Purpose: To evaluate outcomes of the arthroscopic treatment of FAI and labral tears in patients with mild preoperative OA (Tönnis grade 1) at a minimum 5-year follow-up, and to perform a matched-pair comparison to a control group with Tönnis grade 0.

Study Design: Cohort study; Level of evidence, 3.

Methods: Data were prospectively collected on patients who underwent hip arthroscopic surgery between February 2008 and April 2011. Inclusion criteria were arthroscopic treatment for FAI and labral tears and having preoperative patient-reported outcome (PRO) scores, including the modified Harris Hip Score (mHHS), Non-Arthritic Hip Score (NAHS), and Hip Outcome Score–Sports-Specific Subscale (HOS-SSS), and visual analog scale (VAS) scores for pain. Exclusion criteria were workers' compensation claims, preoperative Tönnis grade ≥ 2 , and previous hip conditions (ipsilateral surgery, slipped capital femoral epiphysis, avascular necrosis, and dysplasia). Patients with minimum 5-year outcomes were eligible for matching on a 1:1 ratio (Tönnis grade 0 vs 1) based on age ± 5 years, body mass index ± 5 kg/m², sex, labral treatment, and capsular treatment.

Results: Of 356 eligible hips, 292 hips had minimum 5-year outcomes (82%). Eighty-five hips with Tönnis grade 1 were evaluated. At 5-year follow-up, patients with Tönnis grade 1 had significant improvements in all PRO and VAS scores ($P < .0001$). The overall satisfaction score was 8.2. The survivorship rate with respect to conversion to total hip arthroplasty for the Tönnis grade 1 group was 69.4% at 5 years, while in the Tönnis grade 0 group, it was 88.4% ($P = .0002$). Sixty-two hips with Tönnis grade 0 were matched to 62 hips with Tönnis grade 1. Both groups demonstrated improvements in all PRO and VAS scores from preoperatively to postoperatively ($P < .0001$). No significant differences existed between preoperative or postoperative scores or survivorship between the groups.

Conclusion: The arthroscopic treatment of FAI and labral tears in patients with Tönnis grade 1 had good results at 5-year follow-up. After controlling for other variables using a matched-pair comparison, patients with Tönnis grade 1 had similar, durable improvements to those with Tönnis grade 0. While strict surgical indications and appropriate expectations are recommended for patients with mild OA, Tönnis grade 1 alone should not be considered a contraindication to hip arthroscopic surgery.

[BACK](#)

The Influence of Body Mass Index on Outcomes After Hip Arthroscopic Surgery With Capsular Plication for the Treatment of Femoroacetabular Impingement

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Background: It remains unknown how variations in body mass index (BMI) influence outcomes after primary hip arthroscopic surgery with capsular plication for femoroacetabular impingement (FAI).

Purpose: To evaluate the effect that abnormal BMI (namely, overweight, obese, morbidly obese, and underweight) versus normal weight has on patient-reported clinical outcomes more than 2 years postoperatively from primary hip arthroscopic surgery with capsular plication by a single surgeon.

Study Design: Cohort study; Level of evidence, 3.

Methods: A clinical repository containing patients undergoing primary hip arthroscopic surgery for FAI between January 1, 2012, and January 1, 2014, with a minimum 2-year follow-up was queried. Outcome measures included the Hip Outcome Score (HOS)–Activities of Daily Living (ADL), HOS-Sports, modified Harris Hip Score (mHHS), visual analog scale (VAS) for pain; satisfaction, and Patient Acceptable Symptomatic State (PASS) for the HOS-ADL; scores were collected preoperatively and at 3 months, 1 year, and minimum 2 years postoperatively. Included patients were segregated by preoperative BMI into the following categories: underweight (<18.5 kg/m²), normal (18.5-24.9 kg/m²), overweight (25.0-29.9 kg/m²), obese (30.0-34.9 kg/m²), and morbidly obese (≥35.0 kg/m²). A multivariate logistic regression model controlling for patient demographics and disease severity was used to identify independent associations between BMI categories and outcomes. A Bonferroni adjustment lowered the threshold for significance to $P < .01$.

Results: There were 409 hips in 381 patients appropriate for study inclusion: 7 underweight, 197 normal BMI, 130 overweight, 31 obese, and 16 morbidly obese. The mean age was 33.1 ± 12.1 years, with 232 (61%) female patients. At 2 years postoperatively, significant differences in the trend among HOS-ADL, HOS-Sports, and mHHS scores were evident, with normal BMI patients, followed by underweight patients, demonstrating greater scores than their overweight, obese, and morbidly obese counterparts. Obese patients demonstrated lower satisfaction scores than normal BMI patients. Overweight, obese, and morbidly obese patients had lower improvements in VAS pain scores compared with normal BMI patients. Increasing BMI (not subdivided into the 5 BMI categories) was associated with a higher infection risk (mean BMI for infections: 32.3 ± 9.8 kg/m² vs mean BMI for noninfections: 25.2 ± 4.8 kg/m²; $P = .0035$). However, with multivariate analysis, no significant differences in patient clinical outcomes between the BMI categories met the threshold for significance. Among obese patients (BMI ≥30.0 kg/m²), no specific risk factors were found to be significantly associated with decreases in the change in VAS, HOS-ADL, HOS-Sports, mHHS, satisfaction, or PASS for the HOS-ADL scores. However, because of the small cohort sizes at the extremes of the BMI categories, this analysis may have been underpowered to identify a significant difference in underweight or morbidly obese patients.

Conclusion: In the current cohort, there were multiple potential confounding variables, and while some clinical differences were observed initially (higher HOS-ADL, HOS-Sports, and mHHS scores for normal BMI patients than overweight and obese patients at 2 years postoperatively; lower satisfaction scores for obese patients than normal BMI patients; and lower improvement in VAS pain scores for overweight, obese, and morbidly obese patients when compared with normal BMI patients), after multivariate analysis, no associations were observed between BMI and clinical outcomes after hip arthroscopic surgery with capsular plication for FAI.

[BACK](#)

Early Functional Outcomes of Periacetabular Osteotomy After Failed Hip Arthroscopic Surgery for Symptomatic Acetabular Dysplasia

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Background: Persistent acetabular dysplasia is a common reason for the failure of hip arthroscopic surgery; however, the effect of prior hip arthroscopic surgery on functional outcomes after subsequent periacetabular osteotomy (PAO) is unknown.

Hypothesis/Purpose: The purpose of this study was to (1) compare demographic and radiological findings in patients who had and had not undergone previous hip arthroscopic surgery before PAO for symptomatic acetabular dysplasia and (2) compare the short-term, hip-specific patient-reported outcomes in these same patient populations. It was hypothesized that prior hip arthroscopic surgery is associated with worse early functional outcomes in PAO.

Study Design: Cohort study; Level of evidence, 3.

Methods: A retrospective cohort study design was utilized. Patients undergoing PAO were enrolled from a single-center, prospective hip preservation registry from March 2011 to April 2015. Patients with a minimum of 1-year clinical follow-up with preoperative and postoperative outcome scores undergoing PAO were eligible for inclusion (n = 93 patients; mean clinical follow-up, 24 months [range, 11-58 months]). The study group consisted of patients undergoing PAO for symptomatic hip dysplasia after prior hip arthroscopic surgery (PREVSCOPE group; 22 patients, 25 hips). Patients undergoing PAO without prior hip arthroscopic surgery (PAOALONE group; 71 patients, 85 hips) were included as a comparison group. Demographic and radiological variables were recorded. Postoperative functional outcome scores (modified Harris Hip Score [mHHS], Hip Outcome Score [HOS], and International Hip Outcome Tool [iHOT-33]) were recorded at 6 months and annually postoperatively.

Results: There were no demographic differences between the 2 groups at baseline. Acetabular version, femoral version, Tönnis grade, preoperative lateral center edge angle, and intraoperative procedures were not different between the 2 groups. At 1-year follow-up from the last hip surgical procedure, the mean (\pm SD) mHHS (73 ± 14 vs 86 ± 14 , respectively; $P < .001$), HOS–Activities of Daily Living (84 ± 12 vs 93 ± 11 , respectively; $P = .007$), HOS-Sport (62 ± 25 vs 85 ± 18 , respectively; $P < .001$), and iHOT-33 (62 ± 21 vs 79 ± 20 , respectively; $P = .004$) were decreased in the PREVSCOPE group versus the PAOALONE group. At last follow-up (mean, 18 months

from the last hip surgical procedure), the mHHS and HOS-Sport were lower in the PREVSCOPE group versus the PAOALONE group. There was no difference in complication or reoperation rates between the 2 groups.

Conclusion: Failed hip arthroscopic surgery before PAO for symptomatic hip dysplasia is associated with lower hip-specific functional outcomes within the first 1 year of follow-up despite similar baseline demographic and radiological characteristics. These differences persisted in certain outcome scores (mHHS, HOS-Sport) at last follow-up but were less pronounced than at 1 year.

[BACK](#)

Minimum 2-Year Outcomes of Hip Arthroscopic Surgery in Patients With Acetabular Overcoverage and Profunda Acetabulae Compared With Matched Controls With Normal Acetabular Coverage

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Background: Advancements in instrumentation and techniques have extended the scope of hip arthroscopic surgery to treat complex osseous deformities that were previously best addressed with an open approach. Global pincer-type femoroacetabular impingement is an example of an abnormality requiring osseous correction with a technically challenging access point.

Purpose: To report on the patterns of clinical presentation and intra-articular derangements, radiological associations, and minimum 2-year outcomes after hip arthroscopic surgery in patients with a lateral center edge angle (LCEA) >40° and profunda acetabulae in comparison with matched controls with normal acetabular coverage.

Study Design: Cohort study; Level of evidence, 3.

Methods: Data were collected on all patients undergoing hip arthroscopic surgery during the study period from April 2008 to April 2013. All patients who had undergone hip arthroscopic surgery for symptomatic labral tears not responsive to a minimum of 3 months of physical therapy with both an LCEA >40° and profunda acetabulae, as defined by the ilioischial line lateral to the medial border of the teardrop, and without a history of hip surgery or hip conditions were included. This group was matched in a 1-to-1 ratio with a control group that had also undergone the arthroscopic management of symptomatic labral tears refractory to a minimum of 3 months of physical therapy with an LCEA between 25° and 40° according to age within 3 years, sex, body mass index category, Tönnis grade, labral treatment, and capsular treatment. Range of motion, impingement signs, and radiographic indices of coverage and version were recorded for each group. Four patient-reported outcome (PRO) scores, the visual analog scale (VAS) for pain, patient satisfaction, revision hip arthroscopic surgery, and conversion to total hip arthroplasty (THA) were also recorded.

Results: Thirty-nine patients met the inclusion criteria for the study (overcoverage) group, of which 36 (92.3%) patients had a minimum 2-year follow-up; 215 patients satisfied the inclusion

criteria for the control (normal coverage) group, of which 183 (85.1%) had a minimum 2-year follow-up. Thirty-six patients were matched in each group using the above criteria. There was no difference with respect to range of motion and impingement signs between the groups. The study group had significantly higher radiological markers of overcoverage but not retroversion compared with the control group. The study group had a significantly higher incidence of Seldes type 2 tears compared with the control group: 50.0% versus 19.4%, respectively ($P = .013$). Both groups demonstrated significant improvements in the mean scores of all PROs, but the study group had a lower magnitude of improvement for all the PROs compared with the control group, with the modified Harris Hip Score (mHHS) achieving statistical significance: 13.5 versus 21.7 points, respectively ($P = .032$). The study group had a significantly lower mean patient satisfaction score compared with the control group: 6.61 versus 7.91, respectively ($P = .019$). The study group also had a significantly higher incidence of conversion to THA compared with the control group: 4 versus 0, respectively ($P = .040$).

Conclusion: Hip arthroscopic surgery for the management of symptomatic labral tears in patients with combined overcoverage and coxa profunda is associated with improvements in patient outcomes and pain at a minimum 2-year follow-up. However, the degree of improvement is of lower magnitude compared with a matched cohort with normal coverage undergoing the arthroscopic management of symptomatic labral tears. While hips with lateral overcoverage combined with coxa profunda may have a smaller potential for improvement compared with hips with normal coverage, this type of osseous morphology is still repairable with arthroscopic treatment.

[BACK](#)

Acetabular Chondral Lesions in Hip Arthroscopy: Relationships Between Grade, Topography, and Demographics

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Background:

Hip pain remains a challenge given the multiple factors that can cause damage to the articular cartilage, such as traumatic injury, metabolic damage, and morphologic variations such as femoroacetabular impingement (FAI) and that can contribute to progression of osteoarthritis. However, a direct relationship between patient characteristics, the extent of acetabular chondral damage, and topologic characteristics of chondral lesions has not been established.

Purpose:

To compare the grade of acetabular chondral damage, measured in terms of acetabular labrum articular disruption (ALAD) classification, to the size and position of the chondral lesions, matching patients' demographic factors such as age and body mass index (BMI).

Study Design:

Cross-sectional study; Level of evidence, 3.

Methods:

This study included all hip arthroscopies performed by the corresponding author from August 7, 2008, to November 19, 2014, in which acetabular chondral lesions were intraoperatively identified and measured in terms of ALAD grade, clockface location, and size. Bivariate analyses and multiple logistic regression were used to identify the demographic factors, characteristics of the acetabular chondral lesion, and other anatomic characteristics that were related to the ALAD grade of the acetabular chondral lesion.

Results:

Acetabular chondral lesions were measured in 1502 patients during the study period. Multivariate analysis showed that higher ALAD grade of acetabular chondral damage was significantly related to male sex, more advanced age, the area of the acetabular chondral lesion, anterior extension of the acetabular chondral lesion within the anterosuperior quadrant, labral detachment from the acetabular cartilage, and posterior extension of the labral tear.

Conclusion:

Higher grades of acetabular chondral damage were related to male sex, increased age, height, weight, BMI, and the size of the lesion. Chondral lesions were generally found in the anterosuperior region of the acetabulum, consistent with labral lesions and the weightbearing area of the acetabulum.

[BACK](#)

Do Ligamentum Teres Tears Portend Inferior Outcomes in Patients With Borderline Dysplasia Undergoing Hip Arthroscopic Surgery? A Match-Controlled Study With a Minimum 2-Year Follow-up

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Background: Arthroscopic surgery in borderline dysplastic hips remains controversial, but the role of the ligamentum teres (LT) has not been studied in this setting.

Hypothesis: Borderline dysplastic patients with LT tears have worse short-term outcomes than those without LT tears.

Study Design: Cohort study; Level of evidence, 3.

Methods: Data were prospectively collected on patients who underwent arthroscopic surgery between February 2008 and April 2014. The inclusion criteria were borderline dysplasia (lateral center-edge angle [LCEA], 18°-25°) and labral tears; arthroscopic treatments including labral preservation and capsular plication; and preoperative patient-reported outcome scores including the modified Harris Hip Score (mHHS), Non-Arthritic Hip Score (NAHS), Hip Outcome Score–Sport-Specific Subscale, and visual analog scale for pain. Patients were excluded for preoperative Tönnis osteoarthritis grade >0, workers' compensation claims, previous ipsilateral hip surgery and conditions, or frank dysplasia (LCEA <18°). Patients with LT tears were pair-

matched to patients without tears for sex, age at surgery ± 10 years, body mass index (<30 kg/m² vs ≥ 30 kg/m²), labral treatment type, and microfracture.

Results: Of 68 eligible patients, 63 (93%) had a minimum 2-year follow-up, and 30 (48%) had LT tears. Twenty patients in each group were pair-matched. The mean follow-up time was 54.3 months (range, 24.2-83.8 months) for the LT tear group and 38.6 months (range, 24.6-70.6 months) for the control group ($P = .002$). Ninety percent were female. There were no significant differences regarding demographics or intra-operative procedures. The LT tear group trended toward lower postoperative mHHS ($P = .09$) and NAHS ($P = .09$) values. Mean satisfaction was 8.1 for the LT tear group and 7.9 for the control group. Preoperative and follow-up scores were not significantly different between the groups. The LT tear group had 5 revisions, with 1 revision in the control group. Three patients (15%) in the LT tear group underwent total hip arthroplasty (THA); no patients in the control group required THA.

Conclusion: In borderline dysplastic patients undergoing hip arthroscopic surgery with labral treatment and capsular plication, LT tears may indicate advanced instability and portend slightly inferior outcomes when compared with a match-controlled group. Borderline dysplastic patients with LT tears may have increased propensities toward revision arthroscopic surgery and conversion to THA. LT tears in these patients may warrant consideration for additional procedures including periacetabular osteotomy and LT reconstruction.

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JBJS

August - September 2017, volume 99, issue 14-15

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August - September 2017, Vol 475, Issue 8-9

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The Bone & Joint Journal

Volume 99, issue 8

Anterior cruciate ligament reconstruction in skeletally immature patients: a systematic review

U. G. Longo, M. Ciuffreda, C. Casciaro, N. Mannering, V. Candela, G. Salvatore, V. Denaro

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Aims:

Different methods of anterior cruciate ligament (ACL) reconstruction have been described for skeletally immature patients before closure of the growth plates. However, the outcome and complications following this treatment remain unclear. The aim of this systematic review was to analyse the outcome and complications of different techniques which may be used for reconstruction of the ACL in these patients.

Materials and Methods:

We performed a systematic review of the literature according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. This involved a comprehensive search of PubMed, Medline, CINAHL, Cochrane, Embase and Google Scholar databases using the following combinations of keywords, “knee”, “anterior cruciate ligament”, “reconstruction”, “injury”, “children”, “adolescent”, “skeletally immature”, “open physis” and “surgery”.

Results:

A total of 53 studies met the inclusion criteria and were included for analysis. The overall rate of disturbance of growth after ACL reconstruction was 2.6%, with no statistical difference between transphyseal and physeal-sparing techniques. Physeal-sparing techniques had a lower rate of post-operative complications compared with transphyseal techniques ($p = 0.0045$). Outcomes assessed were Lysholm score, International Knee Documentation Committee (IKDC) score, the IKDC grade, the Tegner score and the KT-1000. Both techniques had similar clinical outcomes.

Conclusions:

This review reveals low rates of disturbance of growth after ACL reconstruction in skeletally immature patients. Although limited, the available evidence did not support any particular surgical technique when considering disturbance of growth or clinical outcome. Further randomised controlled trials are needed to investigate the efficacy of differing surgical techniques on outcomes in skeletally immature patients.

[BACK](#)

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