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Upper extremity

Arthroscopy, Volume 37, Issue 01, p 28-37

Arthroscopic Repair of Medium to Large Rotator Cuff Tears with a Triple-Loaded Medially Based Single-Row Technique Augmented with Marrow Vents

Dierckman, B. D., Frousiakis, P., Burns, J. P., Barber, F. A., Wodicka, R., Getelman, M. H., … Snyder, S. J.

https://doi.org/10.1016/j.arthro.2020.08.003

Purpose
The primary purpose of this study was to evaluate the repair integrity on magnetic resonance imaging (MRI), and secondarily, clinical outcomes, of medium to large (2-4 cm) rotator cuff tears treated using an arthroscopic triple-loaded medially based single-row repair technique augmented laterally with bone marrow vents.

Methods
This is a retrospective outcomes study of patients with full-thickness medium to large (2-4 cm) rotator cuff tears repaired by 4 surgeons at a single institution over a 2-year period with a minimum of 24 months' follow-up. A single-row repair with tension-minimizing medially based triple-loaded anchors and laterally placed bone marrow vents was used. Patients completed a satisfaction and pain survey, the Western Ontario Rotator Cuff index questionnaire, and a Short Form-36 version 2 survey to evaluate clinical outcomes. MRI was obtained at a minimum of 24 months follow-up to assess repair integrity.

Results
A total of 64 males and 27 females with a mean age of 59.7 (range, 34-82) were included. The mean tear size was 2.6 cm in anteroposterior dimension, treated with a mean of 2.2 anchors. Eighty-three of 91 shoulders (91%) reported being completely satisfied with their result. The median Western Ontario Rotator Cuff score was 95.2% of normal, with a significant difference found between those with an intact repair and those with a full-thickness recurrent defect (median, 95.9% vs. 73.8%; P = .003). Postoperative MRI obtained at a median of 32 months (range, 24-48) demonstrated an intact repair in 84 of 91 shoulders (92%), with failure defined as a full-thickness defect of the tendon.

Conclusions
Arthroscopic repair of medium to large rotator cuff tears using triple-loaded medially based single-row repair augmented with marrow vents resulted in a 92% healing rate by MRI and excellent patient-reported outcomes

Level of Evidence
Level IV, retrospective case series..

BACK

Inpatient Arthroscopic Rotator Cuff Repair Is Associated With Higher Postoperative Complications Compared With Same-Day Discharge: A Matched Cohort Analysis

Zain M. Khazi, B.S., Yining Lu, B.A., William Cregar, M.D., Alan G. Shamrock, M.D., Trevor R. Gulbrandsen, M.D., Randy Mascarenhas, M.D., and Brian Forsythe, M.D.

https://doi.org/10.1016/j.arthro.2020.07.021

Purpose
To compare 90-day postoperative complications between patients undergoing outpatient versus inpatient arthroscopic rotator cuff repairs (RCR) and identify risk factors associated with postoperative complications.

Methods
An administrative claims database was used to identify patients undergoing arthroscopic RCR from 2007 to 2015. Patients were categorized based on length of hospital stay (LOS) with inpatient RCR defined as patients with ≥1 day LOS, and outpatient RCR as patients discharged day of surgery (LOS = 0). Inpatient and outpatient RCR groups were matched based on age, sex, Charlson comorbidity index (CCI), and various medical comorbidities using 1:1 propensity score analysis. Patient factors, concomitant procedures, total adverse events (TAEs), medical adverse events (MAEs), and surgical adverse events (SAEs) were compared between the matched groups. Multiple logistic regression analysis was performed to identify risk factors associated with increased complications.

Results
After matching, there were 2812 patients (50% outpatient) included in the study. Within 90 days following arthroscopic RCR, the incidence of TAEs (8.9% vs 3.6%, $P < .0001$), SAEs (2.7% vs 0.9%, $P = .0002$), and MAEs (6.4% vs 3.0%, $P < .0001$) were significantly greater for the inpatient RCR group. The multivariate model identified inpatient RCR (LOS ≥1 day), greater CCI, and anxiety or depression as independent predictors for TAEs after arthroscopic RCR. Open biceps tenodesis and inpatient RCR were independent predictors of SAEs, whereas greater CCI, anxiety or depression, and inpatient RCR were independent predictors for MAEs within 90 days after arthroscopic RCR.

Conclusions
Inpatient arthroscopic RCR is associated with increased risk of 90-day postoperative complications compared with outpatient. However, there is no difference for all-cause or pain-related emergency department visits within 90 days after surgery. In addition, the multivariate model identified inpatient RCR, greater CCI, and diagnosis of anxiety or depression as independent risk factors for 90-day TAEs after arthroscopic RCR.

Level of Evidence
III, Retrospective cohort study

BACK

Complications Within 6 Months After Arthroscopic Rotator Cuff Repair: Registry-Based Evaluation According to a Core Event Set and Severity Grading

Felsch, Q., Mai, V., Durchholz, H., Flury, M., Lenz, M., Capellen, C., & Audigé, L.

https://doi.org/10.1016/j.arthro.2020.08.010

Purpose
To report complications after arthroscopic rotator cuff repairs (ARCRs) in a large patient cohort based on clinical application of a newly defined core event set (CES) and severity grading.

Methods
Consecutive primary ARCRs documented in a local clinical registry between February 2010 and September 2016 were included. Clinicians documented adverse events (AEs) reported until the final, 6-month postoperative follow-up according to the CES. The CES is an organized list of relevant AEs sorted into 3 intraoperative event groups (device, osteochondral, and soft tissue) and 9 postoperative event groups (device, osteochondral, pain, rotator cuff, surgical-site infection, peripheral neurologic, vascular, superficial soft tissue, and deep soft tissue). Severity was determined using an adaptation of the Clavien-Dindo classification. Cumulative complication risks were calculated per event group and stratified by severity and rotator cuff tear extent.

Results
A total of 1,661 repairs were documented in 1,594 patients (mean age, 57 years [standard deviation, 9 years]; 38% women); 21% involved partial tears. All events were recorded according to the CES. Intraoperative events occurred in 2.2% of repairs. We identified 329 postoperative events in 307 repairs (305 patients); 93% had 1 AE. The cumulative AE risk at 6 months was 18.5%; AE risks were 21.8% for partial tears, 15.8% for full-thickness single-tendon tears, 18.0% for tears with 2 ruptured tendons, and 25.6% for tears with 3 ruptured tendons. AE risks per event group were as follows: 9.4% for deep soft tissue, with shoulder stiffness (7.6%) being the most common event; 3.4% for persistent or worsening pain; 3.1% for rotator cuff defects; 1.7% for neurologic lesions; 0.8% for surgical-site infection; 0.7% for device; 0.4% for osteochondral; 0.2% for superficial soft tissue, and 0.1% for vascular. Most AEs had severity grades I (160 [49%]) and II (117 [36%]).

Conclusions
Comprehensive local AE documentation according to the CES and severity grading was possible and showed that about one-fifth of ARCRs were affected, mostly by one AE of low severity. Shoulder stiffness was the most frequent event.

Level of Evidence
Level IV, case series.

BACK

Superior Capsular Reconstruction Provides Sufficient Biomechanical Outcomes for Massive, Irreparable Rotator Cuff Tears: A Systematic Review

Smith, T. J., Gowd, A. K., Kunkel, J., Kaplin, L., & Waterman, B. R.

https://doi.org/10.1016/j.arthro.2020.09.007

Purpose
To critically review the literature reporting biomechanical outcomes of superior capsular reconstruction (SCR) for the treatment of massive and/or irreparable rotator cuff tears.

Methods
A systematic review was performed following PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) guidelines using the PubMed, MEDLINE, and Cochrane Library databases in August 2020. Cadaveric studies were assessed for glenohumeral translation, subacromial contact pressure, and superior humeral translation comparing SCR with an intact cuff with reference to a torn control state.

Results
A total of 15 studies (142 shoulders) were included in our data analysis. SCR showed improvements in superior humeral translation, subacromial contact force, and glenohumeral contact force when biomechanically compared with the massive and/or irreparably torn rotator cuff. No statistically significant differences were found between SCR and the intact rotator cuff regarding superior humeral translation (standard mean difference [SMD], 2.09 mm vs 2.50 mm; P = .54) or subacromial contact force (SMD, 2.85 mPa vs 2.83 mPa; P = .99). Significant differences were observed between SCR and the intact cuff for glenohumeral contact force only, in favor of the intact cuff (SMD, 1.73 N vs 5.45 N; P = .03).

Conclusions
SCR may largely restore static restraints to superior humeral translation in irreparable rotator cuff tears, although active glenohumeral compression is diminished relative to the intact rotator cuff.

Clinical Relevance
Investigating the biomechanical outcomes of SCR will help surgeons better understand the effectiveness of this treatment option

BACK

Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA), Volume 29, issue 01, pages 120 -126

Posterior bony Bankart bridge technique results in reliable clinical 2-year outcomes and high return to sports rate for the treatment of posterior bony Bankart lesions.

Lacheta, L., Goldenberg, B.T., Horan, M.P. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-019-05783-x

Purpose

To introduce the arthroscopic “posterior bony Bankart bridge” repair technique, and to report clinical outcomes, patient satisfaction, recurrent instability rate, and return to sport rate.

Methods

Patients who were treated for posterior bony Bankart lesions with posterior bony Bankart bridge technique and were at least 2 years out from surgery were included. Clinical outcomes were assessed prospectively by the use of the American Shoulder and Elbow Surgeons (ASES) Score, Single Assessment Numerical Evaluation (SANE) Score, Quick Disabilities of the Arm, Shoulder and Hand (DASH) Score and patient satisfaction. Return to sports rate and complications were reported.

Results

Seven patients with a median age of 23.5 (range 17–43) and a median follow-up of 8 years (range 3–10) were included. Median time from injury to surgery was 15 days (range 3 days–2.2 years). Mean glenoid bone defect was 19% (range 11–31%). At final follow-up the median postoperative outcome scores were: ASES score 100 (range 92–100), SANE score 99 points (range 94–99) and QuickDASH 2.2 points (range 0–9). Median satisfaction of all patients was 10/10 (range 9–10). One patient reported subjective recurrent subluxations, which resolved under physical therapy. No patient underwent further surgery. No complications were noticed. At final follow-up, all patients (100%) reported that their sports participation levels were equal to their pre-injury levels.

Conclusion

The arthroscopic posterior bony Bankart bridge technique leads to reliable postoperative shoulder function and restores shoulder stability with high patient satisfaction and low complication rate in this small patient cohort for the treatment of posterior bony Bankart lesions. Also, no recurrent dislocation was observed at a minimum follow-up of at least 3 years, one patient continued to complain of subjective subluxations which resolved under physical therapy. All patients were able to return to their pre-injury sports level.

Level of evidence

Case series, Level IV.

BACK

Quantitative T2 mapping-based tendon healing is related to the clinical outcomes during the first year after arthroscopic rotator cuff repair.

Xie, Y., Liu, S., qiao, Y. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-019-05811-w

Purpose
The objective of this study was to determine the correlation between quantitative T2 mapping-based tendon healing and clinical outcomes during the first year after arthroscopic rotator cuff repair.

Methods
Twenty-two patients with rotator cuff tear were prospectively recruited. Serial clinical and MRI follow-up assessments were carried out at 1 month, 6 months and 12 months after surgery. Twenty healthy volunteers were involved and were examined with clinical and MRI assessments. Clinical assessments included Constant Score (CS), the American Shoulder and Elbow Surgeons (ASES), the modified University of California, Los Angles (UCLA) scores and Visual Analog Scale (VAS). The region of interest of tendon healing was defined directly over the medial suture anchor on T2 mapping. Spearman correlation coefficient was used to analyze the correlations between MRI measurements and clinical outcomes.

Results
All clinical scores indicated significant improvements over the postoperative observation period compared with the initial preoperative values (all $P < 0.001$). At 12 months, all of the patients returned to their daily life activities. The T2 values of the healing site significantly decreased over time ($P < 0.001$) and were comparable to those of healthy tendons at 12 months (n.s.). Additionally, the T2 values were negatively correlated with CS ($r = -0.5$, $P < 0.001$), ASES ($r = -0.5$, $P < 0.001$), and UCLA ($r = -0.5$, $P < 0.001$); and positively correlated with VAS score ($r = 0.4$, $P < 0.001$). No significant correlations were found between Sugaya classification and clinical scores (all n.s.).

Conclusions
With regard to tendon healing during the first follow-up year, the T2 values of the healing site decreased with the improvement of clinical outcomes over time.

Level of evidence
II

BACK

Arthroscopic double-button Latarjet: two-thirds of bone block healed at 90 days.

Dalmas, Y., Thélu, C.E., Laumonerie, P. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-019-05830-7

Purpose
The aim of this study was to evaluate the union rate and risk factors for delayed union in the early postoperative period after an arthroscopic Latarjet with double-button fixation.

Method
In a retrospective study, postoperative CT scans at 3 months were analysed following an arthroscopic Latarjet with double-button fixation used to treat anterior shoulder instability. Healing of the bone block, its position in the sagittal and coronal planes, and the contact area graft/scapula were analysed.

Results
Ninety-eight CT scans (98 patients) were included. The rate of healing at 3 months was 63/98 (64%) and four grafts clearly migrated. The position was perfectly flush to the glenoid rim in 67% and under the equator in 96%. The mean contact graft/scapula area was 135 mm 2 (4–420). In multivariate analysis, the risk of non-union at 3 months was associated with tobacco consumption (p = 0.001, aOR = 12.17 95% CI [2.62–56.49]), absence of preoperative glenoid bone defect (p = 0.003, aOR = 8.06 95% CI [2.06–31.56]), and a contact area graft/scapula less than 120 mm 2 (p = 0.010, aOR = 5.25 95% CI [1.50–18.40]). Among 31 non-united grafts, 93% definitively healed on CT scan at 1 year, leaving an overall rate of 93% of united grafts at last follow-up.

Conclusions
The rate of union at 3 months after an arthroscopic Latarjet with double-button fixation was 64%, reaching 93% at 1 year. This procedure should be carefully indicated in case of tobacco use or instability without glenoid bone defect, especially when the shoulder is exposed to high-energy trauma in the early phase after surgery.

BACK

Subacromial balloon spacer implantation for patients with massive irreparable rotator cuff tears achieves satisfactory clinical outcomes in the short and middle of follow-up period: a meta-analysis.

Liu, F., Dong, J., Kang, Q. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-019-05834-3

Purpose
This meta-analysis was performed systematically to evaluate the efficacy of subacromial balloon spacers for patients with massive, irreparable rotator cuff tears.

Methods
Electronic databases, including Medline/PubMed, Embase and Cochrane Library, were systematically searched to identify studies evaluating the efficacy of subacromial spacers for patients with irreparable or massive rotator cuff tears. Meta-analyses were performed to pool the outcome estimates of interest, such as the total constant score (TCS) and its sub-score (pain, activities of daily living [ADL], range of motion [ROM], and strength), Oxford shoulder score (OSS), American Shoulder and Elbow Society scores (ASES) and numeric rating scale (NRS), as well as different outcomes at different time points in the follow-up period.

Results
Ten studies with a total of 261 patients involving 270 shoulders were deemed viable for inclusion in the meta-analysis. The combined results demonstrated significant improvements in the TCS at the final follow-up (pooled mean difference = 26.4, 95% confidence intervals [CIs] 23.3 to 29.5). A sensitivity analysis and subgroup analysis, which were implemented based on two factors, different follow-up points and sub-scores (pain, ADL, ROM, and strength), revealed a consistent trend. The combined shoulder motion results demonstrated significant improvements in the forward flexion and external rotation (0° abduction) variables rather than in the abduction and external rotation (90° abduction) variables. Additionally, significant improvements in the OSS and ASES and a decrease in the NRS were observed in the middle of the follow-up period.

Conclusion
This meta-analysis indicated that subacromial balloon spacer implantation for patients with massive irreparable rotator cuff tears may achieve satisfactory outcomes between 3 months and 3 years of follow-ups. Although the short- and middle- term effect is significant, the long-term effect needs to be confirmed by large-sample randomized controlled trial.

Level of evidence
IV.

BACK

Anterior rotator cable disruption does not affect outcomes in rotator cuff tear with subscapularis involvement.

Yoon, TH., Kim, SJ., Choi, YR. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05891-z

Purpose
The purpose of this study was to compare clinical and radiological outcomes after arthroscopic repair of two different rotator cuff tear configurations: anterosuperior rotator cuff tear and rotator cuff tears with subscapularis involvement. It was hypothesized that, although both tear configurations would show significant improvement in clinical outcomes after arthroscopic repair, the rotator cuff tears with subscapularis involvement where the anterior rotator cable maintains its integrity would have better clinical outcomes and structural integrity.

Methods
This study included 226 patients who underwent arthroscopic repair of anterosuperior rotator cuff tears (n = 107, group A) and rotator cuff tears with subscapularis involvement (n = 119, group B). The visual analog scale (VAS) pain score, subjective shoulder value (SSV), American Shoulder and Elbow Surgeons (ASES) score, University of California at Los Angeles (UCLA) shoulder score, and active range of motion (ROM) were assessed. Modified belly press test was performed to assess the strength of the subscapularis muscle. Cuff integrity was evaluated using magnetic resonance arthrography or computed tomographic arthrography at 6 months after operation.

Results
At 3-year follow-up, the VAS score, SSVs, ASES scores, UCLA shoulder scores, active ROM, and modified belly press test showed significant improvement in both groups ($p < 0.001$). However, these improvements showed no statistical significance between the two groups. On follow-up radiologic evaluations, no significant difference in re-tear rates between group A (25 of 107, 23.4%) and group B (23 of 119, 19.3%) was observed.

Conclusions
The presence of anterior cable involvement of the anterosuperior rotator cuff tear did not affect postoperative clinical outcomes and re-tear rate compared to rotator cuff tears with subscapularis involvement where the anterior cable integrity was maintained, although the anterosuperior rotator cuff tear was associated with more significant preoperative supraspinatus fatty infiltration. Therefore, the present study determined that it would not be necessary to differentiate treatment protocols between these patterns.

Level of evidence
Level III

BACK

Postoperative bone marrow edema lasts no more than 6 months after uncomplicated arthroscopic double-row rotator cuff repair with PEEK anchors.

Chen, S., He, Y., Wu, D. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05897-7

Purpose
To assess the natural evolution of the osseous reaction following arthroscopic double-row rotator cuff repair with PEEK anchors and to analyze its correlation with clinical shoulder function.

Methods
Between 2015 and 2017, 159 patients received arthroscopic double-row rotator cuff repair with PEEK anchors and underwent serial clinical and radiological follow-up (3, 6, 12, and 24 months). Radiological results were analyzed by tendon integrity, bone marrow edema, and peri-implant osteolysis. Clinical shoulder function was evaluated with the Constant score.

Results
One-hundred and seventeen patients were enrolled; among them, 63% demonstrated bone marrow edema around the anchors on postoperative 3-month MRI. The edema area percentage was 41% ± 7%. At 6 months, edema was only seen in 12% of cases, with an area percentage of 18% ± 5%. At 12 and 24 months, edema was rarely present. Fluid signals around the anchor were observed in 17.6%, 42.7%, 33.3%, and 21.0% of patients at 3, 6, 12, and 24 months, respectively; the tunnel widening values were 1.1 ± 0.4 mm, 1.8 ± 0.5 mm, 2.3 ± 0.6 mm, and 2.2 ± 0.7 mm at each follow-up, respectively. The sign of osteolysis was significantly more obvious around the lateral anchor than around the medial anchor. The presence of an osseous reaction was not correlated with worse clinical outcome.

Conclusion
Osseous reactions following arthroscopic rotator cuff repair are common and significant even with PEEK anchors. Bone marrow edema does not last more than 6 months in patients without complications. Peri-implant osteolysis is more evident around the lateral anchor than around the medial anchor and improves gradually over time. The sign of osteolysis is not correlated with clinical shoulder function. Based on these findings, surgeons should be cautious about bone marrow edema lasting more than 6 months following arthroscopic rotator cuff repair.

Level of evidence
Level IV.

BACK

The novel arthroscopic subscapular quadriceps tendon–bone sling procedure provides increased stability in shoulder cadavers with severe glenoid bone loss.

Klungsøyr, J.A., Vagstad, T., Ferle, M. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05900-1

Purpose
Treatment of anterior glenoid bone loss in patients with recurrent anterior shoulder instability is a challenge. The subscapular sling method with quadriceps tendon bone (QTB) graft is a modification of the subscapular sling with a semitendinosus (ST) graft. The aim of the study was to test the biomechanical stability of the QTB sling procedure in human shoulder cadavers with severe anterior glenoid bone loss.

Methods
Fourteen cadaveric shoulders were tested with a force–moment-guided robot in three conditions: physiologically intact, anterior glenoid bone resection, and the subscapular sling procedure with a QTB graft. Joint stability was measured in anterior, anterior inferior and inferior directions in four glenohumeral joint positions: 0° and 60° of glenohumeral abduction, with each at 0° and 60° of external rotation. Maximum external rotation was measured at 0° and 60° glenohumeral abduction. Computer tomography scans were obtained preoperatively to plan the glenoid bone resection, as well as postoperatively to calculate the proportion of the glenoid bone actually resected.

Results
Significantly decreased translations were observed in the shoulders with the QTB sling compared to the intact joint and the glenoid bone loss model. No significant differences in maximum external rotation were observed between the three different conditions.

Conclusion
This biomechanical study revealed a significant stabilizing effect of the arthroscopic subscapular QTB graft sling procedure in human shoulder cadavers without compromising external rotation. Clinical trials may reveal the usefulness of this experimental method.

BACK

Partial and complete repairs of massive rotator cuff tears maintain similar long-term improvements in clinical scores.

Besnard, M., Freychet, B., Clechet, J. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05907-8

Purpose
The authors have previously published early outcomes of arthroscopic repairs of 86 massive rotator cuff tears (mRCTs) and aimed to determine whether their clinical scores are maintained or deteriorate after 5 more years.

Methods
Of the initial series of 86 shoulders, 2 had deceased, 16 lost to follow-up and 4 reoperated, leaving 64 for assessment. The repairs were complete in 44 and partial in 20, and 17 shoulders had pseudoparalysis. Preoperative assessment included absolute Constant score, shoulder strength, tear pattern, tendon retraction, and fatty infiltration. Patients were evaluated at 8.1 ± 0.6 years (range 7.1–9.3) using absolute and age-/sex-adjusted Constant score, subjective shoulder value (SSV), and simple shoulder test (SST).

Results
Absolute Constant score was 80.0 ± 11.7 at first follow-up (at 2–5 years) but diminished to 76.7 ± 10.2 at second follow-up (at 7–10 years) ($p < 0.001$). Adjusted Constant score was 99.7 ± 15.9 at first follow-up and remained 98.8 ± 15.9 at second follow-up (ns). Comparing other outcomes revealed a decrease in strength over time ($p < 0.001$) but no change in pain, SSV or SST. Partially-repaired shoulders had lower strength at both follow-ups ($p < 0.05$). Pseudoparalytic shoulders had lower absolute and adjusted Constant score at second follow-up ($p < 0.05$), but their net improvements in absolute Constant score were higher ($p = 0.014$).

Conclusions
Both partial and complete arthroscopic repairs grant satisfactory long-term outcomes for patients with mRCTs, regardless of their tear pattern, fatty infiltration and presence of pseudoparalysis. Absolute Constant score decreased over time for both repair types, but adjusted Constant score remained stable, suggesting that decline is due to aging rather than tissue degeneration. The clinical relevance of this study is that arthroscopic repair should be considered for mRCTs, even if not completely repairable, rather than more invasive and/or risky treatments, such as reverse shoulder arthroplasty.

Level of evidence
IV.

BACK

Surgical stabilization of pediatric anterior shoulder instability yields high recurrence rates: a systematic review.

Shanmugaraj, A., Chai, D., Sarraj, M. et al.

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Purpose
The purpose of this systematic review was to assess the surgical techniques, indications outcomes and complications for pediatric patients (≤ 19 years old) undergoing shoulder stabilization procedures for anterior shoulder instability.

Methods
The electronic databases MEDLINE, EMBASE, CINAHL, and Web of Science were searched from data inception to March 14, 2019 for articles addressing surgery for pediatric patients with anterior shoulder instability. The Methodological Index for Non-randomized Studies (MINORS) tool was used to assess the quality of included studies.

Results
Overall 24 studies, with a total of 688 patients (696 shoulders) and a mean age of 16.6 ± 2.5 years met inclusion criteria. Mean follow-up was 49 ± 26 months. The majority (59%) of studies only offered shoulder stabilization procedures to patients with more than one shoulder dislocation, however, three studies reported operating on pediatric patients after first time dislocations. Of the included patients 525 had arthroscopic Bankart repair (78%), 75 had open Bankart repair (11%), 34 had modified Bristow (5%), and 26 had Latarjet (4%) procedures. The overall complication rate was 26%. Patients undergoing arthroscopic Bankart repair experienced the highest recurrence rate of 24%. There were no significant differences in recurrent instability (n.s.) or loss of external rotation (n.s.) in pediatric patients treated with arthroscopic Bankart repair compared to open Latarjet. Patients had a 95% rate of return to sport at any level (i.e. preinjury level or any level of play) postoperatively (95%).

Conclusions
Pediatric patients are at high risk of recurrent instability after surgical stabilization. The majority of pediatric patients with anterior shoulder instability were treated with arthroscopic Bankart repair. Most studies recommend surgical stabilization only after more than one dislocation. However, given the high rates of recurrence with non-operative management, it may be reasonable to perform surgery at a first-time dislocation, particularly in those with other risk factors for recurrence. With the current evidence and limited sample sizes, it is difficult to directly compare the surgical interventions and their post-operative efficacy (i.e. re-dislocation rates or range of motion). There was an overall high rate of return to sport after surgical stabilization at final follow-up.

Level of evidence
IV.

BACK

The majority of patients return to athletic activity following biceps tenodesis.

Cassidy, J.T., Hurley, E.T., Moore, D. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05930-9

Purpose
Biceps tenodesis is widely used as a primary treatment for long head of the biceps brachii pathology and superior labral anterior and posterior (SLAP) lesions. However, rates and timing of full return to sports (RTSs)/duty have not been systematically analysed. This systematic review examines the literature to ascertain the rate and timing of return to athletic activity, and the availability of specific criteria for safe return to atheletic activity following the biceps tenodesis.

Methods
Based on PRISMA guidelines, this systematic review utilised the EMBASE, MEDLINE, and The Cochrane Library Databases. Eligible for inclusion were clinical studies reporting on return to athletic activity following biceps tenodesis. Statistical analysis was performed using SPSS.

Results
This review identified 17 studies including 374 cases meeting the inclusion criteria. The majority of patients were men 260 (69.7%), with an median age of 42.2 years (range 16–88) and a mean follow-up of 37.4 months. The overall rate of RTS was 217/269 (80.7%), with 43/59 (72.9%) returning to the same level. In overhead athletes, the overall rate of return to play was 39/49 (79.6%). Among military personnel, the overall rate of return to duty was 61/74 (82.4%). The average time to RTS was 5.4 (range 3–11) months. 10 (58.8%) Studies reported a recommended time window within which patients were allowed to return to full activity. Specific criteria for return to play were not reported in any of the identified studies.

Conclusion
While overall rate of return to athletic activity was reportedly high following biceps tenodesis, one in four patients were not able to resume athletic activity at the same level. At present, there is no objective assessment of when patients can return to full activity reported in the literature.

Level of evidence
IV.

BACK

Novel and reproducible technique coping with intraoperative anchor pullout during arthroscopic rotator cuff repair.

Jung, W., Kim, D.O., Kim, J. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05935-4

Purpose
To evaluate the incidence of intraoperative anchor pullout during arthroscopic rotator cuff repair, to compare the outcomes of different methods of managing anchor pullout, and to introduce a new technique for anchor pullout.

Methods
1076 patients who underwent arthroscopic rotator cuff repair using a single-row repair technique were included. In 483 patients, rotator cuff repair was performed using a screw-in type anchor, and in 593 patients, soft anchors were used. When intraoperative anchor pullout occurred, it was managed by buddy screwing, anchor insertion in a different location, cement augmentation, or by bar anchoring using a threaded Steinmann pin. Plain radiography and sonography were used to check anchor locations and healing.

Results
Fifty-two patients experienced anchor pullout intra- or postoperatively (48 and four patients, respectively). Anchor pullouts were more frequently observed for larger tears, women, older patients, and in patients with preoperative stiffness (limitations of both active and passive movements of the affected shoulder joint). For screw-in type anchors, pullout during surgery occurred in 16 patients (3.3%, 16/483), and all were managed using the buddy screwing technique. For soft anchor cases, pullout occurred in 32 patients (5.4%, 32/593) and was managed by anchor insertion in a different location (17 patients), cement augmentation (two patients), or bar anchoring using a threaded Steinmann pin (13 patients). Three patients managed by buddy screwing and two patients managed by anchor insertion in a different location had anchor failure after repair. Tendon healing at 6 months was observed in 12/16 patients treated by buddy screwing, 11/17 treated by anchor insertion in a different location, 2/2 treated by cement augmentation, and 12/13 treated by bar anchoring with a threaded Steinmann pin.

Conclusion
Intraoperative anchor pullout during arthroscopic rotator cuff repair is an uncommon but cumbersome complication. There are some techniques already introduced to deal with this complication. In comparison, not one technique is overwhelmingly superior to others; however, our new technique which is bar anchoring with a threaded Steinmann pin could be another solution, since it could utilize primary anchor sites and results appear to be acceptable.

Level of evidence
III.

BACK

Arthroscopic Bankart repair with an individualized capsular shift restores physiological capsular volume in patients with anterior shoulder instability.

Eberbach, H., Jaeger, M., Bode, L. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05952-3

Purpose
Capsular volume reduction in the context of anterior arthroscopic shoulder stabilization represents an important but uncontrolled parameter. The aim of this study was to analyse capsular volume reduction by arthroscopic Bankart repair with an individualized capsular shift in patients with and without ligamentous hyperlaxity compared to a control group.

Methods
In the context of a prospective controlled study, intraoperative capsular volume measurements were performed in 32 patients with anterior shoulder instability before and after arthroscopic Bankart repair with an individualized capsular shift. The results were compared to those of a control group of 50 patients without instability. Physiological shoulder joint volumes were calculated and correlated with biometric parameters (sex, age, height, weight and BMI).

Results
Patients with anterior shoulder instability showed a mean preinterventional capsular volume of 35.6 ± 10.6 mL, which was found to be significantly reduced to 19.3 ± 5.4 mL following arthroscopic Bankart repair with an individualized capsular shift (relative capsular volume reduction: 45.9 ± 21.9%; $P < 0.01$). Pre-interventional volumes were significantly greater in hyperlax than in non-hyperlax patients, while post-interventional volumes did not differ significantly. The average shoulder joint volume of the control group was 21.1 ± 7.0 mL, which was significantly correlated with sex, height and weight ($P < 0.01$). Postinterventional capsular volumes did not significantly differ from those of the controls (n.s.).

Conclusion
Arthroscopic Bankart repair with an individualized capsular shift enabled the restoration of physiological capsular volume conditions in hyperlax and non-hyperlax patients with anterior shoulder instability. Current findings allow for individual adjustment and intraoperative control of capsular volume reduction to avoid over- or under correction of the shoulder joint volume. Future clinical studies should evaluate, whether individualized approaches to arthroscopic shoulder stabilization are associated with superior clinical outcome.

BACK

Lateral acromioplasty cannot sufficiently reduce the critical shoulder angle if preoperatively measured over 40°.

Olmos, M.I., Boutsiadis, A., Swan, J. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05951-4

Purpose
To investigate whether arthroscopic lateral acromion resection can sufficiently reduce the critical shoulder angle (CSA) without damaging deltoid muscle insertion.

Methods
Ninety patients who underwent arthroscopic rotator cuff (RC) repair were retrospectively analysed. According to the preoperative CSA, patients were categorized as Group I (CSA < 35°) and Group II (CSA ≥ 35°). Additional arthroscopic lateral acromion resection was performed in Group II. The CSA was measured 1 week postoperatively, while RC integrity and the deltoid attachment were assessed at 3, 6 and 12 months via ultrasound. Deltoid function was evaluated using the Akimbo test, in which patients place their hands on the iliac crest with abduction in the coronal plane and internal rotation of the shoulder joint while simultaneously flexing the elbow joint and pronating the forearm.

Results
Large and massive RC tears were more prevalent in Group II ($p = 0.017$). In both groups, the CSA reduction was statistically significant (Group I = 1°: range 0°–3°, Group II = 3.7°: range 1°–8°; $p < 0.001$). When the preoperative CSA was > 40°, the respective postoperative CSA remained > 35° in 83.3% of cases ($p < 0.001$). Final shoulder strength was correlated with the amount of CSA reduction (rho = 0.41, $p = 0.002$). The postoperative CSA was higher, but not significantly different (n.s.), in patients with re-torn (36°, range 32°–40°) than with healed RC (33°, range 26°–38°). No clinical detachment or hypotrophy of the deltoid was observed with the Akimbo test and ultrasound evaluation.

Conclusions
Arthroscopic lateral acromion resection is a safe procedure without affecting deltoid muscle origin or function, and it is effective in significantly reducing the CSA. However, the CSA cannot always be reduced to < 35°, especially in patients with preoperative CSA values > 40°.

Level of evidence
III.

BACK

The Hill–Sachs interval to glenoid track width ratio is comparable to the instability severity index score for predicting risk of recurrent instability after arthroscopic Bankart repair.

Chen, KH., Yang, TC., Chiang, ER. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05955-0

Purpose
The purpose of this study was to clinically validate the Hill–Sachs interval to glenoid track width ratio (H/G ratio) compared with the instability severity index (ISI) score for predicting an increased risk of recurrent instability after arthroscopic Bankart repair.

Methods
A retrospective evaluation was performed using data from patients with anteroinferior shoulder instability who underwent arthroscopic Bankart repair with a follow-up period of at least 24 months. A receiver operating characteristic (ROC) curve was used to determine the optimal cut-off values for the H/G ratio and the ISI score to predict an increased risk of recurrent instability. The area under the ROC curve (AUC) of the two methods and the sensitivity and specificity of their optimal cut-off values were compared.

Results
A total of 222 patients were included, among whom 31 (14.0%) experienced recurrent instability during the follow-up period. The optimal cut-off values for predicting an increased risk of recurrent instability were an H/G ratio of ≥ 0.7 and ISI score of ≥ 4. There were no significant differences between the AUC of the two methods (H/G ratio AUC = 0.821, standard error = 0.035 and ISI score AUC = 0.792, standard error = 0.04; n.s.) nor between the sensitivity and specificity of the optimal cut-off values (n.s. and n.s., respectively).

Conclusions
The H/G ratio is comparable to the ISI score for predicting an increased risk of recurrent instability after arthroscopic Bankart repair. Surgeons are recommended to consider other strategies to treat anterior shoulder instability if H/G ratio is ≥ 0.7.

Level of evidence
III.

BACK

Arthroscopic treatment of type II superior labral anterior to posterior (SLAP) lesions in a younger population: minimum 2-year outcomes are similar between SLAP repair and biceps tenodesis.

Dunne, K.F., Knesek, M., Tjong, V.K. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05971-0

Purpose
Compared to a relatively older population over 30–40 years of age, the efficacy of biceps tenodesis for type II SLAP lesions in a younger population is not well studied. The purpose of this study was to compare outcomes between biceps tenodesis and labral repair for type II SLAP lesions in a young active population.

Methods
Patients aged 15–40 who underwent primary arthroscopic biceps tenodesis or SLAP repair for type II SLAP tears between 2009 and 2016 were included. Shoulders with intraarticular chondral damage, full thickness rotator cuff tear, rotator cuff repair, labral repair outside of the superior labrum, bony subacromial decompression, and acromioclavicular joint resection were excluded. Patient-reported outcomes were evaluated using the American Shoulder and Elbow Surgeons (ASES) score, Disabilities of the Arm, Shoulder, and Hand Sports/Performing Arts Module (DASH-sport), visual analog scale (VAS) for pain, and satisfaction. Return to sport rates were also recorded.

Results
Fifty-three patients (20 tenodesis, 33 repair) were available for minimum 2-year follow-up. Postoperatively, there were no significant differences in mean ASES, DASH-sport, VAS, and satisfaction between groups [ASES: tenodesis 86.3 vs. repair 86.4 (n.s.); DASH-sport: 11.0 vs. 22.5 (n.s.); VAS: 1.85 vs. 1.64 (n.s.); satisfaction: 8.50 vs. 8.00 (n.s.)]. Rate of return to pre-injury level of performance/competition in sport/physical activity was also similar between groups [tenodesis 63% vs. repair 50% (n.s.)].

Conclusions
In a young active population, primary arthroscopic biceps tenodesis is a viable surgical alternative to labral repair for type II SLAP lesions. The results of this study suggest that indications for arthroscopic tenodesis can safely be expanded to a younger patient group than has previously been demonstrated in the literature.

Level of evidence
III.

BACK

Arthroscopic iliac crest bone grafting in recurrent anterior shoulder instability: minimum 5-year clinical and radiologic follow-up.

Boehm, E., Minkus, M., Moroder, P. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05986-7

Purpose
To investigate the clinical and radiologic mid- to long-term results of arthroscopic iliac crest bone-grafting for anatomic glenoid reconstruction in patients with recurrent anterior shoulder instability.

Methods
Seventeen patients were evaluated after a minimum follow-up of 5 years. Clinical [range of motion, subscapularis tests, apprehension sign, Subjective Shoulder Value (SSV), Constant Score (CS), Rowe Score (RS), Walch Duplay Score (WD), Western Ontario Shoulder Instability Index (WOSI)], and radiologic [X-ray (true a.p., Bernageau and axillary views) and computed tomography (CT)] outcome parameters were assessed.

Results
Fourteen patients [mean age 31.1 (range 18–50) years] were available after a follow-up period of 78.7 (range 60–110) months. The SSV averaged 87 (range 65–100) %, CS 94 (range 83–100) points, RS 89 (range 30–100) points, WD 87 (range 25–100) points, and WOSI 70 (range 47–87) %. The apprehension sign was positive in two patients (14%). One patient required an arthroscopic capsular plication due to a persisting feeling of instability, while the second patient experienced recurrent dislocations after a trauma, but refused revision surgery. CT imaging showed a significant increase of the glenoid index from preoperative 0.8 ± 0.04 (range 0.7–0.8) to 1.0 ± 0.11 (range 0.8–1.2) at the final follow-up ($p < 0.01$).

Conclusion
Arthroscopic reconstruction of anteroinferior glenoid defects using an autologous iliac crest bone-grafting technique yields satisfying clinical and radiologic results after a mid- to long-term follow-up period. Postoperative re-dislocation was experienced in one (7.1%) of the patients due to a trauma and an anatomic reconstruction of the pear-shaped glenoid configuration was observed.

Level of evidence
IV.

BACK

A classification for partial subscapularis tendon tears.

Martetschläger, F., Zampeli, F., Tauber, M. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05989-4

Purpose
The aim of the study was to analyze partial subscapularis tendon (SSC) tears and provide a descriptive classification.

Methods
The retrospective study included 50 patients with arthroscopically confirmed partial SSC tears. Internal rotation (IR) force measurements and IR ROM have been made and compared to the healthy contralateral side. Then the footprint of the SSC was routinely investigated by arthroscopy with standardized measurement of the bony footprint lesion. The partial tears were classified according to the mediolateral and craniocaudal extension of the rupture in the transverse and coronal plane, respectively.

Results
Partial SSC tears could be classified into split lesions (type 1, n = 11) and 3 further groups depending on the mediolateral peeled-off length of the bony footprint (type 2: < 10 mm, n = 20; type 3: 10–15 mm, n = 10; type 4: > 15 mm, n = 9). Type 2–4 could be further divided depending on the craniocaudal peeled-off length of the bony footprint (group A: < 10 mm, group B: 10–15 mm, group C: > 15 mm). Significantly decreased IR strength was shown for types 2–4 ($p < 0.05$) but not for split lesions as compared to healthy side. Types 1–4 showed significant decreased active IR ROM and all except type 3 (n.s.) which showed decreased passive IR ROM compared to the healthy side ($p < 0.05$).

Conclusion
We present a novel classification for partial SSC tears for a more detailed and reproducible description. This can help to improve the current knowledge about the appropriate treatment. It could be shown that partial tears of the subscapularis can have an impact on IR strength and motion.

Level of evidence
III

BACK

Journal of Shoulder and Elbow Surgery (JSES), Volume 30, issue 01, pages 1-8

Celecoxib significantly reduces opioid use after shoulder arthroplasty.

Burns, K.A., Robbins, L.M., LeMarr, A.R., et al.

DOI: https://doi.org/10.1016/j.jse.2020.08.025

Background
The opioid crisis has illuminated the risks of opioid use for pain management, with renewed interest in reducing opioid consumption after common orthopedic procedures. Anti-inflammatory medication is an important component of multimodal pain management for patients undergoing orthopedic surgery. The purpose of this study was to evaluate the effect of celecoxib on pain control and opioid use after shoulder surgery.

Methods
Patients scheduled for either total shoulder replacement (group 1) or rotator cuff repair (group 2) were candidates for the study. The exclusion criteria included allergy to celecoxib, coagulopathy, use of anticoagulants, baseline use of long-acting opioids, and a history of medical conditions such as myocardial infarction or stroke. Consenting patients were randomized by type of procedure using block randomization to receive either placebo or celecoxib 1 hour prior to the procedure and for 3 weeks postoperatively. The primary outcome measure assessed was opioid utilization as measured by morphine-equivalent dose (MED). Secondary outcome measures included pain scores at 3 and 6 weeks postoperatively. Data were analyzed using multiple linear regression.

Results
Of 1081 patients scheduled for either total shoulder replacement or rotator cuff repair from February 2014 to February 2018, 78 were enrolled for arthroplasty (group 1, with 39 receiving celecoxib and 39 receiving placebo) and 79 were enrolled for rotator cuff repair (group 2, with 40 receiving celecoxib and 39 receiving placebo). Compared with the placebo arm, patients prescribed celecoxib took fewer MEDs by –168 (95% confidence interval [CI], –272 to –64; $P < .01$) at 3 weeks in the total population and by –197.7 (95% CI, –358 to –38; $P = .02$) in the arthroplasty group. Similarly, at 6 weeks, total MEDs used was –199 (95% CI, –356 to –42; $P < .01$) in the total population and –270 (95% CI, –524 to –16; $P = .04$) in the arthroplasty group. No statistically significant differences in opioid consumption were found between study arms in the cuff repair group, at either 3 or 6 weeks. Of note, preoperative opioid use was statistically associated with higher levels of opioid use in the total population and group 1 at 3 and 6 weeks ($P < .01$ for all) but not in group 2 ($P > .05$ for both).

Conclusions
Use of morphine equivalents was statistically significantly less at 3 and 6 weeks in patients who took celecoxib in the total population and in the arthroplasty group. Patients prescribed celecoxib for 3 weeks after shoulder surgery took less opioid medication for pain at 3 and 6 weeks. Multimodal pain control using celecoxib is an effective way to reduce postoperative opioid use in shoulder arthroplasty patients. Preoperative opioid use is associated with higher levels of opioid use after shoulder arthroplasty.

Level of evidence
Level I, Randomized Controlled Trial

BACK

Combination of risk factors affecting retear after arthroscopic rotator cuff repair: a decision tree analysis.

Harada,N., Gotoh, M., Ishitani,E., et al.

DOI: https://doi.org/10.1016/j.jse.2020.05.006

Background
Several risk factors for postoperative retear after arthroscopic rotator cuff repair (ARCR) have been cited in a large number of reports; various combinations of these seem to be present in the clinical setting.

Purpose
Using a combination model for decision tree analysis, we aimed to investigate the combination of risk factors that affect postoperative retear the most.

Methods
A total of 286 patients who underwent magnetic resonance (MR) imaging at 6 months after surgery were included in this study. Based on the structural integrity of the MR images taken 6 months after surgery, the patients were divided into a healed group (intact tendon, 254 patients) and a retear group (ruptured tendon, 32 patients). Using univariate and decision tree analyses, we selected a combination of 11 risk factors that drastically affected postoperative retear.

Results
The mean age was 64.9 ± 7.1 years, and the mean symptom duration was 9.7 ± 11.6 months. The tear was small/medium in 177 patients and large/massive in 109 patients. The technique for surgical repair was single row in 42 patients, double row in 60 patients, and suture bridging in 216 patients. On univariate analysis, both groups had significant differences in the anteroposterior (AP) tear size ($P < .0001$), mediolateral tear size ($P < .0001$), hyperlipidemia ($P = .0178$), global fatty degeneration index ($P < .0001$), supraspinatus fatty degeneration stage ($P < .0001$), and critical shoulder angle (CSA) ($P = .0015$). All of these 5 risk factors, except for mediolateral tear size, were selected as candidates for the decision tree analysis. Eight combination patterns were determined to have prediction probabilities that ranged from 4.3% to 86.1%. In particular, the combination of an AP tear size of ≥40 mm, hyperlipidemia, and a CSA of ≥37° affected retear after ARCR the most.

Conclusions
Decision tree analysis lead to the extraction of different retear factor combinations, which were divided into 5 retear groups. The worst combination was of AP tear size ≥40 mm, hyperlipidemia, and CSA ≥37°, and the prediction probability of this combination was 86.2%. Therefore, our data may offer a new index for the prediction of retear after ARCR.

Level of evidence
Level III, Retrospective Cohort Comparison

BACK

***Cutibacterium acnes* is an intracellular and intra-articular commensal of the human shoulder joint.**

Hudek, R., Brobeil, A., Brüggemann, H., et al.

DOI: https://doi.org/10.1016/j.jse.2020.04.020

Background
Cutibacterium acnes (*C acnes*) is a mysterious member of the shoulder microbiome and is associated with chronic postoperative complications and low-grade infections. Nevertheless, it is unclear whether it represents a contaminant or whether it accounts for true infections. Because it can persist intracellularly in macrophages at several body sites, it might in fact be an intra-articular commensal of the shoulder joint.

Methods
In 23 consecutive, otherwise healthy patients (17 male, 6 female; 58 years) who had no previous injections, multiple specimens were taken from the intra-articular tissue during first-time arthroscopic and open shoulder surgery. The samples were investigated by cultivation, genetic phylotyping, and immunohistochemistry using *C acnes*–specific antibodies and confocal laser scanning microscopy.

Results
In 10 patients (43.5%), cultures were *C acnes*–positive. Phylotype IA1 dominated the subcutaneous samples (71%), whereas type II dominated the deep tissue samples (57%). Sixteen of 23 patients (69.6%) were *C acnes*–positive by immunohistochemistry; in total, 25 of 40 samples were positive (62.5%). Overall, 56.3% of glenohumeral immunohistochemical samples, 62.5% of subacromial samples, and 75% of acromioclavicular (AC) joint samples were positive. In 62.5% of the tested patients, *C acnes* was detected immunohistochemically to reside intracellularly within stromal cells and macrophages.

Discussion
These data indicate that *C acnes* is a commensal of the human shoulder joint, where it persists within macrophages and stromal cells. Compared with culture-based methods, immunohistochemical staining can increase *C acnes* detection. Phylotype II seems to be most prevalent in the deep shoulder tissue. The high detection rate of *C acnes* in osteoarthritic AC joints might link its intra-articular presence to the initiation of osteoarthritis.

Level of evidence
Level III, Cross-Sectional Design

BACK

Risk factors for symptomatic retears after arthroscopic repair of full-thickness rotator cuff tears.

Lobo-Escolar, L., Ramazzini-Castro, R., Codina-Grañó, D., et al.

DOI: https://doi.org/10.1016/j.jse.2020.05.010

Background
Factors affecting a rotator cuff symptomatic retear after arthroscopic repair have yet to be clearly identified, since they usually influence the surgical decisions.

Methods
Consecutive patients with full-thickness tear of the supraspinatus who underwent arthroscopic repair were retrospectively analyzed. Cases of symptomatic retear, defined as Sugaya type IV and V on magnetic resonance imaging, associated with intensive pain and/or functional impairment were identified at follow-up. The patients with no symptomatic retear were selected as the control group. Information from potential risk factors of symptomatic retear, including depression and subacromial corticosteroid injections, was extracted from the medical records. The statistical analysis included multivariant logistic regression.

Results
The symptomatic retear rate was 9.5% in 158 patients. Patients in the symptomatic retear group were more likely to be smoking, to have massive tears, a short acromiohumeral distance, and moderate to severe fatty infiltration. They also had had more frequently subacromial corticosteroid injections and depression. However, following the multiple logistic regression analysis, only massive tears and moderate to severe fatty infiltration remained significantly associated. Similarly, in relation to the study hypothesis, both corticosteroid injections (odds ratio [OR] 6.66, 95% confidence interval [CI] 1.49, 29.81; *P* = .013) and depression (OR 8.26, IC 1.04, 65.62; *P* = .046) were significantly associated with symptomatic retear risk.

Conclusions
This study found support for the hypothesis that both depression and corticosteroid infiltration before surgery are independent risk factors for symptomatic retear after arthroscopic repair of rotator cuff.

Level of evidence
Level III, Retrospective Cohort Comparison

BACK

Postoperative rotator cuff integrity: can we consider type 3 Sugaya classification as retear?

Muniandy, M., Niglis, L., Dosch, J.C., et al.

DOI: https://doi.org/10.1016/j.jse.2020.05.002

Background
Sugaya classification is a widely accepted classification system that is used to analyze postoperative rotator cuff tendon integrity. However, there are inconsistencies in the literature as to whether type 3 Sugaya should be considered as a retear or healed tendon.

Purpose
We aimed to show that type 3 Sugaya is not a retear by comparing the long-term supraspinatus and infraspinatus muscle degeneration and the functional outcomes of type 3 with those of type 4 and 5 Sugaya. We hypothesized that the clinical course of type 3 Sugaya would be different from type 4 or 5 Sugaya.

Method
The study was a retrospective multicenter review of all the rotator cuff repair done in 2003-2004. We included all the patients who had undergone supraspinatus repair with 10-year follow-up (magnetic resonance imaging done with full functional assessment). Data collection included pre- and postoperative supraspinatus and infraspinatus fatty infiltration, supraspinatus muscle atrophy, and Constant score with a separate analysis of its Strength subsection. Supraspinatus tendon integrity at 10-year follow-up was determined according to Sugaya classification. The patients were divided into 2 groups: type 3 Sugaya and type 4 and 5 Sugaya. Statistical comparison was done between the groups.

Results
There was no significant difference in the preoperative fatty infiltration of the supraspinatus and infraspinatus, supraspinatus muscle atrophy, and Constant score between the 2 groups. However, type 3 Sugaya patients had significantly better scores in the preoperative Strength subsection. Postoperatively, type 3 Sugaya patients showed significantly lesser fatty infiltration of the supraspinatus and infraspinatus, lesser supraspinatus muscle atrophy, and higher Constant score compared with type 4 and 5 Sugaya ($P < .001$).

Conclusion
Patients with type 3 Sugaya supraspinatus tendon exhibited lesser muscle degeneration in the supraspinatus and infraspinatus and performed better in functional assessment compared with type 4 and 5 Sugaya patients. We inferred that type 3 Sugaya should not be considered as a retear.

Level of evidence
Level III, Retrospective Cohort Comparison

BACK

American Journal of Sports Medicine (AJSM), Volume 49, Issue 01, pp. 146–153

Factors Predicting Frequency and Severity of Postoperative Pain After Arthroscopic Rotator Cuff Repair Surgery

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https://doi.org/10.1177/0363546520971749

Background:
Postoperative pain after arthroscopic rotator cuff repair (RCR) is difficult to predict and manage. The experience of pain is thought to be influenced by a range of different factors. Determining which patient factors contribute to the pain may help us to better understand and manage it.

Purpose:
To evaluate the preoperative patient characteristics that may be predictive of, and correlated with, postoperative pain after arthroscopic RCR.

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

Methods:
The study evaluated 2172 patients who underwent an arthroscopic RCR between February 2004 and December 2015. Pain frequency and severity were measured preoperatively and at 6 weeks after surgery using a modified L'Insalata questionnaire with Likert scales. This 6-week time point was chosen as previous studies have shown patients rank this time point as high in terms of pain after RCR. Logistic regression analysis was conducted to examine the relationship between postoperative pain scores and preoperative pain scores, age, sex, tear size, strength, level of sporting and work activity, and work-related injury status.

Results:
The severity of preoperative pain at night ($r = 0.33$; $P < .001$), preoperative pain at rest ($r = 0.32$; $P < .001$), and frequency of extreme pain ($r = 0.31$; $P < .001$) were the strongest independent associations with the frequency of pain at 6 weeks postoperatively. Other associations with postoperative pain frequency included reduced liftoff strength ($r = −0.21$; $P < .001$), work-related injury status ($P < .001$), younger age ($P = .001$), and female sex ($P = .04$). Tear size was inversely related with pain severity ($R2 = 0.85$). The severity of preoperative pain had the strongest independent association with the severity of postoperative pain at 6 weeks after surgery ($r = 0.35$; $P < .001$). Other associations with postoperative pain severity included increased patient-ranked preoperative stiffness ($P < .001$), a poorer impression of one's shoulder ($P < .001$), reduced level of sporting activity ($P < .001$), and work-related injury status ($P < .001$).

Conclusion:
Multiple risk factors have been identified for postoperative pain after RCR, the strongest of which is preoperative pain. However, of note, the magnitude of the correlations between preoperative severity and frequency of pain and postoperative severity and frequency of pain were found to be weak to moderate ($r = 0.30$-0.35). This suggests that while preoperative pain and its severity are associated with postoperative pain, other factors are likely involved in predicting pain. Smaller tear size, younger age, female sex, and work-related injuries were also associated with postoperative pain at 6 weeks after surgery.
Eric D. Haunschild, BS, Ron Gilat, MD, Michael C. Fu, MD, Tracy Tauro, BS, Hailey P. Huddleston, BS, Adam B. Yanke, MD, Brian Forsythe, MD, Nikhil N. Verma, MD, Brian J. Cole, MD, MBA†

BACK

BACK

The Bone and Joint Journal (BJJ), Volume 103, Issue 01

Preoperative bone marrow stimulation does not improve functional outcomes in arthroscopic cuff repair: A prospective randomized controlled trial

Peter Lapner, J. W. Pollock, Odette Laneuville, Hans K. Uhthoff, Tinghua Zhang, Adnan Sheikh, Katie McIlquham, Guy Trudel

https://doi.org/10.1302/0301-620X.103B1.BJJ-2020-0011.R2

Aims
Despite recent advances in arthroscopic rotator cuff repair, re-tear rates remain high. New methods to improve healing rates following rotator cuff repair must be sought. Our primary objective was to determine if adjunctive bone marrow stimulation with channelling five to seven days prior to arthroscopic cuff repair would lead to higher Western Ontario Rotator Cuff (WORC) scores at 24 months postoperatively compared with no channelling.

Methods
A prospective, randomized controlled trial was conducted in patients undergoing arthroscopic rotator cuff repair. Patients were randomized to receive either a percutaneous bone channelling of the rotator cuff footprint or a sham procedure under ultrasound guidance five to seven days prior to index surgery. Outcome measures included the WORC, American Shoulder and Elbow Surgeons (ASES), and Constant scores, strength, ultrasound-determined healing rates, and adverse events.

Results
Overall, 94 patients were randomized to either bone channelling or a sham procedure. Statistically significant improvements in all clinical outcome scores occurred in both groups from preoperative to all timepoints ($p < 0.001$). Intention-to-treat analysis revealed no statistical differences in WORC scores between the two interventions at 24 months postoperatively ($p = 0.690$). No differences were observed in secondary outcomes at any timepoint and healing rates did not differ between groups ($p = 0.186$).

Conclusion
Preoperative bone channelling one week prior to arthroscopic rotator cuff repair was not associated with significant improvements in WORC, ASES, Constant scores, strength, or ultrasound-determined healing rates.

BACK

Lower Extremity

Arthroscopy, Volume 37, Issue 01, P 86-94

Arthroscopic Capsular Management of the Hip: A Comparison of Indications for and Clinical Outcomes of Periportal Versus Interportal Capsulotomy

McGovern, R. P., Bucci, G., Nickel, B. A., Ellis, H. B., Wells, J. E., & Christoforetti, J. J.

https://doi.org/10.1016/j.arthro.2020.08.004

Purpose
To compare the clinical outcomes of periportal capsulotomy versus interportal capsulotomy with closure using a standard clinical algorithm at a minimum of 2 years after hip arthroscopy.

Methods
A retrospective cohort study of patients treated from July 2015 to October 2017 was conducted to determine the effects of 2 capsular management approaches on clinical outcomes. When patient pathology limited adequate exposure via periportal capsulotomy, an interportal capsulotomy was performed. The capsular management approaches were correlated with the following patient-reported outcomes (PROs) at 2 years: Hip Outcome Score (HOS), 12-item International Hip Outcome Tool, visual analog scale for pain, and patient satisfaction. Preoperative comparisons between the 2 groups were analyzed using t tests or the Fisher exact test, depending on the category of data. Two-tailed independent t tests were performed to evaluate whether preoperative and follow-up outcome scores were significantly different between patients treated with a periportal capsulotomy and those treated with an interportal capsulotomy.

Results
Overall, patients in both groups experienced significant improvements in all PROs on postoperative comparisons at 2-year follow-up ($P < .001$). The mean changes in the PROs were as follows: HOS–Activities of Daily Living, 24.7 in the periportal group and 23.5 in the interportal group ($P = .484$); HOS–Sport-Specific Subscale, 30.2 and 31.3, respectively ($P = .895$); 12-item International Hip Outcome Tool score, 41.9 and 40.2, respectively ($P = .564$); and visual analog scale pain score, –40.9 mm and –34.5 mm, respectively ($P = .791$). Additionally, no statistically significant difference in patient satisfaction at 2-year follow-up was found between patients who underwent interportal capsulotomy and those who underwent periportal capsulotomy ($P = .604$).

Conclusions
At 2-year follow-up, patients who underwent a periportal capsulotomy reported statistically and clinically significant improvements in PROs and satisfaction with the surgical intervention. This study confirms that the use of a simple clinical algorithm for selection of periportal capsulotomy or interportal capsulotomy with closure results in acceptable management decisions as defined by 2-year PROs.

Level of Evidence
Level III, retrospective cohort study.

BACK

Decreased Hip Labral Width Measured via Preoperative Magnetic Resonance Imaging Is Associated With Inferior Outcomes for Arthroscopic Labral Repair for Femoroacetabular Impingement

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https://doi.org/10.1016/j.arthro.2020.08.006

Purpose
To determine the association between labral width as measured on preoperative magnetic resonance imaging (MRI) and hip-specific validated patient self-reported outcomes at a minimum of 2 years' follow-up.

Methods
We performed an institutional review board–approved retrospective review of prospectively gathered hip arthroscopy patients from 2010 to 2017. The inclusion criteria were defined as patients aged 18 to 65 years with radiographic evidence of femoroacetabular impingement who underwent a primary labral repair and had a minimum of 2 years' clinical follow-up. The exclusion criteria were defined as inadequate preoperative imaging, prior hip surgery, Tönnis grade 1 or higher, or lateral center-edge angle lower than 25°. An a priori power analysis was performed. MRI measurements of labral width were conducted by 2 blinded, musculoskeletal fellowship–trained radiologists at standardized "clock-face" locations using a previously validated technique. Outcomes were assessed using the Harris Hip Score (HHS), modified Harris Hip Score (mHHS), and Non-arthritic Hip Score (NAHS). For the mHHS, scores of 8 and 74 were used to define the minimal clinically important difference and patient acceptable symptomatic state, respectively. Patients were divided into groups by a labral width less than 1 SD below the mean (hypoplastic) or widths above 1 SD below the mean. Statistical analysis was performed using linear and polynomial regression; the Mann-Whitney U, χ 2, and Fisher exact tests; and intraclass correlation coefficient testing.

Results
A total of 103 patients (107 hips) met the inclusion criteria (mean age, 39.4 ± 17 years; body mass index, 25.0 ± 4; 51% right sided; 68% female patients; mean follow-up, 76.5 ± 19.1 months [range, 30.0-113.0 months]). Mean labral width at the 11:30 clock-face position (indirect rectus), 3-o'clock position (psoas U), and 1:30 clock-face position (point halfway between the 2 aforementioned positions) was 7.1 ± 2.2 mm, 7.0 ± 2.0 mm, and 5.5 ± 1.9 mm, respectively. Intraclass correlation coefficient agreements were good to excellent between readers at all positions (0.83-0.91, $P < .001$). The preoperative HHS, mHHS, and NAHS were not statistically significantly different ($P > .05$) between the 2 groups. Sex, laterality, and body mass index were not predictive of outcomes ($P > .05$). The postoperative HHS, mHHS, and NAHS were found to be significantly lower in the hypoplastic group at each location tested ($P < .01$), including the mHHS at the 11:30 clock-face position (69 vs 87), 3-o'clock position (70 vs 87), and 1:30 clock-face position (71 vs 87). The proportion of patients with hypoplastic labra who reached the minimal clinically important difference was significantly lower ($P < .001$) at the 11:30 clock-face position (50% vs 91%), 3-o'clock position (56% vs 90%), and 1:30 clock-face position (58% vs 91%) in comparison to the non-hypoplastic labrum group. The proportion of patients with hypoplastic labra above the patient acceptable symptomatic state was significantly lower ($P < .001$) at the 11:30 clock-face position (44% vs 83%), 3-o'clock position (37.5% vs 84%), and 1:30 clock-face position (42% vs 85%) in comparison to the non-hypoplastic labrum group. Linear regression modeling was not significant at any position ($P > .05$). Polynomial regression was significant at the 11:30 clock-face position ($R 2 = 0.23$, $P < .001$), 3-o'clock position ($R 2 = 0.17$, $P < .001$), and 1:30 clock-face position ($R 2 = 0.26$, $P < .004$).

Conclusions
Hip labral width less than 1 SD below the mean measured via preoperative MRI was associated with significantly worse functional outcomes after arthroscopic labral repair and treatment of

BACK

femoroacetabular impingement. The negative relation between labral width and outcomes may be nonlinear.

Level of Evidence
Level IV, case series with subgroup analysis.

BACK

Allograft Augmentation of Hamstring Autograft in Anterior Cruciate Ligament Reconstruction Results in Equivalent Outcomes to Autograft Alone

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https://doi.org/10.1016/j.arthro.2020.07.010

Purpose
To examine allograft augmentation of undersized hamstring (HS) autograft tendons at the time of anterior cruciate ligament (ACL) reconstruction, compared with un-augmented autograft HS ACL reconstruction.

Methods
Patients who underwent ACL reconstruction at our institution between 2005 and 2015 were reviewed. Inclusion criteria included patients who underwent (1) primary ACL reconstruction, (2) use of a hybrid HS autograft with allograft augmentation, and (3) had a minimum 2-year postoperative follow-up. Patients with revision ACL, multiligamentous injuries, all-epiphyseal fixation techniques, or additional procedures beyond chondroplasty or meniscal repair/debridement were excluded. Data collected included demographics, graft size, concomitant procedures, revision operation, revision ACL reconstruction, and patient-reported outcomes.

Results
In total, 59 patients met criteria for inclusion into the hybrid group, and 80 patients were eligible for inclusion into the control group. The average age of the cohort was 22.9 (interquartile range Q1:17, Q3: 38.3), and 51.8% of the patients were female. Seven patients (11.9%) in the hybrid ACL group underwent revision ACL surgery versus 15 (18.8%) in the control group (P = .27). There was no difference in patient-reported outcomes between groups.

Conclusions
Augmenting an HS ACL autograft that is 8 mm or less with allograft tissue to increase the overall size of the ACL graft shows no difference in overall reoperation or revision of ACL failure. The hybrid autograft/allograft ACL reconstruction patients showed no clinically important difference between groups in patient-reported outcome measures.

Level of Evidence
Level III, case–control comparative analysis.

BACK

Beighton Score, Tibial Slope, Tibial Subluxation, Quadriceps Circumference Difference, and Family History Are Risk Factors for Anterior Cruciate Ligament Graft Failure: A Retrospective Comparison of Primary and Revision Anterior Cruciate Ligament Reconstructions

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https://doi.org/10.1016/j.arthro.2020.08.031

Purpose
To assess patient history, physical examination findings, magnetic resonance imaging (MRI) and 3-dimensional computed tomographic (3D CT) measurements of those with anterior cruciate ligament (ACL) graft failure compared with primary ACL tear patients to better discern risk factors for ACL graft failure.

Methods
We performed a retrospective review comparing patients who underwent revision ACL reconstruction (ACLR) with a primary ACLR group with minimum 1-year follow-up. Preoperative history, examination, and imaging data were collected and compared. Measurements were made on MRI, plain radiographs, and 3D CT. Inclusion criteria were patients who underwent primary ACLR by a single surgeon at a single center with minimum 1-year follow-up or ACL graft failure with revision ACLR performed by the same surgeon.

Results
A total of 109 primary ACLR patients, mean age 33.7 years (range 15 to 71), enrolled between July 2016 and July 2018 and 90 revision ACLR patients, mean age 32.9 years (range 16 to 65), were included. The revision ACLR group had increased Beighton score (4 versus 0; $P < .001$) and greater side-to-side differences in quadricep circumference (2 versus 0 cm; $P < .001$) compared with the primary ACLR group. A family history of ACL tear was significantly more likely in the revision group (47.8% versus 16.5%; $P < .001$). The revision group exhibited significantly increased lateral posterior tibial slope (7.9° versus 6.2°), anterolateral tibial subluxation (7.1 versus 4.9 mm), and anteromedial tibia subluxation (2.7 versus 0.5 mm; all $P < .005$). In the revision group, femoral tunnel malposition occurred in 66.7% in the deep-shallow position and 33.3% in the high-low position. The rate of tibial tunnel malposition was 9.7% from medial to lateral and 54.2% from anterior to posterior. Fifty-six patients (77.8%) had tunnel malposition in ≥2 positions. Allograft tissue was used for the index ACLR in 28% in the revision group compared with 14.7% in the primary group.

Conclusion
Beighton score, quadriceps circumference side-to-side difference, family history of ACL tear, lateral posterior tibial slope, anterolateral tibial subluxation, and anteromedial tibia subluxation were all significantly different between primary and revision ACLR groups. In addition, there was a high rate of tunnel malposition in the revision ACLR group.

BACK

Prevalence of Lumbosacral Transitional Vertebrae in Patients With Symptomatic Femoroacetabular Impingement Requiring Hip Arthroscopy

Luo, R., Barsoum, D., Ashraf, H., Cheng, J., Hurwitz, N. R., Goldsmith, C., & Moley, P. J.

https://doi.org/10.1016/j.arthro.2020.08.034

Purpose

The primary aim of this study was to determine the prevalence of lumbosacral transitional vertebrae (LSTVs) in patients with symptomatic femoroacetabular impingement (FAI) requiring hip arthroscopy. The secondary aim was to determine whether there is an association between LSTV anatomy and patient-reported outcomes.

Methods

This retrospective study included patients aged 18 to 45 years with symptomatic FAI who underwent arthroscopy between March 2010 and March 2016 and had anteroposterior pelvic radiographs. The exclusion criteria included lack of an FAI diagnosis, hip osteoarthritis (Tönnis grade ≥ 2), prior spinal fusion surgery, prior total hip arthroplasty, indications for total hip arthroplasty, and revision surgery on the affected hip. All radiographs were assessed by an interventional spine and sports fellow. The primary outcome was the prevalence of LSTVs, classified using the criteria of Castellvi et al. Secondary outcomes included the modified Harris Hip Score, Hip Outcome Score, and International Hip Outcome Tool 33 score.

Results

A total of 1,880 patients were included. Review of the patients' radiographs yielded 262 LSTVs, for an overall prevalence of 13.9% (type IA in 104 [5.5%], type IB in 53 [2.8%], type IIA in 60 [3.2%], type IIB in 25 [1.3%], type IIIA in 8 [0.4%], type IIIB in 0 [0%], and type IV in 12 [0.64%]). The prevalence of type II, III, and IV LSTVs was 5.6% (n = 105). Unilateral LSTV sidedness did not correlate with symptom laterality (κ = 0.07). There were no differences in patient-reported outcomes between patients with LSTV anatomy and those without it.

Conclusions

In this large cohort of 1,880 patients with symptomatic FAI, the prevalence of LSTVs was 13.9%. There was no correlation between sidedness of unilateral LSTVs and the symptomatic hip. Furthermore, there was no association between LSTV anatomy and patient-reported outcomes. The prevalence of LSTVs in this cohort was similar to the prevalence rates previously reported in patients with low-back pain.

Level of Evidence

Level IV, case series

BACK

Degree of Anterolateral Ligament Injury Impacts Outcomes After Double-Bundle Anterior Cruciate Ligament Reconstruction

Ahn, J. H., Lee, S. K., Mun, J. W., & Kim, S. W.

https://doi.org/10.1016/j.arthro.2020.09.003

Purpose
To evaluate the effect of anterolateral ligament (ALL) injury identified on preoperative magnetic resonance imaging (MRI) on postoperative outcomes after double-bundle (DB) anterior cruciate ligament reconstruction (ACLR).

Methods
For this retrospective study, the inclusion criteria were patients who were at least 3 years out of DB ACLR. Exclusion criteria included a delay in MRI over 4 weeks, delay in surgery over 6 months, single-bundle ACLR, and revision surgery. Enrolled patients were divided into 2 groups according to the ALL injury grade in preoperative MRI by a musculoskeletal radiologist who was blinded to the perioperative findings (the high-grade group with complete or nearly complete tear: n = 53 and the low-grade group with intact ALL or partial tear: n = 33). Knee laxity, clinical outcomes using the International Knee Documentation Committee (IKDC) examination form, and revision rates were compared at the last follow-up (8.1 ± 2.2 years). An independent t test was applied to compare continuous variables, and χ 2 or Fisher exact test was used to compare the nominal variables.

Results
The anterior translation was 3.2 ± 1.9 mm in the high-grade group and 1.6 ± 1.0 mm in the low-grade group (P < .001). The high-grade group showed 18 cases with a pivot-shift grade of 2 or 3 (40.0%); however, the low-grade group showed only 1 case with a pivot-shift grade 2 or 3 (3.0%) (P = .002). The high-grade group also showed inferior outcomes in the IKDC objective grade (grade A: 49.0%; grade B: 17.0%; grade C: 30.2%; grade D: 3.8% vs grade A: 90.9%; grade B: 6.1%; grade C: 3.0%; grade D: 0%, P = .001) and IKDC subjective score (87.5 ± 9.9 vs 93.9 ± 5.3, P < .001). In addition, the high-grade group showed a greater revision rate (11.3% vs 0%, P = .045).

Conclusions
DB ACLR for patients with high-grade ALL injury resulted in increased knee laxity, worse clinical outcomes, and higher revision rate compared to patients with low-grade ALL injury.

Level of Evidence
Level III, retrospective comparative study

BACK

All-Inside Arthroscopic Modified Broström Technique to Repair Anterior Talofibular Ligament Provides a Similar Outcome Compared With Open Broström-Gould Procedure

Zhou, Y.-F., Zhang, Z.-Z., Zhang, H.-Z., Li, W.-P., Shen, H.-Y., & Song, B.

https://doi.org/10.1016/j.arthro.2020.08.030

Purpose
To introduce an all-inside modified Broström technique to suture the anterior talofibular ligament (ATFL) and inferior extensor retinaculum (IER) under arthroscopy and to compare its outcomes with those of the conventional open procedure.

Methods
All patients who underwent arthroscopic or open repair of the ATFL between June 2014 and December 2017 were included in this study. Visual analog scale (VAS), Karlsson and Peterson (K-P), American Orthopedic Foot and Ankle Society (AOFAS) ankle/hindfoot, and Tegner activity scores, as well as manual anterior drawer test (ADT), were used to evaluate the patients preoperatively and ≥2 years after surgery. The Sefton grading system was used to assess the level of satisfaction after surgery. Detailed surgical data and intraoperative findings were documented at the time of surgery.

Results
A total of 67 patients, 31 in the arthroscopic group and 36 in the open group, were included in this study (43 men and 24 women, mean body mass index 24.00, range 19.53 to 30.03). The surgical duration in the arthroscopic group (median, 34 minutes; range, 25 to 74) was significantly shorter than that in the open group (mean, 43.08 ± 8.11 minutes; 95% confidence interval [CI] 40.34 to 45.83) (P = .007). At the last follow-up, the subjective functional scores and ADT results improved significantly in both cohorts (P < .001). However, no significant difference was found in the VAS score (1.74 ± 1.24, 95% CI 1.29 to 2.2, in the open group versus 1.58 ± 1.2, 95% CI 1.18 to 1.99, in the arthroscopic group; P = .581), AOFAS score (91.71 ± 5.46, 95% CI 89.71 to 93.71, versus 90.67 ± 5.59, 95% CI 88.78 to 92.56; P = .444), K-P score (87.52 ± 7.59, 95% CI 84.73 to 90.3, versus 88.75 ± 5.56, 95% CI 86.87 to 90.63; P = .446), and ADT evaluation (normal: 96.77% versus 94.44%, P = .557) between the arthroscopic and open groups, respectively. In addition, 28 cases (90.32%) in the arthroscopic group and 32 (88.89%) in the open group achieved satisfactory results based on the Sefton grading system (P = .736). Seventeen patients (47.2%) in the open group and 18 patients (58.1%) in the arthroscopic group underwent Tegner evaluation after surgery, which showed no significant difference (5, interquartile range [IQR] 1 in the open group versus 5, IQR 3 in the arthroscopic group; P = .883). Complications were reported in 4 (11.1%) and 2 (6.5%) patients who underwent open and arthroscopic surgeries, respectively (P = .813).

Conclusions
Both open and arthroscopic modified Broström surgeries generated favorable outcomes, with a significant improvement compared with the preoperative condition. Compared with the open Broström-Gould procedure, the all-inside arthroscopic modified Broström technique produced equivalent functional and clinical results at a minimum of 2 years after the operation, with a shorter surgical duration. Arthroscopic repair might be a safe and viable alternative to open surgery for lateral ankle stabilization.

Level of Evidence
III.

BACK

Superior Postoperative Stability and Functional Outcomes With Anteromedial Versus Transtibial Technique of Single-Bundle Autologous Hamstring Anterior Cruciate Ligament Reconstruction: A Meta-analysis of Prospective Randomized Controlled Trials

Moorthy, V., Sayampanathan, A. A., & Chye Tan, A. H.

https://doi.org/10.1016/j.arthro.2020.07.018

Purpose
The aim of this meta-analysis was to compare the postoperative stability and functional outcomes of anteromedial (AM)– and transtibial (TT)–based single-bundle hamstring anterior cruciate ligament (ACL) reconstruction techniques.

Methods
A meta-analysis comparing the outcomes of single-bundle hamstring ACL reconstruction using the AM and TT techniques was performed. Prospective randomized controlled trials identified from searches of PubMed, Cochrane, and Embase were included in this review. The outcome measures analyzed included postoperative Lachman test and pivot-shift test results, side-to-side difference, International Knee Documentation Committee (IKDC) score, Lysholm score, and Tegner activity score.

Results
A total of 7 randomized controlled trials (654 patients) were included in this review. The AM technique, compared with the TT technique, resulted in superior postoperative stability based on the negative Lachman test rate (risk ratio [RR], 1.12; 95% confidence interval [CI], 1.01 to 1.24; P = .03; 95% prediction interval [PI], 0.32 to 3.46), negative pivot-shift test rate (RR, 1.16; 95% CI, 1.06 to 1.28; P = .002; 95% PI, 0.40 to 2.88), and side-to-side difference (weighted mean difference [WMD], –0.32 mm; 95% CI, –0.48 to –0.16; P < .0001; 95% PI, –0.55 to –0.09). Likewise, the AM technique contributed to superior postoperative functional outcomes based on the proportion of IKDC grade A findings (RR, 1.16; 95% CI, 1.02 to 1.32; P = .03; 95% PI, 0.40 to 2.83) and the Lysholm score (WMD, 0.82; 95% CI, 0.23 to 1.41; P = .007; 95% PI, –0.22 to 1.86). However, the AM and TT techniques had comparable subjective IKDC scores (WMD, 0.98; 95% CI, –0.91 to 2.88; P = .31; 95% PI, –3.18 to 5.14) and Tegner activity scores (WMD, 0.32; 95% CI, –0.23 to 0.86; P = .25; 95% PI, –3.84 to 4.48).

Conclusions
The AM method of single-bundle hamstring ACL reconstruction results in superior postoperative stability and functional outcomes compared with the TT method.

Level of Evidence
Level I, systematic review of Level I studies.

BACK

Return to Play After Anterior Cruciate Ligament Reconstruction with Extra-Articular Augmentation: A Systematic Review

Hurley, E. T., Manjunath, A. K., Strauss, E. J., Jazrawi, L. M., & Alaia, M. J.

https://doi.org/10.1016/j.arthro.2020.06.007

Purpose
The purpose of the current study is to systematically review the current evidence in the literature to ascertain rates of return to play after ACLR with extra-articular augmentation (EA).

Methods
A literature search was performed based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Studies were included if they evaluated and reported on return to play after ACLR + EA; case studies and review articles were excluded. The outcomes measured focused on (1) return to play, (2) return to play at the same or higher level, and (3) timing of return to play. Qualitative analysis and quantitative analysis were performed using SPSS.

Results
Overall, 19 studies met our inclusion criteria. Among patients undergoing primary ACLR, 82.8% to 100% were able to return to play, with 64% to 100% able to return at the same or higher level of play. All professional athletes were able to return to play, and 85.7% to 100% were able to return to the same level of preoperative play. The mean time to return was 5 to 11 months in those undergoing primary ACLR + EA. Among those undergoing revision ACLR, 50% to 88.4% were able to return to play, with 41.5% to 77.8% able to return at the same or higher level of play. None of the 5 studies that compared rate of return to play (at any level) between ACLR + EA and ACLR alone found a significant difference between them. However, among the 6 studies that compared rate of return to play at the same level between ACLR + EA and ACLR alone, 2 studies found a significantly higher rate of return to play with ACLR + EA.

Conclusion
ACLR + EA resulted in high levels of return to play in those undergoing either primary or revision ACLR. Additionally, comparative studies of patients undergoing primary ACLR with or without EA reported similarly high rates of return to play.

Level of Evidence
Level IV, systematic review of level I to IV studies

BACK

Knee Surgery, Sports Traumatology, Arthroscopy, January 2021, volume 29, issue 1, pages: 44-50.

Steep posterior slope and shallow concave shape of the medial tibial plateau are risk factors for medial meniscus posterior root tears.

Okazaki, Y., Furumatsu, T., Kodama, Y. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-019-05590-4

Purpose
Bone morphological factors are important for menisci. Their association with medial meniscus posterior root tears, however, has not yet been studied. This study aimed to compare sagittal medial tibial slope and medial tibial plateau depth between knees with and without medial meniscus posterior root tears.

Methods
Nine healthy volunteers, 24 patients who underwent anterior cruciate ligament reconstruction, and 36 patients who underwent medial meniscus posterior root pullout repair were included. Magnetic resonance imaging examinations were performed in the 10°-knee-flexed position. The medial tibial slope and medial tibial plateau depth were compared among the groups.

Results
In healthy volunteers, the anterior cruciate ligament reconstruction group, and the medial meniscus posterior root tear group, the medial tibial slopes were 3.5° ± 1.4°, 4.0° ± 1.9°, and 7.2° ± 1.9°, respectively, and the medial tibial plateau depths were 2.1 ± 0.7 mm, 2.2 ± 0.6 mm, and 1.2 ± 0.5 mm, respectively. Patients with medial meniscus posterior root tears had a significantly steep medial tibial slope and shallow medial tibial plateau concavity compared to those of healthy volunteers ($P < 0.01$) and the anterior cruciate ligament group ($P < 0.01$). In the multivariate logistic regression analysis, body mass index, medial tibial slope, and medial tibial plateau depth were significantly associated with medial meniscus posterior root tears.

Conclusions
A steep posterior slope and a shallow concave shape of the medial tibial plateau are risk factors for medial meniscus posterior root tear.

Level of evidence
Level III: Case–control study.

BACK

The “sleeper’s sign” is valid and suggestive of a medial sub-meniscal flap tear.

Lefevre, N., Klouche, S., Sezer, H.B. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-019-05655-4

Purpose
To describe, evaluate and validate the diagnostic performance of a new clinical sign, the sleeper’s sign, for the diagnosis of a medial submeniscal flap tear (MSMFT).

Methods
This retrospective single-center series included patients aged 18–55 years old who underwent arthroscopic treatment in 2013–2015 for a medial meniscal tear. This study was performed according to STARD (standards for reporting of diagnostic accuracy) guidelines, and the reference test was a peroperative diagnosis of a MSMFT. The preoperative consultation reports were all analyzed to search for the sleeper’s sign, defined as night time medial tibiofemoral pain when the patient is in the fetal position with both knees in contact and no pain during daytime activities.

Results
Three-hundred and ten patients responded to the study criteria, mean age 41.7 ± 9.7 years old. The sleeper’s sign was identified in 39 (12.6%) patients and a MSMFT was confirmed during arthroscopy in 47 (15.2%) cases, with significant agreement between this sign, arthroscopy (kappa = 0.78, p = 10–4) and MR-imaging (kappa = 0.72, p < 0.0001). The performance parameters of the sleeper’s sign were: sensitivity 74.5 ± 12.5%, specificity 98.5 ± 1.6%, Youden index 0.73 and accuracy 96.9%. MR imaging was found to be more sensitive (91.5 ± 8%). Multivariate analysis identified the sleeper’s sign as a risk factor of MSMFT during arthroscopy: OR 131.9 CI 95% [26.9–646.2], p < 0.0001 and a bone edema next to the flap tear on MR-imaging: OR 13, CI 95% [1.9–7.1], p = 0.008.

Conclusion
The “sleeper’s sign” is a new, valid, highly specific clinical sign for the diagnosis of a medial submeniscal flap tear. MRI was found to be more sensitive than the sleeper’s sign.

Level of evidence
II.

BACK

Large chondral defect not covered by meniscal allograft is associated with inferior graft survivorship after lateral meniscal allograft transplantation.

Park, JG., Bin, SI., Kim, JM. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-019-05713-x

Purpose
This study aimed to evaluate graft survivorship according to the size and location of chondral defects and its effect on clinical outcomes after meniscal allograft transplantation (MAT). It was hypothesized that large chondral defects would be associated with inferior outcomes.

Methods
Patients who underwent lateral MAT with fresh-frozen allografts between 2007 and 2016 were retrospectively reviewed. The inclusion criteria were patients with femoral or tibial chondral defects (International Cartilage Repair Society grade 4) who were followed up more than 2 years with 3.0-T magnetic resonance imaging (MRI) scans. Maximal lesion diameter and location were assessed on MRI. The patients were divided into two groups, with chondral defects of < 3 and ≥ 3 cm2 on the tibial side. Graft survivorship was compared between the two groups. Graft failure was defined as revisional MAT, meniscal tear or meniscectomy greater than one-third of the allograft on MRI. Clinical outcomes were evaluated using the modified Lysholm score.

Results
Twenty-eight knees in 26 patients (mean age 37.4 ± 10.3 years) with a mean follow-up of 3.6 ± 1.0 (range 2.0–5.4) years were identified. Nineteen knees in 17 patients had both femoral and tibial chondral defects, 7 knees in 7 patients had only femoral chondral defects, and 2 knees in 2 patients had only tibial chondral defects. The mean preoperative femoral and tibial chondral defect sizes were 1.7 ± 1.2 and 3.0 ± 1.4 cm2, respectively. Among the seven graft failures, no graft failure occurred in the cases with tibial chondral defects of < 3 cm2. Tibial chondral defects of ≥ 3 cm2 were significantly associated with graft failure (P = 0.004; odds ratio 28.3; 95% confidence interval 2.5–4006.7). Defects of < 3 cm2 were located primarily in the posterior aspect of the lateral tibial plateau, and most lesions were covered by allograft (7/9, 77.8%). The modified Lysholm scores significantly improved irrespective of chondral defects size (P < 0.001).

Conclusions
Larger chondral defects, more than 3 cm2 on the tibial side, were associated with inferior graft survivorship but did not influence the clinical outcomes after MAT at the 3.6-year follow-up. Chondral defect location was associated with defect size.

Level of evidence
IV.

BACK

Predictive factors for developing osteochondritis dissecans after surgery for discoid lateral meniscus are younger age and shorter meniscal width.

Mochizuki, T., Tanifuji, O., Sato, T. et al.

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Purpose
This study aimed to identify the predictive factors for postoperative osteochondritis dissecans (OCD) in juvenile and adolescent knees with discoid lateral meniscus (DLM).

Methods
In total, 242 patients with symptomatic DLM who underwent surgery were identified. Inclusion criteria were set as follows: (1) age ≤ 17 years with an open growth plate, (2) follow-up magnetic resonance imaging, and (3) absence of preoperative OCD. Consequently, 52 patients were retrospectively investigated. Average age during surgery, body mass index (BMI), and follow-up duration were 12 years [95% confidence interval (CI) 11–13], 19.2 kg/m2 (95% CI 18.4–20.1), and 27.3 months (95% CI 20.9–33.7), respectively. Age, sex, sports activities, BMI, symptomatic OCD in other joints, postoperative rehabilitation, preoperative shift of DLM by Ahn's classification, surgical procedures (saucerization alone or with stabilization, and subtotal meniscectomy), and postoperative meniscal width were analyzed as possible predictive factors.

Results
Postoperatively, 42 patients without OCD and 10 with OCD were observed. In univariate analysis, younger age [odds ratio (OR) 1.5; p = 0.003], subtotal meniscectomy (OR 6.3; p = 0.027), and shorter meniscal width (OR 2.7; p = 0.005) were predictive factors for postoperative OCD. Multivariate analysis demonstrated that younger age (OR 1.6; p = 0.009) and shorter meniscal width (OR 1.5; p = 0.003) were predictive factors.

Conclusions
To prevent postoperative OCD after DLM surgeries, achieving stabilization with adequate meniscal width is necessary for juvenile knees.

Level of Evidence
III.

BACK

Polyurethane scaffold implants for partial meniscus lesions: delayed intervention leads to an inferior outcome.

Condello, V., Dei Giudici, L., Perdisa, F. et al.

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Purpose
The purpose of this study was to assess the clinical outcomes of the implantation of an aliphatic polyurethane scaffold for the treatment of partial loss of meniscal tissue at a mean follow-up of 36 months.

Methods
A retrospective review on prospectively collected data was performed on patients who underwent implantation of an aliphatic polyurethane-based synthetic meniscal scaffold. Patients were evaluated for demographics data, lesion and implant characteristics (sizing, type and number of meniscal sutures), previous and combined surgeries and complications. Clinical parameters were rated using NRS, IKDC subjective, Lysholm, KOOS, and Tegner activity score, both preoperatively and at final follow-up.

Results
Sixty-seven patients were evaluated at a mean follow-up of 36 months (48 M and 19 F; mean age 40.8 ± 10.6 years; mean BMI 25.4 ± 4.3). The scaffold was implanted on the medial side in 54 cases, and on the lateral one in 13. Forty-seven patients had undergone previous surgical treatment at the same knee and 45 required combined surgical procedures. All evaluated scores improved significantly from the baseline. Among possible prognostic factors, a delayed scaffold implantation had lower post-operative clinical scores: IKDC subjective ($P = 0.049$), KOOS Sport ($P = 0.044$), KOOS total ($p = 0.011$), and Tegner ($P = 0.03$) scores at follow-up.

Conclusions
The polyurethane meniscal scaffold implantation led to a significant clinical benefit in a large number of patients. A delayed intervention correlated with worse results.

Level of evidence
IV.

BACK

A professional athlete functionally active 10 years after an arthroscopic lateral collagen meniscus implant.

Marcheggiani Muccioli, G.M., Lullini, G., Cammisa, E. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05876-y

Abstract
The case of a former high-level professional soccer player is presented at 10-year follow-up after arthroscopically implanted lateral Collagen Meniscus Implant (CMI). The patient achieved a full-knee functional recovery and a complete sport resumption to the same pre-injury level for several soccer seasons and he is still performing semi-professional soccer activity (minor league) 10 years after surgery.

Level of evidence
Case Report. Level IV.

BACK

Arthroscopic coronal plane syndesmotic instability has been over-diagnosed.

Hagemeijer, N.C., Elghazy, M.A., Waryasz, G. et al.

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Purpose
Ankle arthroscopy is widely used for diagnosis of syndesmotic instability, especially in subtle cases. To date, no published article has systematically reviewed the literature in aggregate to understand which instability values should be used intraoperatively. The primary aim was to systematically review the amount of tibiofibular displacement that correlates with syndesmotic instability after a high ankle sprain. A secondary aim is to assess the quality of such research.

Methods
Systematic searches of EMBASE (Ovid) and MEDLINE via PubMed, CINAHL, Web of Science, and Google Scholar were used. Inclusion criteria: studies that arthroscopically evaluated the fibular displacement at various stages of syndesmotic ligament injury. Two reviewers independently extracted data and assessed methodological quality using the Anatomical Quality Assessment (AQUA) Tool and methodological index for non-randomized studies (MINORS).

Results
Eight cadaveric studies and three clinical studies were included for review. All studies reported displacement in the coronal plane, four studies reported in the sagittal plane, and one reported findings in the rotational plane. Four cadaveric studies had a similar experimental set up and the weighted mean associated with instability in the coronal plane could be calculated and was 2.9 mm at the anterior portion of the distal tibiofibular joint and 3.4 mm at the posterior portion. Syndesmotic instability in the sagittal plane is less extensively studied, however available data from a cadaveric study suggests thresholds of 2.2 mm of posterior fibular translation when performing an anterior to posterior hook test and 2.6 mm of anterior fibular translation when performing a posterior to anterior hook test.

Conclusions
The results have concluded that the commonly used 2.0 mm threshold value of distal tibiofibular diastasis may lead to overtreatment of syndesmotic instability, and that using threshold values of 2.9 mm measured at the anterior portion of the incisura and 3.4 mm at the posterior portion may represent better cut off values. Given the ready availability of 3 mm probes among standard arthroscopic instrumentation, at the very least surgeons should use 3 mm in lieu of 2 mm probes intraoperatively.

III.

BACK

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Accurate Arthroscopic Cam Resection Normalizes Contact Stresses in Patients With Femoroacetabular Impingement

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Background: Femoroacetabular impingement (FAI) is increasingly recognized as a cause of hip pain in young adults. The condition leads to chondrolabral separation and chondral delamination and eventually predisposes to osteoarthritis of the hip. FAI that inflicts cartilage damage has been observed in hips with abnormal morphological characteristics and is related to a long-term evolution toward osteoarthritis. Arthroscopic surgery, which allows for correction of morphological characteristics and restores impingement-free motions, is the current standard of treatment.

Hypothesis: Arthroscopic cam resection can restore the normal mechanical environment of the hip joint in cam-type FAI.

Study Design: Descriptive laboratory study.

Methods: Patient-specific discrete element models from 10 patients with cam-type FAI (all male; age, 18-40 years) were defined based on preoperative computed tomography scans and postoperative magnetic resonance imaging (MRI) scans. Complete cam resection postoperatively on MRI was confirmed with alpha angles <55°. The preoperative and postoperative peak contact stress findings during impingement testing were compared against a matched control group.

Results: Peak contact stress was significantly elevated in patients with cam-type FAI during impingement testing, with increasing amounts of internal hip rotation (26.6 ± 11.64 MPa in cam patients preoperatively, 12.1 ± 4.62 MPa in those same patients postoperatively, and 11.4 ± 1.72 MPa in the virtual control group during impingement testing at 20° of internal hip rotation; $P < .01$). This effect was normalized after arthroscopic cam resection and loading patterns matched those of the control group.

Conclusion: Accurate arthroscopic cam resection restored the normal peak joint contact stresses in the hip joint. This highlights the importance of early and complete cam resections in the face of a positive diagnosis of cam-type FAI.

BACK

No Correlation Between Depth of Acetabuloplasty or Postoperative Lateral Center-Edge Angle on Midterm Outcomes of Hip Arthroscopy With Acetabuloplasty and Labral Repair

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Background: The treatment of pincer deformity in hip arthroscopy remains controversial, with some authors advocating that over resection may risk early joint deterioration. The role of acetabular resection depth and postoperative acetabular morphology on postoperative outcomes has yet to be defined.

Purpose/Hypothesis: This study measures the influence of acetabular resection depth and postoperative lateral center-edge angle (LCEA) on minimum 5-year patient-reported outcomes (PROs), revision rates, and conversion to total hip arthroplasty using a single surgeon's prospective database. We hypothesized that patients with acetabular resections >10°, as measured by LCEA, or patients with postoperative LCEA outside the normal range of 25° to 35° would have lower PROs, higher revision rates, and higher conversion to total hip arthroplasty at midterm follow-up.

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

Methods: A total of 192 patients who underwent primary hip arthroscopy with acetabuloplasty and labral repair by a single surgeon with a minimum 5-year follow-up met the inclusion criteria. Preoperative and postoperative LCEAs were measured on supine anteroposterior radiographs, and patients were divided into cohorts based on LCEA and acetabular resection depth. Cohorts for postoperative LCEA were <20° (dysplasia), 20° to 25° (borderline dysplasia), 25° to 35° (normal), and >35° (borderline overcoverage). Cohorts for acetabular resection depth were <5°, 5° to 10°, and >10° difference from preoperative to postoperative LCEA. Outcome measures included the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), 12-Item Short Form Health Survey, modified Harris Hip Score, Hip Outcome Score, satisfaction scores, revision rates, and conversion to arthroplasty rates.

Results: Patients significantly improved in all outcome score measures at final follow-up. There were no statistically significant differences in PRO scores or conversion to total hip arthroplasty between any cohorts in the postoperative LCEA group. There were more revisions in the 25° to 35° cohort than the other cohorts (P = .02). The 5-10° resection depth cohort demonstrated a higher postoperative WOMAC score (P = .03), but otherwise no statistically significant differences were seen between resection depth cohorts in the remaining postoperative outcomes scores, revision rates, or conversion to total hip arthroplasty rates.

Conclusion: Patients with postoperative LCEA values outside the normal reference range and with large resections perform similar to those with normal postoperative LCEA values and smaller resections at a minimum 5-year follow-up.

BACK

Hip Arthroscopic Surgery in the Context of Femoroacetabular Impingement Syndrome, Labral Tear, and Acetabular Overcoverage: Minimum 5-Year Outcomes With a Subanalysis Against Patients Without Overcoverage

David R. Maldonado, MD, Samantha C. Diulus, BS, Jacob Shapira, MD, Philip J. Rosinsky, MD, Cynthia Kyin, BA, Hari K. Ankem, MD, Ajay C. Lall, MS, MD, Benjamin G. Domb, MD‖

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Background: Improvement in patient-reported outcomes (PROs) has been reported in the short term after hip arthroscopy for femoroacetabular impingement syndrome (FAIS) and labral tear in the setting of acetabular overcoverage. Yet, there is a paucity of information in the literature on midterm PROs.

Purpose: To (1) report minimum 5-year PROs in patients who underwent primary hip arthroscopy for FAIS and acetabular labral tears in the context of acetabular overcoverage and (2) compare outcomes with those of a propensity-matched control group without acetabular overcoverage.

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

Methods: Data were prospectively collected and retrospectively analyzed on all patients who underwent hip arthroscopy for FAIS and labral tears between February 2008 and November 2013. Inclusion criteria were lateral center-edge angle >40° and minimum 5-year follow-up for the modified Harris Hip Score (mHHS), Nonarthritic Hip Score (NAHS), and the Hip Outcome Score–Sports-Specific Subscale (HOS-SSS). Exclusion criteria were previous ipsilateral hip surgery or conditions, active workers' compensation claims, or lack of minimum 5-year outcomes. A 1:1 propensity-matched comparison was made between the study group and a control group without acetabular overcoverage (lateral center-edge angle, 25°-40°) based on age at surgery, sex, body mass index, Tönnis grade, laterality, and follow-up time. The minimal clinically important difference (MCID) was calculated for the mHHS, HOS-SSS, and NAHS. Secondary surgical procedures were recorded.

Results: A total of 54 patients satisfied the inclusion criteria for the study group, of whom 45 (83.3%; 45 hips) had a minimum 5-year follow-up and were matched without differences in age at surgery, sex, body mass index, or follow-up time. The study and control groups demonstrated significant and comparable improvements for the mHHS (mean ± SD Δ, 24.06 ± 24.19 vs 26.33 ± 17.27; P = .625), NAHS (Δ, 31.22 ± 25.31 vs 27.15 ± 17.61; P = .399), and HOS-SSS (Δ, 33.16 ± 34.73 vs 34.75 ± 26.15; P = .557). The rates for achieving the MCID were similar for the study and control groups for the mHHS (76.7% vs 84.2%; P = .399), HOS-SSS (79.1% vs 75.8%; P = .731), and NAHS (81.4% vs 84.2%; P = .738). Need for revision surgery was similar (P = .748). A lower conversion rate to total hip arthroplasty was reported for the study than for the control group (2.2% vs 15.6%; P = .026).

Conclusion: In the context of FAIS, labral tears, and acetabular overcoverage, patients who underwent hip arthroscopy reported significant improvement in several PROs at minimum 5-year follow-up. Moreover, outcomes were comparable with those of a propensity-matched control group without acetabular overcoverage. Furthermore, the rate of achieving the MCID for the mHHS, HOS-SSS, and NAHS was similar between these groups.

BACK

Revision Hip Arthroscopy in the Borderline Dysplastic Population: Reporting Outcomes With Minimum 2-Year Follow-up, With a Subanalysis Against a Propensity-Matched Nondysplastic Control Group

David R. Maldonado, MD, Cynthia Kyin, BA, Jacob Shapira, MD, Philip J. Rosinsky, MD, Mitchell B. Meghpara, MD, Mitchell J. Yelton, BS, Ajay C. Lall, MD, MS, Benjamin G. Domb, MD‖

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Background: Hip arthroscopy in patients with borderline dysplasia continues to be surrounded by controversy. Even more controversial is the management of the failed hip arthroscopy in this population. There is a paucity of studies in contemporary literature regarding outcomes after arthroscopic revision surgery.

Purpose: (1) To report minimum 2-year patient-reported outcome (PRO) scores in patients with borderline dysplasia who underwent revision hip arthroscopy and (2) to compare these PRO scores with those of a propensity-matched control group without dysplasia who underwent revision hip arthroscopy.

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

Methods: Data were prospectively collected between August 2009 and November 2017. Inclusion criteria were revision arthroscopic surgery, capsular plication, and baseline and minimum 2-year follow-up for the following PROs: modified Harris Hip Score (mHHS), Nonarthritic Hip Score (NAHS), Hip Outcome Score–Sports Specific Subscale (HOS-SSS), and visual analog scale (VAS) for pain. Patients with Tönnis grade >1 or previous hip conditions were excluded. Two groups were created: a study group with borderline dysplasia (lateral center-edge angle [LCEA], 18°-25°) and a control group without dysplasia (LCEA, 25°-40°). Groups were propensity-matched in a 1:3 ratio for sex, age, body mass index, and follow-up time.

Results: A total of 22 revision borderline dysplastic hips (21 patients) had a minimum 2-year follow-up during the study period. Patients in this group reported significant improvements for all PROs from baseline and achieved the minimal clinically important difference (MCID) for the mHHS at a rate of 70%. Moreover, 21 borderline dysplastic hips (21 patients) were matched to 63 control hips (63 patients). Mean LCEA for the study and control groups was 22.6 ± 1.7 and 32.0 ± 5.0, respectively. Both groups reported similar improvement in all PROs. The rate for achieving the MCID for the mHHS and VAS was similar between groups; however, the control group had higher rates of meeting the MCID for the HOS-SSS and NAHS (P = .042 and P = .025, respectively). The rates of conversion to hip arthroplasty were 7.9% (n = 5) in the control group and 23.8% (n = 5) in the borderline dysplasia propensity-matched group (P = .052). The rate of re-revision arthroscopy was 11.1% (n = 7) in the control group and 19.0% (n = 4) on the borderline dysplasia group (P = .350).

Conclusion: After revision hip arthroscopy, significant improvement was obtained for all PROs in patients with borderline dysplasia at a minimum 2-year follow-up. Moreover, outcomes, patient satisfaction, the rate for achieving the MCID for the mHHS and VAS, and the rate for secondary surgery were similar to those of a propensity-matched control group without dysplasia. Nevertheless, there was a nonsignificant trend toward higher secondary procedures in the study group; therefore, arthroscopic revision surgery in the borderline patients should be approached with measured prognosis.

BACK

Hip Arthroscopy for Femoroacetabular Impingement in Adolescents: 10-Year Patient-Reported Outcomes

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Background: Limited evidence exists comparing short- and long-term patient-reported outcomes (PROs) and overall survival rates after hip arthroscopy for femoroacetabular impingement syndrome (FAIS).

Hypothesis: Patients with high improvement (HI) versus low improvement (LI) at 1 year postoperatively would achieve higher PROs and better index procedure survival rates at 5-year follow-up.

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

Methods: Patients who underwent primary hip arthroscopy for FAIS between September 2012 and March 2014 with minimum 5-year outcome data were identified. Using the median 1-year change in modified Harris Hip Score (mHHS) as a threshold, HI and LI subcohorts were determined. Analysis of variance was used to compare PROs. Failure rates were determined using Kaplan-Meier and Cox proportional hazards model analyses. Regression analysis was used to identify factors associated with increasing 5-year change in mHHS and Nonarthritic Hip Score (NAHS).

Results: Out of 108 eligible consecutive patients, 89 (82.4%) were included (mean [SD]: age, 43.3 [14.6] years; body mass index, 25.4 [4.5]). As compared with the LI group (n = 45), the HI group (n = 44) had a longer 5-year index surgery survival rate (mean ± SEM: 83.7 ± 3.3 months vs 68.5 ± 4.6 months; P = .012) and 5-year estimated survival rate (89% vs 71%). The HI group had a decreased risk of failure versus the LI group (hazard ratio, 0.15; P = .002). The HI group also had greater PROs than did the LI group at 1 year (mHHS: 94.8 ± 1.2 vs 72.6 ± 2.7, P < .001; NAHS: 94.0 ± 1.3 vs 75.6 ± 2.2, P < .001) and 5 years (mHHS: 86.9 ± 2.0 vs 77.6 ± 3.4, P = .017; NAHS: 92.6 ± 1.8 vs 82.7 ± 4.1, P = .020). As compared with the LI group, the HI group achieved higher rates of the Patient Acceptable Symptomatic State (PASS) and minimal clinically important difference (MCID) at 1 year (PASS: 95% vs 42%, P < .001; MCID: 100% vs 89%, P = .056) and 5 years (PASS: 77% vs 45%, P = .002; MCID: 86% vs 64%, P = .014). Linear regression demonstrated that being in the HI group (ΔmHHS, P = .041; ΔNAHS, P = .017) and decreasing body mass index (ΔmHHS, P = .055; ΔNAHS, P = .023) were associated with higher 5-year ΔPROs.

Conclusion: Patients with FAIS and significant improvement in the first year after hip arthroscopy had superior 5-year outcomes versus patients with persistent symptom severity. Survival rates and PROs were significantly better in patients who achieved high early outcomes at the 1-year mark.

BACK

Age and Outcomes in Hip Arthroscopy for Femoroacetabular Impingement: A Comparison Across 3 Age Groups

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https://doi.org/10.1177/0363546520974370

Background: Limited evidence exists concerning the effect of age on hip arthroscopy outcomes for femoroacetabular impingement (FAI).

Purpose/Hypothesis: The purpose was to investigate patient-reported outcomes (PROs) and clinical failure rates across various age groups in patients undergoing hip arthroscopy for FAI. We hypothesized that older patients would experience lower improvements in PROs and higher clinical failure rates.

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

Methods: A total of 109 of 130 eligible consecutive patients underwent hip arthroscopy for FAI with a minimum 5-year follow-up. Patients were stratified into 3 groups for comparison (ages 15-34, 35-50, and 51-75 years). Clinical survival rates to revision surgery or total hip arthroplasty (THA) were determined by Kaplan-Meier analysis, and PROs were assessed using analysis of variance. Regression analysis was used to determine factors associated with clinical failure and ΔPROs from baseline to 5 years.

Results: The 5-year survival-to-revision rate was 71% (survival time, 69.2 months; 95% CI, 62.8 to 75.5 months). A significant difference in survival to THA was found between groups (P = .030). Being in the older group versus the young and middle-aged groups predicted increased risk of THA conversion (hazard ratio, 5.7; 95% CI, 1.1 to 28.6; P = .035). Overall modified Harris Hip Score (mHHS) and Nonarthritic Hip Score (NAHS) improved from baseline to 5 years (mHHS, P < .001; NAHS, P < .001). Body mass index (mHHS: beta, −1.2; 95% CI, −2.2 to −0.3; P = .013; NAHS: beta, −1.6; 95% CI, −2.6 to −0.5; P = .005) and baseline PROs (mHHS: beta, −0.8; 95% CI, −1.1 to −0.4; P < .001; NAHS: beta, −0.7; 95% CI, −1.1 to −0.4; P < .001) were predictive of 5-year ΔPROs. A decrease was seen in minimal clinically important difference rates in middle-aged (P = .011) and old (P = .030) groups from 6-month to 5-year outcomes.

Conclusion: Although hip arthroscopy for FAI yielded improvements in PROs regardless of age, middle-aged and older patients experienced greater declines in clinical outcomes over time than younger patients. Older patients remain good candidates for arthroscopy despite a greater risk for conversion to THA.

BACK

The Influence of Body Mass Index on Outcomes After Hip Arthroscopy for Femoroacetabular Impingement Syndrome: Five-Year Results in 140 Patients

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https://doi.org/10.1177/0363546520976357

Background: Significant short-term improvements in function and pain after arthroscopic management of femoroacetabular impingement syndrome (FAIS) have been demonstrated regardless of mass index (BMI). No studies have reported the influence of obesity on mid- to long-term outcomes.

Purpose: To evaluate the effect of BMI class on 5-year patient outcomes after arthroscopic treatment of FAIS.

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

Methods: A retrospective review of a prospective database was performed to identify patients who underwent arthroscopic treatment for FAIS. A matched-pair analysis for age and sex was performed in a 1:1:2:3 fashion for morbidly obese (BMI ≥35), obese (BMI = 30-34.9), overweight (BMI = 25-29.9), and normal weight (BMI = 18.5-24.9) patients, respectively. Patient characteristics, imaging, Hip Outcome Score Activities of Daily Living (HOS-ADL) and Sports Subscale (HOS-SS) scores, modified Harris Hip Score (mHHS), and pain scores were recorded preoperatively, with the same outcome scores recorded at 5 years postoperatively, along with satisfaction scores. Standardized modern hip arthroscopy, with labral repair, acetabuloplasty, femoroplasty, and capsular plication followed by formalized rehabilitation, was performed for all patients. Absolute outcomes along with change in outcomes were assessed between BMI groups. A between-group analysis was also conducted evaluating achievement of the minimal clinically important difference (MCID), patient acceptable symptomatic state (PASS), and substantial clinical benefit (SCB) for any outcome score. A multivariable analysis was additionally included to evaluate outcomes adjusting for known confounding variables.

Results: A total of 140 patients with mean follow-up of 62.1 ± 6.5 months were identified: 20 morbidly obese, 20 obese, 40 overweight, and 60 normal weight. There were significant improvements for HOS-ADL, HOS-SS, and mHHS scores in the normal (all $P < .0001$) and overweight groups (all $P < .0001$), mHHS in the obese group ($P = .0275$), and no significant improvement in functional scores in the morbidly obese group ($P > .05$). Compared with normal controls, multivariable analysis, adjusting for confounders, showed similar improvement in HOS-ADL for patients in the overweight and obese groups, HOS-SS for patients in the overweight group, and mHHS for patients in the overweight and obese groups (all $P > .05$). All groups showed significant improvement in pain scores (all $P < .01$) that were not significantly different between groups in multivariable analysis (all $P > .05$). Obese BMI was associated with a 54.9-point decrease in 5-year HOS-SS, and morbidly obese BMI was associated with a 27.3, 35.0, and 23.7-point decrease in 5-year HOS-ADL, HOS-SS, and mHHS, respectively (all $P < .05$). Regarding surgical benefit in comparison with normal weight patients, patients in the overweight and obese groups were as likely to achieve MCID (reciprocal odds ratio [ROR]: 1.5 and 1.2, respectively, both $P > .05$), but patients in the morbidly obese group were not. All groups were significantly less likely than the normal weight group to achieve PASS (ROR: overweight 5.2, obese 14.1, morbidly obese 13.0; all $P < .05$) and SCB (ROR: overweight 3.9, obese 7.8, morbidly obese 20.3; all $P < .05$).

Conclusion: There were significant improvements in at least 1 outcome score across all BMI groups with arthroscopic treatment of FAIS. While the normal weight patients demonstrated universal improvement in all patient-reported outcomes and significantly greater likelihood of achieving PASS and SCB, the higher BMI groups still demonstrated significant improvement in

BACK

function and pain, except for the morbidly obese group. Patients with morbid obesity demonstrated long-term pain improvement, although they did not experience functional improvement.

BACK

Can Patient-Reported Outcomes Predict the Need for Secondary Surgeries After Hip Arthroscopy?

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Background: Patient-reported outcomes (PROs) capture the postoperative period and reflect the patient's perspective of one's own recovery. However, it is unknown if PROs can reflect and predict the need for secondary surgeries after a primary hip arthroscopy.

Purpose: To examine if PROs at 3 months and 1 year after primary hip arthroscopy were correlated with future reoperations and determine the critical thresholds for significant PROs utilizing a multivariate logistic regression analysis and receiver operator characteristic (ROC) analysis.

Study Design: Case-control study; Level of evidence, 3.

Methods: Data on consecutive patients who underwent primary hip arthroscopy between February 2008 and August 2018 was retrospectively reviewed. Patients were included for analysis if they had the following PROs preoperatively and at 3 months and 1 year postoperatively: modified Harris Hip Score (mHHS), Nonarthritic Hip Score (NAHS), and visual analog scale (VAS) for pain. Patients were split into 2 groups: those who underwent secondary surgery and those who did not. Patient variables, intraoperative labral treatment, preoperative PROs, and postoperative PROs were compared between the 2 groups. A multivariate logistic regression analysis and ROC analysis were deployed to evaluate the correlation between PROs and the need for future surgery.

Results: A total of 911 primary arthroscopy cases were included in this study. While age, body mass index, labral treatment, and 3-month and 1-year follow-up mHHS, NAHS, and VAS were significant in the bivariate analysis, the multivariate logistic regression analysis only found 1-year mHHS to be significant in the final model ($P < .05$). The ROC curve for 1-year mHHS demonstrated acceptable discrimination between patients requiring secondary surgery and patients not requiring secondary surgery with an area under the curve of 0.73. Using the Youden index, a threshold of 80.5 was determined for the 1-year mHHS.

Conclusion: The risk for secondary procedures may be evaluated with mHHS at 1 year after primary hip arthroscopy. Surpassing a score of 80.5 may be associated with a 74.4% reduction in risk for either a revision hip arthroscopy or a conversion to hip replacement.

BACK

Hip Arthroscopy for Femoroacetabular Impingement: 1-Year Outcomes Predict 5-Year Outcomes

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Background: Limited evidence exists comparing short- and long-term patient-reported outcomes (PROs) and overall survival rates after hip arthroscopy for femoroacetabular impingement syndrome (FAIS).

Hypothesis: Patients with high improvement (HI) versus low improvement (LI) at 1 year postoperatively would achieve higher PROs and better index procedure survival rates at 5-year follow-up.

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

Methods: Patients who underwent primary hip arthroscopy for FAIS between September 2012 and March 2014 with minimum 5-year outcome data were identified. Using the median 1-year change in modified Harris Hip Score (mHHS) as a threshold, HI and LI subcohorts were determined. Analysis of variance was used to compare PROs. Failure rates were determined using Kaplan-Meier and Cox proportional hazards model analyses. Regression analysis was used to identify factors associated with increasing 5-year change in mHHS and Nonarthritic Hip Score (NAHS).

Results: Out of 108 eligible consecutive patients, 89 (82.4%) were included (mean [SD]: age, 43.3 [14.6] years; body mass index, 25.4 [4.5]). As compared with the LI group (n = 45), the HI group (n = 44) had a longer 5-year index surgery survival rate (mean ± SEM: 83.7 ± 3.3 months vs 68.5 ± 4.6 months; P = .012) and 5-year estimated survival rate (89% vs 71%). The HI group had a decreased risk of failure versus the LI group (hazard ratio, 0.15; P = .002). The HI group also had greater PROs than did the LI group at 1 year (mHHS: 94.8 ± 1.2 vs 72.6 ± 2.7, P < .001; NAHS: 94.0 ± 1.3 vs 75.6 ± 2.2, P < .001) and 5 years (mHHS: 86.9 ± 2.0 vs 77.6 ± 3.4, P = .017; NAHS: 92.6 ± 1.8 vs 82.7 ± 4.1, P = .020). As compared with the LI group, the HI group achieved higher rates of the Patient Acceptable Symptomatic State (PASS) and minimal clinically important difference (MCID) at 1 year (PASS: 95% vs 42%, P < .001; MCID: 100% vs 89%, P = .056) and 5 years (PASS: 77% vs 45%, P = .002; MCID: 86% vs 64%, P = .014). Linear regression demonstrated that being in the HI group (ΔmHHS, P = .041; ΔNAHS, P = .017) and decreasing body mass index (ΔmHHS, P = .055; ΔNAHS, P = .023) were associated with higher 5-year ΔPROs.

Conclusion: Patients with FAIS and significant improvement in the first year after hip arthroscopy had superior 5-year outcomes versus patients with persistent symptom severity. Survival rates and PROs were significantly better in patients who achieved high early outcomes at the 1-year mark.

BACK

Predictors of Clinical Outcomes After Hip Arthroscopy: 5-Year Follow-up Analysis of 1038 Patients

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Background: Although hip arthroscopy has been shown to have favorable results, there is a paucity of literature describing predictive factors of 5-year clinical outcomes.

Purpose: To identify predictive factors of midterm outcomes after hip arthroscopy in a cohort of 1038 patients whose outcomes at minimum 2-year follow-up were previously reported. In addition, to provide a comparison of short- and midterm predictive factors in outcome measures after hip arthroscopy.

Study Design: Case-control study; Level of evidence, 3.

Methods: Data were prospectively collected and retrospectively reviewed on all patients undergoing hip arthroscopy between February 2008 and June 2012. Patients were included if they had minimum 5-year follow-up on 2 patient-reported outcomes: Nonarthritic Hip Score (NAHS) and modified Harris Hip Score. Patients were excluded if they had any previous ipsilateral hip conditions. Using bivariate and multivariate analyses, we analyzed the effect of 36 pre- and intraoperative variables on the NAHS, modified Harris Hip Score, and conversion to total hip arthroplasty.

Results: A total of 1038 patients met the inclusion criteria for the 2-year study, and 860 met our listed inclusion criteria for the 5-year study. The mean follow-up time was 62.0 months (range, 60.0-120.0 months). The bivariate analysis identified 10 variables (4 categorical and 6 continuous) that were predictive of 5-year postoperative NAHS. For the multivariate analysis, 7 variables were identified as being significant: preoperative NAHS, body mass index (BMI), age, lateral joint space, alpha angle, revision hip arthroscopy, and acetabular microfracture. These 7 variables were also predictive in the bivariate analysis. Age, BMI, revision hip arthroscopy, Tönnis grade, sex, trochanteric bursectomy, femoral head cartilage damage, and acetabular inclination were significant predictors of conversion to total hip arthroplasty.

Conclusion: This study reports favorable midterm clinical outcomes in the largest cohort of hip arthroscopies with minimum 5-year follow-up in the literature to date. Seven variables were identified as being significant predictors of postoperative NAHS in the bivariate and multivariate analyses: preoperative NAHS, BMI, age, lateral joint space, alpha angle, revision hip arthroscopy, and acetabular microfracture. Of these, preoperative NAHS, BMI, age, and revision hip arthroscopy were predictive of 2- and 5-year postoperative NAHS. These predictive factors may prove useful to clinicians in determining indications for hip arthroscopy and counseling patients on its expected outcomes.

BACK

Survivorship and Patient-Reported Outcomes After Comprehensive Arthroscopic Management of Glenohumeral Osteoarthritis: Minimum 10-Year Follow-up

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Background: Few long-term outcome studies exist evaluating glenohumeral osteoarthritis (GHOA) treatment with arthroscopic management.

Purpose: To determine outcomes, risk factors for failure, and survivorship for the comprehensive arthroscopic management (CAM) procedure for the treatment of GHOA at minimum 10-year follow-up.

Study Design: Case series; Level of evidence, 3.

Methods: The CAM procedure was performed on a consecutive series of patients with advanced GHOA who opted for joint preservation surgery and otherwise met criteria for total shoulder arthroplasty. At minimum 10-year follow-up, postoperative outcome measures included change in the American Shoulder and Elbow Surgeons, Single Assessment Numeric Evaluation, 12-Item Short Form Health Survey (SF-12) Physical Component Summary, and visual analog scale for pain, along with the QuickDASH (shortened version of Disabilities of the Arm, Shoulder and Hand) and satisfaction score. Kaplan-Meier survivorship analysis was performed, with failure defined as progression to arthroplasty.

Results: In total, 38 CAM procedures were performed with 10-year minimum follow-up (range, 10-14 years) with a mean patient age of 53 years (range, 27-68 years) at the time of surgery. Survivorship was 75.3% at 5 years and 63.2% at minimum 10 years. Those who progressed to arthroplasty did so at a mean 4.7 years (range, 0.8-9.6 years). For those who did not undergo arthroplasty, American Shoulder and Elbow Surgeons scores significantly improved postoperatively at 5 years (63.3 to 89.6; $P < .001$) and 10 years (63.3 to 80.6; $P = .007$). CAM failure was associated with severe preoperative humeral head incongruity in 93.8% of failures as compared with 50.0% of patients who did not go on to arthroplasty ($P = .008$). Median satisfaction was 7.5 out of 10.

Conclusion: Significant improvements in patient-reported outcomes were sustained at minimum 10-year follow-up in young patients with GHOA who underwent a CAM procedure. The survivorship rate at minimum 10-year follow-up was 63.2%. Humeral head flattening and severe joint incongruity were risk factors for CAM failure. The CAM procedure is an effective joint-preserving treatment for GHOA in appropriately selected patients, with sustained positive outcomes at 10 years.

BACK

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Cuistow: Chinese Unique Inlay Bristow

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Background:
The prevalence of nonunion after the Latarjet procedure remains high. The purpose of the present study was to investigate healing and clinical outcomes after a novel arthroscopic coracoid process transfer procedure.

Methods:
Sixty-three patients who underwent the arthroscopic inlay Bristow procedure combined with Bankart repair were identified, and 51 patients who met the inclusion criteria were enrolled in this study. The key feature of this technique was that the coracoid process was trimmed and fixed into a trough (5 to 10 mm deep) in the glenoid neck with a metal screw. Bone graft union and positioning accuracy were assessed with use of postoperative computed tomography (CT) imaging. Clinical examinations, return to sport, and functional scores (American Shoulder and Elbow Surgeons [ASES] and Rowe scores) were recorded.

Results:
The mean duration of follow-up (and standard deviation) was 41.5 ± 7.7 months (range, 36 to 48 months). Postoperative CT scans showed that the position of coracoid graft was at 4:10 (from 3:50 to 5:00) (referencing the right shoulder) in the sagittal view. The α angle was 16.4° ± 9.5°, with 4 (7.8%) of 51 screws being over-angulated (α > 25°). On the axial view, the graft position was considered to be flush in 33 patients (64.7%), medial in 11 (21.6%), congruent in 7 (13.7%), and lateral or too medial in none. At 1 year, the coracoid graft had healed in 49 patients (96.1%) and had failed to unite in 2 patients. CT scanning, performed for 47 patients, showed grade-0 osteolysis in 9 patients, grade-1 osteolysis in 21 patients, and grade-2 osteolysis in 17 patients. At the time of the latest follow-up, there was a significant increase in the Rowe score (from 35.5 ± 8.3 to 95.7 ± 7.2) and the ASES score (from 71.2 ± 9.7 to 91.5 ± 4.4), and 87.0% of patients were able to return to sport. No arthropathy was observed in any patient.

Conclusions:
After a minimum 3-year follow-up, the arthroscopic inlay Bristow procedure resulted in a high rate of graft healing, excellent clinical outcomes, and a high rate of return to sports.

Level of Evidence:
Therapeutic Level IV.

BACK

Miscellaneous

Arthroscopy, Volume 37, Issue 01, P 139-146

Neuraxial Anesthesia Is Associated With Decreased Pain Scores and Post-Anesthesia Care Unit Opioid Requirement Compared With General Anesthesia in Hip Arthroscopy

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Purpose
We sought to identify the immediate postoperative differences in opioid use, pain scores, and post-anesthesia care unit (PACU) length of stay (LOS) after hip arthroscopy related to the type of anesthesia used for the surgical procedure.

Methods
Patients undergoing hip arthroscopy for femoroacetabular impingement syndrome with labral tears by a single surgeon at an academic center between October 2017 and July 2019 were reviewed retrospectively. The primary outcome was PACU opioid administration, measured by morphine equivalents. Secondary parameters included total LOS, postincision LOS, PACU LOS, and PACU arrival/discharge pain scores. Analyses conducted were t tests, Wilcoxon rank sum tests, or χ 2 tests.

Results
A total of 129 patients met inclusion criteria for this study; 54 male and 75 female, with an average age of 28 (±10.1) years. In total, 52 (40.3%) had general anesthesia and 77 (59.7%) had neuraxial anesthesia, including spinal, epidural, and combined spinal-epidural anesthesia, which were intermixed throughout the study period. Intraoperative and PACU opioid administration demonstrated a significant difference in medians. Neuraxial methods required a lower morphine equivalents in both the operating room (30.0 vs 53.9, P = .001) and PACU (18.2 vs 31.2, P = 0.002). Neuraxial anesthesia had lower median PACU arrival and discharge pain scores (0.0 vs. 5.0, P = .001, 3.0 vs. 4.0, P = .013). There was no statistically significant difference in postincision LOS or traction time. General anesthesia was associated with a longer PACU phase 1 time (1.0 vs 1.3 hours, P = .005). No major adverse events such as death, disability, or prolonged hospitalization occurred in either group.

Conclusions
Neuraxial anesthesia use in routine hip arthroscopy was associated with lower immediate postoperative pain scores, lower intraoperative and immediate postoperative opioid requirements, and may be associated with shorter anesthesia recovery time without any major adverse events when compared with general anesthesia.

Level of Evidence
III, Retrospective Comparative Study

BACK

Remnant-Tensioning Single-Bundle Anterior Cruciate Ligament Reconstruction Provides Comparable Stability to and Better Graft Vascularity Than Double-Bundle Anterior Cruciate Ligament Reconstruction in Acute or Subacute Injury: A Prospective Randomized Controlled Study Using Dynamic Contrast-Enhanced Magnetic Resonance Imaging

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https://doi.org/10.1016/j.arthro.2020.08.035

Purpose
To compare the clinical, second-look arthroscopic, magnetic resonance imaging (MRI), and dynamic-contrast-enhanced MRI (DCE-MRI) findings between remnant-tensioning single-bundle (RT-SB) and double-bundle (DB) anterior cruciate ligament reconstruction (ACLR).

Methods
Sixty-seven patients with acute or subacute anterior cruciate ligament (ACL) injury were randomized to undergo RT-SB or DB ACLR. Twenty-six patients in the RT-SB group and 28 in the DB group were evaluated using stability tests (Lachman test, pivot-shift test, and KT-2000 arthrometer) and multiple clinical scores. One year postoperatively, all 54 patients underwent MRI for evaluation of graft continuity and graft signal/noise quotient and DCE-MRI for the calculation of normalized area under the curve (nAUC) as a marker of graft vascularity. Among them, 41 patients underwent second-look arthroscopy for the evaluation of graft continuity, graft tension, and synovialization. The results were compared between the 2 groups.

Results
At the minimum 2-year follow-up (28.7 ± 6.4 months), the stability tests, clinical scores, second-look arthroscopic findings, and MRI findings were not significantly different between the groups. However, the mean nAUC values on DCE-MRI for the ACL graft were significantly higher in the RT-SB group than those in the DB group in all 3 zones (nAUC proximal, P = .005; nAUC middle, P = .021; nAUC distal, P = .027; and nAUC average, P = .008).

Conclusion
For acute or subacute ACL injury, the RT-SB ACLR showed an outcome comparable to that of DB ACLR in terms of knee stability, clinical scores, MRI findings, and second-look arthroscopic findings. Moreover, RT-SB ACLR showed better graft vascularity 1 year postoperatively than DB ACLR using DCE-MRI.

Level of Evidence
II, prospective randomized controlled trial

BACK