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All-Arthroscopic Supraspinatus and Infraspinatus Muscle Advancement Leads to High Healing Rate and Excellent Outcomes in Patients With Massive, Retracted Rotator Cuff Tears, Even in Patients With Pseudoparalysis

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DOI: <https://doi.org/10.1016/j.arthro.2024.03.041>

Purpose: To evaluate the clinical and radiographic outcomes of an all-arthroscopic rotator cuff repair technique involving muscle advancement and double-layer lasso loop (DLLL) repair for massive, retracted posterosuperior cuff tears.

Methods: This was a retrospective case series of patients with massive, retracted posterosuperior cuff tears who underwent the all-arthroscopic muscle advancement technique from March 2017 to September 2021, with a minimum follow-up of 12 months. Key steps included suprascapular nerve release, advancement of the supraspinatus and infraspinatus muscles, and DLLL repair. Preoperative and postoperative visual analog scale score for pain, American Shoulder and Elbow Surgeons (ASES) shoulder score, Constant score, University of California, Los Angeles (UCLA) shoulder score, active range of motion, and strength were compared. Preoperative and postoperative structural radiologic characteristics were analyzed.

Results: We evaluated 43 shoulders in 38 patients with a mean follow-up period of 18.8 months (range, 12-55 months). Of the 43 shoulders, 4 showed repair failure (9.3% retear rate). Visual analog scale, ASES, Constant, and UCLA scores significantly improved ($P < .001$) in patients who showed healing on postoperative magnetic resonance imaging ($n = 39$). ASES, Constant, and UCLA scores were significantly better in the healed group, with 100% exceeding the minimal clinically important difference for the ASES score and UCLA score and 84.2%, for Constant score. A lower proportion of patients in the retear group achieved the minimal clinically important difference. Active range of motion in all planes significantly improved for patients who had healed repairs ($P < .001$). Relative abduction strength, supraspinatus strength, and infraspinatus strength were at least 90% of those on the contralateral side. The recovery rate of pseudoparalysis (7 patients) was 100%.

Conclusion: All-arthroscopic muscle advancement, coupled with DLLL repair, leads to a high healing rate with excellent clinical outcomes and recovery of strength to at least 90%, even in patients with pseudoparalysis.

Level of Evidence: Level IV, retrospective case series.

High Rate of Union of Scaphoid Pseudoarthrosis Treated With Arthroscopic Olecranon Bone Graft Using Antegrade Percutaneous Headless Compression Screw

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DOI: <https://doi.org/10.1016/j.arthro.2024.06.020>

Purpose: To assess the healing rate of scaphoid pseudoarthrosis treated with wrist arthroscopy, olecranon bone graft, and antegrade screw fixation, as well as evaluate complications and clinical and radiologic outcomes.

Methods: All patients with scaphoid nonunion were selected between January 2017 and December 2022. Inclusion criteria were patients between 18 and 60 years of age, a diagnosis of scaphoid pseudoarthrosis, complete clinical patient-reported outcomes, radiographic measurements, and at least a 1-year follow-up. Scaphoid pseudoarthrosis was treated arthroscopically with olecranon bone graft and antegrade screw fixation. Clinical assessment was performed through visual analog scale (VAS) for pain, QuickDASH (Disabilities of the Arm, Shoulder, and Hand) questionnaire, wrist range of motion using a standard goniometer, and grip strength in kilograms with a Jamar hydraulic hand dynamometer. Clinical relevance was measured with the minimal clinically important difference (MCID) for VAS and QuickDASH. Scapholunate angle was measured. Union was assessed on a computed tomography scan.

Results: Seventeen patients were included with a mean follow-up of 17.2 months. The mean age was 30.1 years, and the average time from injury to arthroscopic surgery was 11.1 months. At latest follow-up, there was an improvement in VAS pain score and QuickDASH score. Range of motion and grip strength increased at last follow-up. MCID threshold for the VAS and QuickDASH score was reached by 100% and 94.1%, respectively. Union was achieved in 16 patients (94.1%) after a median of 16 weeks (interquartile range, 16-20).

Conclusion: Arthroscopic treatment of scaphoid pseudoarthrosis with olecranon bone graft and antegrade percutaneous headless compression screw allows a high grade of union and improves pain and function at short-term follow-up.

Level of Evidence: Level IV, therapeutic case series.

Open Bankart repair plus inferior capsular shift versus isolated arthroscopic Bankart repair in collision athletes with recurrent anterior shoulder instability: a prospective study

I.J. Bitar, L.D. Marangoni

DOI: <https://doi.org/10.1016/j.jse.2024.03.041>

Background: Open Bankart repair plus inferior capsular shift and isolated arthroscopic Bankart repair have never been prospectively compared under the concept of glenoid track in collision athletes with recurrent anterior shoulder instability. The aim of this study was to compare the functional outcomes, range of motion, and recurrence rate between these 2 surgical techniques. We hypothesized that open Bankart repair plus inferior capsular shift would provide similar functional outcomes to isolated arthroscopic Bankart repair but with a lower recurrence rate.

Methods: A prospective cohort study was conducted with 86 collision athletes divided into 2 groups of 43 patients each. All patients had a subcritical glenoid bone loss $\leq 13.5\%$ and an on-track Hill Sachs lesion. The average follow-up was 66 (60-93) months for the open group and 68 (60-97) months for the arthroscopic group. The primary functional outcomes of each group were evaluated at baseline, 6 months, 1 year and for a minimum of 5 years after surgery. The functional outcomes were also compared between the 2 groups. The assessment tools included the Western Ontario Shoulder Instability Index (WOSI) score and American Shoulder and Elbow Surgeons scale (ASES) score. In addition, recurrent instability and range of motion were also evaluated.

Results: In each group, there were significant differences in Western Ontario Shoulder Instability Index score and American Shoulder and Elbow Surgeons scale score between the pre and postoperative periods. There were no differences between the groups at the end of follow-up ($P = .47$ and $.22$). Three dislocations (6.9%) in the open group and 10 dislocations (23.2%) in the arthroscopic group were reported showing significant differences ($P = .012$). In addition, there were no differences in range of motion between pre and postoperative periods for each group as well as between them.

Conclusion: We found no differences in functional outcomes and range of motion between the 2 groups. The recurrence rate was significantly higher in the arthroscopic group. We recommend performing open Bankart repair plus inferior capsular shift as a treatment alternative in collision athletes with recurrent anterior shoulder instability.

Level of Evidence: Level II Prospective Cohort Comparison Treatment Study

Does tranexamic acid reduce elbow swelling and improve early function following arthroscopic arthrolysis? A double-blind randomized controlled trial

M. Zhou, S. Li

DOI: <https://doi.org/10.1016/j.jse.2024.06.009>

Background: Tranexamic acid (TXA) reduces bleeding and hematoma rates in open elbow arthrolysis. However, its effects on arthroscopic elbow arthrolysis remain unclear. This study aims to evaluate the effect of TXA on elbow arthroscopic procedures and compare bleeding volume, hemarthrosis, visual analog scale (VAS) for pain, range of motion (ROM), and Mayo Elbow Performance Score (MEPS) in the early postoperative period between patients who received intra-articular TXA and those who did not.

Methods: A prospective, double-blind, randomized controlled trial enrolling 80 patients with stiff elbows who underwent arthroscopic arthrolysis was performed from January 2021 to December 2022. Intra-articularly, 1 g of TXA in 100 ml of saline or placebo (control group) was administered after the arthroscopic operation according to randomization. Parameters were recorded and compared between the groups, including bleeding volume of drainage, hemoglobin (Hgb) level, ratio of arm and forearm circumference of the surgical side to the contralateral side, grading of hematoma, VAS, ROM, and MEPS within 1 week postoperatively. And during 1 year follow-up, ROM and MEPS were recorded.

Results: All patients enrolled in this study demonstrated significant improvements in ROM (flexion-extension) and MEPS 1 week postoperatively, with no significant differences observed between the 2 groups. Compared to the control group, the TXA group exhibited significant differences in the bleeding volume of drainage (61.45 ± 47.7 ml vs. 89.8 ± 47.0 ml, $P = .030$) and a higher Hgb level 24 hours postoperatively (13.5 ± 1.5 g/dL vs. 12.6 ± 1.8 g/dL $P = .049$). While the ratio of arm and forearm circumferences significantly increased 24 hours postoperatively compared to preoperative values in TXA group (1.05 ± 0.06 vs. 1.02 ± 0.04 and 1.02 ± 0.06 vs. 0.98 ± 0.04 , with $P = .019$ and $P = .005$, respectively), this difference vanished 1 week postoperatively for the ratio of arm circumference. However, it persisted for the ratio of forearm circumference (1.02 ± 0.07 vs. 0.98 ± 0.04 , $P = .003$). Furthermore, there was no significant difference in MEPS, VAS, or ROM between the 2 groups 1 week postoperatively.

Conclusion: Patients with stiff elbows who underwent arthroscopic arthrolysis achieved satisfactory clinical outcomes very early postoperatively. Compared to the control group, patients who underwent arthroscopic elbow arthrolysis with intra-articular administration of TXA exhibited significantly less bleeding volume of drainage and slightly higher Hgb levels postoperatively. One week postoperatively, slightly more swelling in the upper arm region was noted in the control group compared to the TXA group. These findings suggest that the intra-articular injection of TXA after arthroscopic release for elbow stiffness may statistically reduce complications related to postoperative bleeding. However, its clinical relevance needs further investigation.

Level of Evidence: Level I Randomized Controlled Trial Treatment Study

Arthroscopic Bankart repair vs. Latarjet procedure for recurrent shoulder instability: a meta-analysis of clinical outcomes and complication rates in general and athletic populations

R.H. Zadeh, M. Daliri

DOI: <https://doi.org/10.1016/j.jse.2024.06.024>

Background: The Bankart repair and Latarjet procedure are both effective surgical methods for treating repeated recurrent anterior dislocation of the shoulder. However, there is still little consensus regarding the standard treatment for recurrent anterior instability of the shoulder. Typically, the choice of treatment has been influenced more by training and tradition rather than the existing evidence. This systematic review and meta-analysis aimed to compare patient-reported outcomes, recurrence, and complications between the 2 procedures, among both athletic and nonathletic cohorts.

Methods: Relevant clinical trials were identified through a systematic search of databases in April 2023 including PubMed, Scopus, Web of Science, and Cochrane. Randomized controlled trials and cohort studies were included if they compared patient-reported outcomes or complication rates of open Latarjet procedure vs. arthroscopic Bankart repair. Continuous data, such as patient-reported outcomes were pooled as the weighted mean difference. For dichotomous data such as recurrence and revision rates, the pooled risk ratio (RR) with 95% confidence intervals (CIs) was calculated using random effects meta-analysis.

Results: Twenty-one clinical studies (3 randomized controlled trials) were included in the meta-analysis involving a total of 13,176 operated shoulders. Arthroscopic Bankart showed a 3.08 times higher risk of recurrence and revision due to postoperative instability (RR = 3.08, 95% CI 2.03-4.68) compared with those who had the Latarjet approach. The Rowe score was higher in the Latarjet group by an average of 4.55 points (95% CI 2.41-6.68). This difference was more pronounced in athletes, with an increase of 5.47 points (95% CI 0.16-10.78), compared with the nonathletic population: 4.03 (95% CI 2.04-6.02). Return to sport time was shorter by 0.40 months (95% CI -0.75 to -0.05) in the Latarjet group. The total complication rate was approximately 47% lower in the Bankart group (RR = 0.53, 95% CI 0.31-0.90). Additionally, the risk of hematoma was 75% lower in patients undergoing the arthroscopic Bankart compared with the Latarjet procedure. External rotation, assessed both in abduction and adduction of the arm, as well as forward elevation, show no significant differences between the 2 groups.

Conclusion: Our results demonstrate that the Latarjet procedure has a lower recurrence rate, excels in patient-reported outcomes, and requires less time for return to sports. Thus, it may be a superior alternative to arthroscopic Bankart repair. However, it is still associated with a higher incidence of complications.

Level of evidence: Level III Systematic Review/Meta-Analysis

Outcomes following arthroscopic treatment of off-track Hill-Sachs lesions using fresh osteochondral allograft plugs: a case series

A.George, M.J. Kraeutler

DOI: <https://doi.org/10.1016/j.jse.2024.06.008>

Background: Osteochondral allograft (OCA) transplantation is a well-described technique for the treatment of large, engaging Hill-Sachs lesions (HSLs). Traditionally, OCAs are size-matched to the defect, which can be expensive and time-consuming, and the majority of described techniques require an open approach. Recently, an all-arthroscopic approach to Hill-Sachs OCA transplantation using premade plugs was described, eliminating the need for size-matching and graft harvest. The purpose of this study was to evaluate postoperative outcomes of patients who have undergone arthroscopic treatment of HSLs using premade OCA plugs. We hypothesized that these patients would have improved pain and function without recurrent instability.

Methods: A retrospective chart review was performed using operative reports for a single surgeon with search terms Hill-Sachs and allograft. Patients were excluded if an open approach was used or if graft harvest was performed. Postoperative imaging was reviewed to assess for graft incorporation and reconstitution of the HSL. Recurrent instability and reoperation were recorded. Patients completed surveys including the American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES) score and the Western Ontario Shoulder Instability Index (WOSI).

Results: Five patients were identified through chart review and met inclusion criteria. All patients underwent concurrent labral repair and 2 patients underwent a concurrent open Latarjet procedure. Postoperative radiographs showed reconstitution of the HSLs in all patients. There were no complications in the postoperative period with no recurrent instability or reoperations in any patient. The average ASES score was 87% (higher score indicating better outcome) with standard deviation 9.7, and the average WOSI score was 27% (lower score indicating better outcome) with standard deviation 8.3.

Conclusion: Favorable outcomes can be expected after arthroscopic treatment of Hill-Sachs lesions using premade OCA plugs. Further research is needed to assess larger patient cohorts and compare outcomes to size-matched approaches.

Level of evidence: Level IV Case Series Treatment Study

Arthroscopic Bankart repair with remplissage yields similar outcomes to open Latarjet for primary and revision stabilization in the setting of subcritical glenoid bone loss

S.J.-C. Charles, S. Marcaccio

DOI: <https://doi.org/10.1016/j.jse.2024.05.003>

Background: Management of patients with recurrent anterior glenohumeral instability in the setting of subcritical glenoid bone loss (GBL), defined in this study as 20% GBL or less, remains controversial. This study aimed to compare arthroscopic Bankart with remplissage (ABR + R) to open Latarjet for subcritical GBL in primary or revision procedures. We hypothesized that ABR + R would yield higher rates of recurrent instability and reoperation compared to Latarjet in both primary and revision settings.

Methods: A retrospective study was conducted on patients undergoing either arthroscopic ABR + R or an open Latarjet procedure. Patients with connective tissue disorders, critical GBL (>20%), <2 year follow-up, or insufficient data were excluded. Recurrent instability and revision were the primary outcomes of interest. Additional outcomes of interest included subjective shoulder value, strength, and range of motion (ROM).

Results: One hundred eight patients (70 ABR + R, 38 Latarjet) were included with an average follow-up of 4.3 ± 2.1 years. In the primary and revision settings, similar rates of recurrent instability (Primary: $P = .60$; Revision: $P = .28$) and reoperation (Primary: $P = .06$; Revision: $P = 1.00$) were observed between Latarjet and ABR + R. Primary ABR + R exhibited better subjective shoulder value, active ROM, and internal rotation strength compared to primary open Latarjet. However, no differences were observed in the revision setting.

Conclusion: Similar rates of recurrent instability and reoperation in addition to comparable outcomes with no differences in ROM were found for ABR + R and Latarjet in patients with subcritical GBL in both the primary and revision settings. ABR + R can be a safe and effective procedure in appropriately selected patients with less than 20% GBL for both primary and revision stabilization.

Level of evidence: Level III Retrospective Comparative Study

Results of combined all-arthroscopic Latarjet with Hill-Sachs remplissage for significant bipolar glenohumeral bone loss

P. Boileau, R. Ranieri

DOI: <https://doi.org/10.1016/j.jse.2024.07.030>

Background: Arthroscopic Latarjet using suture-button fixation has shown good clinical results and low recurrent instability in patients with significant glenoid bone loss. However, the presence of an associated Hill-Sachs lesion (HSL) is a risk factor for recurrent instability after isolated Latarjet. The aim of the study was to report clinical and radiologic results following all-arthroscopic Latarjet combined with Hill-Sachs remplissage (HSR).

Methods: Monocentric prospective study including 41 patients (mean age 28 ± 7 years) who underwent the combined procedure between 2014 and 2019 with minimum 2 years' follow-up (mean 40 ± 13 months). Indications were glenoid bone loss $>10\%$ (mean $23.9\% \pm 7.5\%$) and large, deep HSL (Calandra 3). Five (13%) patients had signs of osteoarthritis stage I preoperatively, 4 (10%) had previous stabilization surgery (3 cases isolated Bankart and 1 case Bankart combined with HSR), and 4 (13%) were epileptic. The HSR was performed first followed by guided Latarjet procedure. Primary outcome measures included shoulder stability and function represented by Walch-Duplay and Rowe scores, and Subjective Shoulder Value (SSV) for daily life/sports. Secondary outcome measures included coracoid graft position and union, and glenohumeral osteoarthritis using radiographs and computed tomography.

Results: Three patients (7%) had recurrent instability: 1 due to seizure, 1 following fall, and 1 related to graft osteolysis. Two patients were revised because of recurrence with arthroscopic distal clavicle autograft. There were no infections, neurologic complications, or hardware failures. The Walch-Duplay score was 90 (95% CI 76.8-93.2), and the Rowe score 95 (95% CI 77.2-92.2). The median SSV averaged 96% (95% CI 87.5-97.0) for daily life and 90% (95% CI 75.7-90.2) for sports. Mean external rotation with the arm at the side was 60° (95% CI 59° - 70°) with a median loss 10° (95% CI 3° - 17°) compared to the contralateral side. Among patients playing sport preoperatively, 36 (95%) were able to return to sport: 25 (67%) at the same level and 7 (18%) at a lower level, whereas 4 had to change sport. The coracoid graft was flush with the glenoid surface in 96% of cases and subequatorial in 89%. The graft developed nonunion in 11% and fractured in 5%. Seven patients (18%) had radiographic signs of grade I osteoarthritis.

Conclusion: Combined arthroscopic Latarjet and HSR is an efficient solution for dealing with significant bipolar glenohumeral bone loss. The combined procedure deserves consideration in high-risk patients including combined bone loss, recurrent anterior instability after failed stabilization procedures and/or seizure.

Level of evidence: Level IV Monocentric Prospective Study

Arthroscopic retrograde disimpaction of reverse Hill-Sachs lesions in acute posterior shoulder dislocation type A2 leads to good clinical outcome and close to anatomic reconstruction of the articular surface of the humeral head

C. Festbaum, A. Hayta

DOI: <https://doi.org/10.1016/j.jse.2024.07.024>

Background: Posterior shoulder dislocation frequently results in a centrally located impression fracture of the anterior humeral head, known as reverse Hill-Sachs lesion (RHSL). Depending on its size and location, the RHSL can lead to engagement with the posterior glenoid rim and subsequently redislocation of the shoulder joint. The objective of this study was to present the clinical and radiologic outcomes of anatomic reconstruction of the humeral articular surface using arthroscopically assisted disimpaction in patients with acute posterior shoulder dislocation and an engaging RHSL.

Methods: As part of a retrospective analysis, 9 shoulders in 9 patients (1 female, 8 males) with engaging RHSL following acute posterior shoulder dislocation (type A2 according to the ABC classification) who underwent arthroscopically assisted disimpaction of the RHSL between 2016 and 2023 were identified. Eight patients were included, because 1 patient refused to participate. In all patients, a radiologic analysis of the RHSL was accomplished on preoperative and postoperative cross-sectional imaging including the alpha, beta, and gamma angle as well as depth measurements. The clinical examination included an assessment of the active range of motion, instability tests, and patient-reported outcome measures, such as the Western Ontario Shoulder Instability (WOSI) Index, the Constant Score, and the Subjective Shoulder Value (SSV).

Results: The mean follow-up period for all 8 patients was 34.4 ± 38 months (range: 6-102 months). The mechanisms of injury included falls ($n = 6$), traffic accident ($n = 1$), and convulsive episode ($n = 1$). The average time from injury to surgery was 6.8 ± 4.7 days (range: 2-16). Patient-reported outcomes at the final follow-up indicated an average WOSI Index of $77.8\% \pm 17\%$, a mean Constant Score of 88.3 ± 11 points, and a mean SSV of $87\% \pm 16\%$. None of the patients experienced recurrent dislocations during the follow-up period. Post-traumatically, the mean absolute defect depth was 8.4 ± 2.2 mm and the mean gamma angle was $115.8^\circ \pm 13^\circ$. In the radiologic follow-up, the RHSL depth measurements showed a significant reduction in the mean defect depth from 8.4 ± 2 mm to 1.2 ± 1 mm resulting in an average reduction of the RHSL by 7.1 mm ($P < .001$). In 3 of the 8 patients (37.5%), the RHSL was not identifiable any more at follow-up and in 5 patients barely identifiable.

Conclusion: Arthroscopically assisted disimpaction of acute RHSLs leads to close to anatomic reduction of RHSL, achieving a stable shoulder and good clinical outcomes.

Level of evidence: Level IV Case Series Treatment Study

Utilization of a stepwise model to assess pivotal information for patient decision-making regarding open vs. arthroscopic Latarjet procedure

B. Cochard, A. Lädermann

DOI: <https://doi.org/10.1016/j.jse.2024.05.053>

Background: The popularity of arthroscopic Latarjet has increased significantly in recent years due to its perceived advantages. The latter include a smaller surgical incision, faster recovery, quicker return to sports, and ability to treat concomitant intra-articular pathology. Nevertheless, the arthroscopic technique is more technically challenging, has a more significant learning curve, longer operating time, and is less cost-effective. The study aimed to identify the various factors influencing patient decision-making between undergoing arthroscopic or open Latarjet using a stepwise questionnaire model.

Methods: All patients with a primary, whether arthroscopic or open Latarjet procedure were subjected to a stepwise interviewing process and were asked to select between arthroscopic and open approaches at each step.

Results: Fifty patients with a mean age of 28.8 ± 8.8 year old participated in the study. Twenty (40%) consistently selected an arthroscopic approach after analysis of the incision's aspect, whereas 34 (68%) had a final decision different from their initial choice. In addition, out of the 15 patients who chose arthroscopy or were undetermined after presentation of the incisional aspect, 9 (60%) changed their decision to open surgery after presentation of the pros and cons of each approach. Twenty-three (46%) patients were unable to choose and left the choice to their surgeon. The faith in their surgeon and recovery were identified as the 2 most important factors influencing patients' final decisions.

Conclusion: The minimally invasive nature of arthroscopic incisions was not considered to be more cosmetically appealing than that of a single open incision. The advantages of the arthroscopic procedure may not be as valued by patients as by surgeons. Patients were more interested in the equivalent short- and mid-term outcomes of both approaches and the shorter surgical duration of the open option. It is crucial to adequately inform patients during preoperative counseling to achieve the best consensus.

Level of evidence: Survey Study Patients

Good clinical outcomes and low recurrence rate in patients undergoing arthroscopic revision Latarjet for failed arthroscopic Bankart repair

E. Calvo, C. Delgado

DOI: <https://doi.org/10.1016/j.jse.2024.05.054>

Background: The role of arthroscopic Latarjet stabilization after failed arthroscopic Bankart repair has yet to be definitively established and merits further investigation.

Objective: To assess clinical and radiological outcomes after arthroscopic Latarjet stabilization as a revision procedure for failed Bankart repair, as well as the return to athletic activity and complication rates.

Methods: Between 2009 and 2020, patients with a previous failed arthroscopic Bankart repair who were treated with an arthroscopic Latarjet were retrospectively evaluated. Clinical outcomes at a minimum of 24 months postoperatively included the Rowe score, Western Ontario Shoulder Instability Index, Constant-Murley Shoulder Outcome score, and Single Assessment Numeric Evaluation. Dislocations, subluxations, complications, pre- and postoperative levels of activity, and degree of osteoarthritis were also assessed.

Results: A total of 77 patients, with a mean age at revision surgery of 31.2 ± 9.1 years and with either 1 ($n = 59$), 2 ($n = 13$), or 3 ($n = 4$) previous arthroscopic stabilizations, who underwent revision surgery using an arthroscopic Latarjet procedure were studied. Postoperatively, the mean Rowe and Constant-Murley Shoulder Outcome scores increased from 41.8 ± 16 to 90.7 ± 14.3 ($P < .001$) and from 50.5 ± 13.8 to 90.5 ± 10.3 ($P < .001$), respectively. Western Ontario Shoulder Instability Index decreased from 1247 ± 367.6 to 548.9 ± 363 at the final follow-up ($P < .001$). After a mean follow-up of 39.6 ± 23.1 months, 64 shoulders (83.1%) were subjectively graded as good to excellent using the Single Assessment Numeric Evaluation score. Grade 1, 2, and 3 osteoarthritis, according to Ogawa et al, was found in 18 (23.4%), 6 (7.8%), and 3 (3.9%) shoulders, respectively. Six (7.8%) dislocations after revision surgery were reported. In 4 failed cases, an Eden-Hybinette procedure was conducted, and in the remaining 2 patients, an arthroscopic extra-articular anterior capsular reinforcement was performed. A significantly decreased level of athletic activity was observed postoperatively ($P = .01$).

Conclusion: Arthroscopic Latarjet for the revision of failed arthroscopic Bankart repair provides satisfactory patient-reported subjective outcomes with a low rate of recurrences and complications. However, a decreased level of athletic activity is expected.

Level of evidence: Level IV Case Series Treatment Study

Clinical and radiographic outcomes of primary vs. revision arthroscopic anatomic glenoid reconstruction with distal tibial allograft for anterior shoulder instability with bone loss

J. Karpyshyn, R. Murphy

DOI: <https://doi.org/10.1016/j.jse.2024.04.005>

Background: The purpose of this study was to assess the clinical and radiographic outcomes of arthroscopic anatomic glenoid reconstruction (AAGR) used for primary vs. revision surgery for addressing anterior shoulder instability with bone loss.

Methods: We performed a retrospective review on consecutive patients who underwent AAGR from 2012 to 2020. Patients who received AAGR for anterior shoulder instability with bone loss and had a minimum follow-up of 2 years were included. Exclusion criteria included patients with incomplete primary patient-reported outcome scores (PROs), multidirectional instability, glenoid fracture, nonrigid fixation and concomitant humeral avulsion of the glenohumeral ligament, or rotator cuff repair. Our primary outcome was measured using the Western Ontario Shoulder Instability Index (WOSI) scores. Secondary outcomes included postoperative Disabilities of the Arm, Shoulder, and Hand questionnaire (DASH) scores, complications, recurrence of instability and computed tomographic (CT) evaluation of graft position, resorption, and healing.

Results: There were 73 patients (52 primary and 21 revision) finally included. Both groups had comparable demographics and preoperative WOSI and DASH scores. The primary group had significantly better postoperative WOSI and DASH scores at final follow-up when compared to the revision group (WOSI: 21.0 vs. 33.8, $P = .019$; DASH: 7.3 vs. 17.2, $P = .001$). The primary group also showed significantly better WOSI scores than the revision group at the 6-month, 1-year, and 2-year time points ($P = .029$, $.022$, and $.003$, respectively). The overall complication rate was 9.6% (5 of 52) in the primary group and 23.8% (5 of 21) in the revision group. Both groups showed good graft healing and placement in the anterior-to-posterior and mediolateral orientation and had a similar rate of graft resorption and remodeling. There was no difference between the groups in the remainder of the CT measurements.

Conclusion: Functional outcome scores and stiffness were significantly worse in patients undergoing an AAGR procedure after a failed instability surgery when compared with patients undergoing primary AAGR. There were no differences in postoperative recurrence of instability or radiographic outcomes. As a result, AAGR should be considered as a primary treatment option within current treatment algorithms for shoulder instability.

Level of evidence: Level III Retrospective Cohort Comparison Prognosis Study

Comparing postoperative proprioception of the glenohumeral joint between the open and the arthroscopic Latarjet procedure

G. Lallemand, M.N. Soares

DOI: <https://doi.org/10.1016/j.jse.2024.09.002>

Background: Shoulder proprioception, in which the anterior glenohumeral capsule plays a major role, is critical to the functioning of the shoulder. Consequently, most surgeons either do not resect or reinsert the anterior capsule in shoulder stabilization surgery. In the original open Latarjet procedure (OLP), the anterior capsule is preserved. However, in the all-arthroscopic Latarjet procedure (ALP), complete anterior capsule resection is recommended for better view and access to the coracoid. This raises the question if there is a postoperative difference in proprioception between these 2 procedures. Therefore, the aims of this study are (1) to assess the difference in postoperative proprioception between the operated and healthy sides after the OLP and ALP and (2) to compare the difference in postoperative proprioception on the operated side between the OLP and ALP.

Methods: We conducted a retrospective analysis including all patients who underwent a proprioception test after an OLP or ALP at our center. Collected baseline characteristics included sex, age at surgery, operated side, hand dominance, presence of a Hill-Sachs lesion, and time between surgery and the proprioception test. For the test, patients were positioned 1 meter from a wall. They were blindfolded and had to point at a target with a laser pointer taped to their index finger. The laser point was marked and the errors were measured horizontally and vertically and categorized as <4 cm, 4-8 cm, 8-16 cm, and >16 cm.

Results: Between April 2022 and April 2024, a total of 91 cases were identified, of which 24 underwent an OLP and 67 underwent an ALP. No significant difference was found in error distribution between the healthy and operated side after both the OLP ($P = .30$ horizontally, $P = .67$ vertically) and ALP ($P = .20$ horizontally, $P = .34$ vertically). Moreover, there was no significant difference in error distribution between the operated sides after the OLP vs. ALP ($P = .52$ horizontally; $P = .61$ vertically).

Conclusion: Our data suggest that postoperative proprioception is not significantly different between the operated and healthy sides after both the OLP and ALP, nor between the operated sides after the OLP vs. after the ALP. This might imply that completely resecting the anterior glenohumeral capsule does not have a detrimental effect on shoulder proprioception. However, these results are multifactorial and prospective studies are needed to better understand the regeneration potential of glenohumeral capsule mechanoreceptors and the importance of the anterior capsule for shoulder proprioception.

Level of evidence: Level III Retrospective Comparative Study

Arthroscopic repair of anteroinferior glenoid rim fractures: mean 10-year clinical and radiologic results

E. Boehm, A. Keck

DOI: <https://doi.org/10.1016/j.jse.2024.07.027>

Background: To date, long-term results of the arthroscopic repair of glenoid rim fractures are missing. The aim of this study was, to evaluate clinical and radiographic results following arthroscopic repair of anteroinferior glenoid fractures using anchors or bioabsorbable compression screws after a mean follow-up period of 10 years.

Methods: Clinical outcome measures included evaluation of recurrent instability, the Constant Score, Subjective Shoulder Value, Rowe Score (RS), Western Ontario Shoulder Instability Score, and Melbourne Instability Shoulder Score. X-ray images were obtained for assessment of an instability arthropathy (IA).

Results: Twenty-three patients (7 female and 16 male, mean (\pm standard deviation) age 48 ± 15 years) who underwent arthroscopic repair of an acute substantial solitary or multifragmented anteroinferior glenoid rim fracture were enrolled. After a mean follow-up period of 10 ± 2 years, patients reached a mean Constant Score of 92 ± 10 points, Subjective Shoulder Value of $93 \pm 11\%$, RS of 84 ± 20 points, Western Ontario Shoulder Instability Score of $98 \pm 2\%$, and Melbourne Instability Shoulder Score of 91 ± 11 points. No patient suffered recurrent dislocation. Radiographic results were obtained of 18 patients. Signs of IA were noted in 9 patients (50%) with progression of IA in all cases in comparison to the preoperative status. Patients with IA were significantly older (52 vs. 38 years, $P = .04$). Clinical score results did not show a significant difference in patients with vs. without IA except for the RS (74 vs. 94 points, $P = .02$). No intraoperative or postoperative complications were observed, and no patient required revision endoprosthetic surgery.

Conclusion: Arthroscopic repair of acute anteroinferior glenoid rim fractures shows good clinical long-term results. High rates of IA were observed especially in older patients. However, the presence of IA did not seem to influence the subjective shoulder score outcomes.

Level of evidence: Level IV Case Series Treatment Study

Arthroscopic selective approach to dynamic posterior shoulder instability: long-term follow-up insights

D. Gutiérrez-Zúñiga, C. Delgado

DOI: <https://doi.org/10.1016/j.jse.2024.07.021>

Background: The objective of this study is to evaluate the outcomes of arthroscopic capsulolabral repair in patients with structural dynamic posterior instability (Moroder classification B2), analyzing factors associated with inferior clinical outcomes or recurrence. The primary hypothesis is that this surgical approach in patients without static structural changes such as excessive glenoid retroversion or dysplastic glenoids will result in satisfactory clinical outcomes and low failure rates.

Methods: We conducted observational retrospective analysis in patients diagnosed with posterior structural dynamic instability who underwent arthroscopic capsulolabral repair. Demographic, clinical, and radiologic characteristics were registered, as well as patient-reported outcomes, satisfaction, complications, and failure, with a minimum 2-year follow-up. The association between these outcomes and preoperative factors was investigated.

Results: 21 patients were included, with an average age of 38.1 years (range: 27-51 years) and a mean follow-up of 68.7 months (range: 24-127 months). At the final follow-up, the degree of instability was 0 in 19 (90.5%) patients. The overall outcome assessment demonstrated a mean Subjective Shoulder Value score of 82.3 (± 15.2), a mean Western Ontario Shoulder Instability score of 460.1 (± 471), and a mean Rowe score of 91.5 (± 13). Furthermore, a significant portion of patients returned to sport: 71.4% at any level and 57.1% at the previous level, and 71.4% reported satisfaction with treatment, whereas 5 (23.8%) patients had criteria for failure.

Conclusion: Arthroscopic capsulolabral repair in selected patients with type B2 posterior shoulder instability without static posterior findings yielded satisfactory clinical outcomes and low failure rates.

Level of evidence: Level IV Case Series Treatment Study

Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA), Volume 32, Issue 12

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Subscapularis Muscle Radiographic Integrity and Patient-Reported Outcomes Following Arthroscopic Anatomic Glenoid Reconstruction With Distal Tibial Allograft

Castillo de la Peña J, Chalmers PN, Ma J, Wong I.

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Background: Shoulder stabilization surgery has evolved over time, and bony augmentation procedures on the glenoid side are being performed more often. The Latarjet procedure modifies subscapularis anatomy because the conjoined tendon divides the subscapularis muscle fibers through a split/takedown, which has structural and functional implications. Arthroscopic anatomic glenoid reconstruction (AAGR) re-creates anatomy. This technique uses the Halifax portal to deploy and fix a distal tibial allograft (DTA) through the rotator interval, thus preserving the subscapularis anatomy.

Purpose: The purpose was to analyze the radiographic properties of the subscapularis muscle after AAGR. It was hypothesized that the subscapularis muscle structure remains preserved postoperatively.

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

Methods: A retrospective review was performed comprising a consecutive series of patients treated with AAGR with DTA between November 2012 and April 2021 for traumatic anterior shoulder instability with glenoid bone loss. Patients were excluded if they had posterior instability, glenoid fracture, missing pre- or postoperative computed tomography (CT) scans, or only CT arthrogram available. Radiographic variables measured on CT scans included estimates of subscapularis muscle volume, subscapularis/infraspinatus muscle ratio, and fatty infiltration according to the Goutallier classification. Pre- and postoperative Western Ontario Shoulder Instability index scores were collected as a secondary outcome of this study.

Results: Ninety-three patients were included in the study with a clinical follow-up of 2.3 ± 1.5 years (mean \pm SD). The subscapularis volume increased from 185.91 ± 45.85 mL preoperatively to 194.1 ± 49.0 mL postoperatively ($P = .006$). The subscapularis to infraspinatus muscle ratio showed a significant increase from 0.96 ± 0.27 to 1.05 ± 0.30 after surgery ($P = .002$). All patients had a Goutallier stage of 0 before and after surgery. The Western Ontario Shoulder Instability scores showed a significant improvement from 64.8 ± 15.5 preoperatively to 28.2 ± 24.0 postoperatively ($P < .001$).

Conclusion: Patients who undergo AAGR with DTA for traumatic shoulder instability with glenoid bone loss have a preserved subscapularis muscle volume with no fatty infiltration, while showing a significant improvement in clinical outcomes.

Platelet-Rich Plasma for Arthroscopic Rotator Cuff Repair: A 3-Arm Randomized Controlled Trial

Yao L, Pang L, Zhang C, et al.

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Background: Although there has been some amount of research into the use of platelet-rich plasma (PRP) after arthroscopic rotator cuff repair, most studies have not fully demonstrated its benefits. In addition, PRP formulations containing different concentrations of leukocytes have not been directly compared for rotator cuff repair.

Purpose: The purpose of this article was to determine whether arthroscopic rotator cuff repair combined with PRP injection, either leukocyte-rich PRP (LR-PRP) or leukocyte-poor PRP (LP-PRP), is superior to the control. The null hypothesis was that the addition of any PRP formulation would not result in outcomes superior to the control group.

Study Design: Randomized controlled trial; Level of evidence, 1.

Methods: Patients with full-thickness rotator cuff tears who underwent arthroscopic repair were assessed for eligibility. The included patients were randomized to 3 treatment groups: the LR-PRP, LP-PRP, and standard-care control groups. After the rotator cuff suture was fixed firmly, different groups of liquid PRP preparations prepared by centrifugation were injected into the tendon-to-bone interface. The functional outcomes were assessed using the University of California, Los Angeles (UCLA) score, the Constant score, the American Shoulder and Elbow Surgeons (ASES) score, the visual analog scale for pain during sleep and activity, and active range of motion at 3, 6, and 12 months after surgery. In addition, the visual analog scale score was obtained at weeks 2 and 6. Postoperative structural integrity was assessed by magnetic resonance imaging at 12 months using the Sugaya classification. Type III was considered partial retear, and types IV and V were considered complete retears. The safety of surgery was compared by the incidence of complications. The main analyses were performed in accordance with the intention-to-treat principle.

Results: Of 150 patients initially randomized, the functional outcomes in 142 (46 LR-PRP, 47 LP-PRP, 49 control) and the structural integrity in 133 (40 LR-PRP, 46 LP-PRP, 47 control) were analyzed. There was no significant difference in the primary outcome of the UCLA score among the 3 groups ($P = .169$). The trends in functional outcomes and range of motion were similar for the 3 groups, with no significant differences among the groups at 12 months. However, within 6 months after surgery, the ASES score was better in the LR-PRP group than in the control group (3 months: 85.8 ± 4.1 vs 81.6 ± 8.7 ; $P = .011$; 6 months: 90.0 ± 5.4 vs 86.2 ± 6.8 ; $P = .003$). At 12 months after surgery, the overall retear rate, including partial and complete retears, was 8%. There were no significant differences in the rates of overall retear ($P = .755$) or complete retear ($P = .633$) among the 3 groups. The only surgical complication was postoperative stiffness, which occurred in 3% of patients, and the incidence did not significantly differ among the groups ($P = .790$).

Conclusion: The study did not reveal that shoulders treated with the LR-PRP or LP-PRP formulations had any superior functional or structural outcomes at 12 months compared with those of the control group. However, LR-PRP may offer better ASES scores than the control group up to 6 months after surgery, and its clinical benefit remains to be proven.

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Reversal of Denervation Changes in Infraspinus Muscle After Operative Management of Paralabral Cysts: An MRI-Based Study

Mun JW, Oh SY, Kim YT, Kim SH.

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Background: Paralabral cysts at the spinoglenoid notch are rare disorders that can potentially lead to compressive suprascapular neuropathy. Given their infrequency, a standard treatment protocol has not yet been established.

Purpose: This study aimed to assess changes in the infraspinus muscle using magnetic resonance imaging (MRI) and to compare the outcomes of 2 different surgical methods. It was hypothesized that surgical intervention could alleviate compressive neuropathy, with comparable outcomes between the 2 surgical approaches.

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

Methods: This retrospective review encompassed 43 patients undergoing arthroscopic labral repair for a paralabral cyst at the spinoglenoid notch, with cyst decompression (27 patients; labral repair with cyst decompression [LRCD] group) or without cyst decompression (16 patients; labral repair only [LRO] group). Preoperative MRI focused on evaluating the condition of the infraspinus and teres minor muscles. Electromyography (EMG) was conducted on 36 patients (21 in LRCD and 15 in LRO) to assess suprascapular nerve function. Postoperative evaluations were performed in 35 patients at postoperative 1 year, excluding those lost to follow-up. Postoperative MRI findings (24 patients in LRCD and 11 patients in LRO) and functional outcome scores including recovery of external rotation power were compared with preoperative status in both groups.

Results: Preoperative MRI revealed denervation changes or atrophy of the infraspinus in 26 of the 43 patients (60.4%). Among the 36 patients who underwent preoperative EMG, 21 patients (58.3%; 13 patients in LRCD and 8 patients in LRO) showed evidence of suprascapular neuropathy. A discrepancy between EMG and MRI findings was noted in 10 patients, with 5 patients showing suprascapular neuropathy according to EMG despite normal muscle status on MRI scans, and the remaining 5 vice versa. Notable atrophy of the infraspinus was seen in 6 patients and teres minor hypertrophy in 5 patients, all of whom exhibited concurrent infraspinus atrophy. Postoperatively, cyst disappearance was observed in all cases in both LRCD (24 patients) and LRO (11 patients) groups. Denervation changes in the infraspinus were resolved in all patients. In patients with infraspinus atrophy, some improvement was noted. Teres minor hypertrophy persisted in 2 of 4 patients. Improvements were similar in both groups (all $P > .05$). External rotation power improved postoperatively in both groups (from 39.1 ± 18.6 to 50.6 ± 17.7 N in LRCD, $P < .001$; from 45.1 ± 16.0 to 54.2 ± 10.7 N in LRO, $P = .025$).

Conclusion: Both LRCD and LRO surgical approaches appear to be effective for paralabral cysts at the spinoglenoid notch. Suprascapular neuropathy can be successfully addressed by both methods. However, conditions with severe infraspinus atrophy and teres minor hypertrophy warrant further investigation in larger series.

Journal of Bone and Joint Surgery (JBJS), Volume 106, Issue 23

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Clinical Orthopaedics and Related Research (CORR), Volume 482, Issue 12

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Bone and Joint Journal (BJJ), Volume 106, issue 12

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Lower Extremity

Arthroscopy, Volume 40, Issue 12

Hip Arthroscopy Simulator Training With Immersive Virtual Reality Has Similar Effectiveness to Nonimmersive Virtual Reality

O.F. Rahman, K.N. Kunze

DOI: <https://doi.org/10.1016/j.arthro.2024.02.042>

Purpose: To (1) compare the efficacy of immersive virtual reality (iVR) to nonimmersive virtual reality (non-iVR) training in hip arthroscopy on procedural and knowledge-based skills acquisition and (2) evaluate the relative cost of each platform.

Methods: Fourteen orthopaedic surgery residents were randomized to simulation training utilizing an iVR Hip Arthroscopy Simulator (n = 7; PrecisionOS) or non-iVR simulator (n = 7; ArthroS Hip VR; VirtaMed). After training, performance was assessed on a cadaver by 4 expert hip arthroscopists through arthroscopic video review of a diagnostic hip arthroscopy. Performance was assessed using the Objective Structured Assessment of Technical Skills (OSATS) and Arthroscopic Surgery Skill Evaluation Tool (ASSET) scores. A cost analysis was performed using the transfer effectiveness ratio (TER) and a direct cost comparison of iVR to non-iVR.

Results: Demographic characteristics did not differ between treatment arms or by training level, hip arthroscopy experience, or prior simulator use. No significant differences were observed in OSATS and ASSET scores between iVR and non-iVR cohorts (OSATS: iVR 19.6 ± 4.4 , non-iVR 21.0 ± 4.1 , $P = .55$; ASSET: iVR 23.7 ± 4.5 , non-iVR 25.8 ± 4.8 , $P = .43$). The absolute TER was 0.06 and there was a 132-fold cost difference of iVR to non-iVR.

Conclusion: Hip arthroscopy simulator training with iVR had similar performance results to non-iVR for technical skill and procedural knowledge acquisition after expert arthroscopic video assessment. The iVR platform had similar effectiveness in transfer of skill compared to non-iVR with a 132 times cost differential.

Level of evidence: not stated

Arthroscopic Anatomic Anterior Cruciate Ligament Primary Repair Restores Anterior Tibial Translation Intraoperatively at Time Zero With No Additional Effect of Suture Augmentation

S. Rilk, G.C. Goodhart

DOI: <https://doi.org/10.1016/j.arthro.2023.11.033>

Purpose: To intraoperatively evaluate the ability of anterior cruciate ligament (ACL) primary repair (ACLPR) to restore anterior tibial translation (ATT) at time zero and to assess the influence of additional suture augmentation (SA) on ATT.

Methods: Patients with proximal ACL tears undergoing arthroscopic ACLPR with dual–suture anchor fixation were included in this time-zero clinical study. Laxity measurements were taken with a digital arthrometer to evaluate ATT stability preoperatively in the office (T0) as a standardized diagnostic tool, preoperatively under anesthesia (T1), at time zero intraoperatively after ACLPR but prior to SA fixation (T2), and after SA fixation (T3).

Results: A total of 27 patients (mean age \pm standard deviation [SD], 35.1 \pm 12.0 years) with proximal ACL tears and significant preoperative (T0) ATT side-to-side differences (SSDs) (mean \pm SD, 4.1 \pm 1.5 mm) were evaluated. ACLPR was shown to restore ATT SSD at time zero (mean \pm SD, 0.2 \pm 1.1 mm) given that a significant reduction in ATT SSD (mean difference \pm standard error, -4.7 ± 0.21 mm; $P < .001$) was achieved when comparing preoperative and intraoperative measurements after separate refixation of both ACL bundles with suture anchors. Additional SA fixation did not further decrease ATT when comparing measurements of the ipsilateral leg after ACL refixation and after SA fixation (mean difference \pm SD, 0.03 \pm 0.22 mm; $P = .496$).

Conclusion: ACLPR with dual–suture anchor fixation restores time-zero ATT laxity in adults with proximal ACL tears. Additional SA fixation in full knee extension does not further decrease ATT.

Level of evidence: not stated

Journal of Shoulder and Elbow Surgery (JSES), Volume 33, issue 12

No Lower Extremity Abstracts

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Improvement in clinical outcomes following arthroscopic all-inside medial lateral ligament reconstruction for rotational ankle instability

T.L. Lewis, J. Ayathamattam

DOI: <https://doi.org/10.1002/ksa.12244>

Purpose: Rotational ankle instability can be diagnosed in up to 18% of cases of chronic lateral ankle instability. It is characterised by an abnormal increase of talar rotation within the tibiofibular mortise, due to an injury in the most anterior component of the deltoid ligament secondary to a chronic deficiency of the lateral collateral ligament. The aim of this prospective observational study was to investigate the clinical outcomes following arthroscopic all-inside medial and lateral ligament reconstruction for rotational ankle instability.

Methods: A prospective observational study of consecutive patients undergoing arthroscopic all-inside medial and lateral ligament reconstruction for rotational ankle instability with minimum 6-month follow-up. The primary outcome was a validated patient-reported outcome measure (PROM), the Manchester-Oxford Foot Questionnaire. Secondary outcomes included the EQ-5D, European Foot and Ankle Society score and complications.

Results: Between 2020 and 2023, 12 patients underwent primary arthroscopic all-inside medial and lateral ligament reconstruction for rotational ankle instability with pre- and post-operative PROMs available for all 12 patients. The mean \pm standard deviation age was 33.9 ± 7.2 years and the mean follow-up was 1.9 ± 1.2 (range: 0.5–3.8, interquartile range: 0.9–3.0) years. There was a significant improvement in all Manchester-Oxford Foot Questionnaire domain scores ($p < 0.05$): Index 53.1 ± 19.1 to 26.4 ± 27.6 , Pain 46.7 ± 20.3 to 26.2 ± 26.8 , Walking/Standing 58.7 ± 26.0 to 27.0 ± 30.0 and Social Interaction 51.2 ± 19.5 to 25.6 ± 30.1 . There were improvements in EQ-5D-5L Index, VAS and VAS Pain; however, these were not statistically significant. There was one complication—a superficial peroneal nerve injury which resolved with a corticosteroid injection.

Conclusion: The arthroscopic all-inside medial and lateral ligament reconstruction technique is a reliable and safe method for treating rotational ankle instability, demonstrating significant improvement in PROMs at a mean 1.9-year follow-up.

Level of evidence: Level IV

Arthroscopic repair of the tibiotalar fascicle of deltoid ligament is feasible through anterior ankle arthroscopy

M. Guelfi, J. Vega

DOI: <https://doi.org/10.1002/ksa.12209>

Purpose: Although arthroscopic repair of the deltoid ligament is becoming a popular procedure, no studies have assessed which bundles of the deltoid ligament can be reached by anterior ankle arthroscopy. This study aimed to assess the feasibility of the arthroscopic repair of the deep layer of the deltoid ligament. In addition, it aimed to correlate which fascicle of the superficial layer of the deltoid ligament corresponds to the deep fascicle visualised by arthroscopy.

Methods: Arthroscopy was performed in 12 fresh frozen ankles by two foot and ankle surgeons. With the arthroscope introduced through the anterolateral portal, the medial compartment and the deltoid ligament were explored in ankle dorsiflexion without distraction. Using a suture passer introduced percutaneously, the most posterior fibres of the deep deltoid ligament visualised by anterior arthroscopy were tagged. Then, the ankles were dissected to identify the deep and superficial bundles of the deltoid ligament tagged with a suture.

Results: In all specimens (100%), the intermediate part of the tibiotalar fascicle, corresponding to the fibres originating from the anterior colliculus, was tagged with a suture. The posterior part of the tibiotalar fascicle was never tagged with a suture. In all specimens, the intermediate part of the tibiotalar fascicle grasped by the suture correlated with the tibiospring fascicle of the superficial layer.

Conclusion: The current study demonstrates the feasibility of the arthroscopic repair of the deep fascicle of the deltoid ligament. By performing anterior arthroscopy, it is possible to visualise and repair the intermediate part of the tibiotalar fascicle (deep layer of the deltoid ligament). These fibres correspond to the tibiospring fascicle of the superficial layer. The clinical relevance of the current study is that the arthroscopic repair of the deep layer of the deltoid ligament is feasible through anterior ankle arthroscopy.

Level of evidence: not applicable

Arthroscopic repair is an effective treatment for dynamic medial ankle instability secondary to posttraumatic and partial injury of the deltoid ligament deep fascicle

J. Vega, F. Malagelada

DOI: <https://doi.org/10.1002/ksa.12197>

Purpose: When the intermediate or collicular fascicle of the medial collateral ligament (MCL) is injured, the diagnosis of posttraumatic medial ankle instability (MAI) is supported. The aim of this study was to describe an arthroscopic all-inside MCL repair after posttraumatic MAI secondary to an isolated injury of the MCL deep fascicle with a knotless suture anchor technique.

Methods: Seven patients (seven men, median age: 23 [19–28] years) with posttraumatic MAI were treated by arthroscopic means after failing nonoperative management. The median follow-up was 34 (13–75) months. The MCL was repaired with an arthroscopic all-inside technique.

Results: A tear affecting the deep and intermediate or collicular fascicle of the MCL was observed in all cases. In addition, five patients were diagnosed with an isolated fibular anterior talofibular ligament (ATFL) detachment, and in two patients, both the ATFL and calcaneofibular ligament were involved. All patients reported subjective improvement after the arthroscopic ligament repair. The median American Orthopedic Foot and Ankle Society score increased from 68 (range: 64–70) preoperatively to 100 (range: 90–100) at final follow-up.

Conclusion: Posttraumatic MAI can be successfully treated by an arthroscopic all-inside repair of the MCL. The presence of an MCL tear affecting the tibiotalar ligament fibres attached to the area of the anterior colliculus should be considered a sign of posttraumatic MAI. This partial deltoid injury at the level of the intermediate or collicular fascicle will conduct to a dynamic MAI.

Level of evidence: Level IV

A Simple Clinical Predictive Model for Arthroscopic Mobility of Osteochondritis Dissecans Lesions of the Knee

Milewski MD, Miller PE, Gossman EC, et al.

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Background: Osteochondritis dissecans (OCD) of the knee is a focal idiopathic alteration of subchondral bone and/or its precursor with risk for instability and disruption of adjacent cartilage. Treatment options focused on preventing premature osteoarthritis vary depending on multiple patient and lesion characteristics, including lesion mobility.

Purpose: To differentiate lesion mobility before arthroscopy using a multivariable model that includes patient demographic characteristics and physical examination findings.

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

Methods: Demographic, preoperative physical examination, and radiographic data were collected from a multicenter national prospective cohort of patients with OCD of the knee. Inclusion criteria included patients <19 years of age and patients with arthroscopically confirmed mobility status based on the Research on Osteochondritis Dissecans of the Knee arthroscopy classification. Multivariable logistic regression analysis using stepwise model selection was used to determine factors associated with the likelihood of a mobile versus an immobile lesion. A 75% partition of the data was used for model training, and 25% was used as a validation cohort. Quantitative model fit statistics were computed using the holdout data, including sensitivity, specificity, and the area under the receiver operating characteristic curve (AUC), along with the corresponding 95% CI.

Results: A total of 407 patients in the prospective cohort met inclusion criteria, and 62% were male. The mean \pm SD age was 13.7 ± 2.2 years, height 161.8 ± 5.3 cm, and weight 59.2 ± 42.2 kg. Arthroscopic evaluation yielded 235 immobile and 172 mobile lesions. Multivariable analysis determined that the best model to predict lesion mobility included chronologic age ≥ 14 years ($P < .001$), effusion on physical examination ($P < .001$), and any loss of range of motion on physical examination ($P = .07$), while controlling for male sex ($P = .38$) and weight >54.4 kg ($P = .12$). In the 25% holdout validation sample ($n = 102$), a sensitivity of 83%, a specificity of 82%, and an AUC of 0.89 (95% CI, 0.82-0.95) were achieved with these predictive factors.

Conclusion: Age, effusion, and loss of motion can predict knee OCD lesion mobility at the time of arthroscopy. Education about lesion mobility can help with surgical planning and patient and family counseling.

Physiologic Preoperative Knee Hyperextension Is Not Associated With Postoperative Laxity, Subjective Knee Function, or Revision Surgery After ACL Reconstruction With Hamstring Tendon Autografts

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Background: There is concern that physiologic knee hyperextension may be associated with inferior outcomes after anterior cruciate ligament reconstruction (ACLR) using hamstring tendon (HT) autografts.

Purpose: To assess whether there is an association between contralateral passive preoperative knee hyperextension ($\leq -5^\circ$) and postoperative anterior knee laxity, subjective knee function, or revision surgery after ACLR using HT autografts.

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

Methods: Patients without concomitant ligament injuries who underwent primary ACLR using an HT autograft at Capio Arthro Clinic, Stockholm, Sweden, between January 1, 2005, and December 31, 2018, were identified. The cohort was dichotomized into the hyperextension group ($\leq -5^\circ$) and the no hyperextension group ($> -5^\circ$) depending on preoperative contralateral passive knee extension degree. Anterior knee laxity (KT-1000 arthrometer; 134 N) was assessed preoperatively and at 6 months postoperatively. The Knee injury and Osteoarthritis Outcome Score (KOOS) was collected preoperatively and at 1, 2, and 5 years postoperatively. Patients who underwent revision ACLR at any institution in Sweden within 5 years of the primary surgery were identified in the Swedish National Knee Ligament Registry.

Results: A total of 6104 patients (53.5% male) for whom knee range of motion measurements were available were identified (hyperextension group [$\leq -5^\circ$]: 2350 [38.5%]; mean extension, $-6.1^\circ \pm 2.3^\circ$ [range, -20° to -5°]; no hyperextension group [$> -5^\circ$]: 3754 [61.5%]; mean extension, $0^\circ \pm 1.4^\circ$ [range, -4° to 15°]). There were no intergroup differences in anterior knee laxity preoperatively (hyperextension group, 3.6 ± 2.8 mm; no hyperextension group, 3.7 ± 2.7 mm; $P = .24$) or postoperatively (hyperextension group, 1.8 ± 2.3 mm; no hyperextension group, 1.8 ± 2.2 mm; $P = .41$). The only significant but nonclinically relevant intergroup differences were seen in the KOOS Symptoms subscale at the 1-year follow-up (hyperextension group, 81.4 ± 16.0 ; no hyperextension group, 80.3 ± 16.5 ; $P = .03$) and in the Sport and Recreation subscale at the 5-year follow-up (hyperextension group, 73.0 ± 25.6 ; no hyperextension group, 75.7 ± 24.3 ; $P = .02$). No other significant intergroup differences were noted preoperatively or at 1, 2, or 5 years postoperatively in any of the KOOS subscales. The overall revision ACLR rate at ≤ 5 years after the primary surgery was 4.9% (302 of 6104 patients). The hazard for revision ACLR in the no hyperextension group (4.5%; 170 of 3754 patients) was not significantly different from that in the hyperextension group (5.6%; 132 of 2350 patients) (hazard ratio, 0.89; 95% CI, 0.71 to 1.12; $P = .34$). A subsequent subanalysis showed that the hazard of revision ACLR in patients with no hyperextension was not significantly different from that of patients with $\leq -10^\circ$ of extension (5.8%; 27 of 467 patients) (hazard ratio, 0.91; 95% CI, 0.61 to 1.36; $P = .65$).

Conclusion: Preoperative passive contralateral knee hyperextension ($\leq -5^\circ$) was not associated with postoperative anterior knee laxity, subjective knee function, or revision surgery ≤ 5 years after ACLR using HT autografts. Therefore, the presence of knee hyperextension alone should not be considered a contraindication per se for the use of HT autografts in ACLR.

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Effect of Patient Resilience on Functional Outcomes After Anterior Cruciate Ligament Reconstruction

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Background: Previous studies have examined the relationship between patient resilience and functional outcome scores after anterior cruciate ligament reconstruction (ACLR). However, past studies have failed to explore the longitudinal relationship between preoperative resilience and functional outcomes 2 years after ACLR.

Purpose: To evaluate the relationship between preoperative patient resilience and functional outcomes 2 years after ACLR.

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

Methods: Patients were identified who underwent ACLR for anterior cruciate ligament tears between January and June 2020 at a single institution. Those who completed the Brief Resilience Scale preoperatively as part of routine patient questionnaires were considered for inclusion. Patients were contacted a minimum of 2 years after ACLR to complete the short form of the Knee injury and Osteoarthritis Outcome Score (KOOS-JR), Single Assessment Numeric Evaluation (SANE), International Knee Documentation Committee (IKDC) Subjective Knee Form, and visual analog scale (VAS). Outcomes were compared among patients with low resilience (LR), normal resilience (NR), and high resilience (HR), as defined in a previous study.²³

Results: A total of 81 patients were included in the final analysis, with 14 patients in the low preoperative resilience group, 54 in normal, and 13 in high. The mean age of the cohort was 32.0 years, and there were no significant differences in age, sex, race, graft type, or psychiatric comorbidities among the resilience groups. Significantly increased postoperative KOOS-JR scores were observed in patients in the HR group as compared with those in the NR and LR groups (94.8, 86.7, and 79.6, respectively; $P = .031$). There were also significantly increased postoperative SANE scores in patients in the HR group versus those in the NR and LR groups (92.3, 83.5, and 69.2; $P = .012$). Patients with high preoperative resilience achieved the IKDC Patient Acceptable Symptom State at significantly higher rates ($P = .003$). No significant differences were observed in postoperative VAS ($P = .364$), IKDC ($P = .072$), or change in IKDC ($P = .448$) over time among resilience groups. Postoperatively, 30 patients (37.0%) changed resilience groups, with 13 moving down and 17 moving up in category (low, $n = 12$; normal, $n = 55$; high, $n = 14$).

Conclusion: Preoperative resilience correlated with KOOS-JR and SANE scores 2 years after ACLR but did not correlate with VAS, IKDC, or change in IKDC over the same period. Resilience was not static, with changes in resilience observed from initial to final evaluations. Resilience is not a strong predictor of postoperative patient-reported outcomes after ACLR.

Functional Outcomes of Immediate Weightbearing After Arthroscopic Lateral Ankle Ligament Repair: A Prospective Randomized Single-Center Trial

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Background: Previous studies have revealed that early postoperative rehabilitation of chronic lateral ankle instability is just as crucial as surgical intervention. Immediate weightbearing has yielded good clinical results; however, randomized controlled studies have been limited.

Purpose: To compare the clinical outcomes of patients with immediate weightbearing after lateral ankle ligament repair with those with delayed weightbearing after 2 weeks in a prospective randomized controlled study.

Study Design: Randomized controlled clinical trial; Level of evidence, 1.

Methods: Patients who underwent arthroscopic anterior talofibular ligament repair between August 2021 and December 2022 were randomized into 2 groups—immediate weightbearing with a hard ankle brace and nonweightbearing casting for 2 weeks followed by cast removal and weightbearing. Primary outcomes were the ankle function scores as assessed using the visual analog scale at rest and during activities, the American Orthopaedic Foot & Ankle Society (AOFAS) score, and the Karlsson Ankle Functional Score (Karlsson score). Secondary outcomes were the time to return to unsupported walking, jogging, work, and exercise and change in the ankle range of motion (ROM) at 3-, 6-, and 12-month follow-ups.

Results: A total of 88 participants were included, consisting of 58 men and 30 women, with a mean age of 30.26 years. Computerized randomization resulted in 44 patients per group. These 2 groups displayed no difference in the AOFAS score, Karlsson score, and ankle ROM at all follow-ups. Patients who underwent immediate weightbearing had a significantly shorter time of returning to unsupported walking ($P < .001$). No differences were observed in the time of returning to work, jogging, and sports exercise.

Conclusion: For patients with chronic ankle instability after arthroscopic anterior talofibular ligament repair, immediate weightbearing allowed patients to return to unsupported walking more quickly and had no negative effects on the AOFAS score, Karlsson score, times of returning to normal life, jogging, sports exercise, and ankle ROM at 3-, 6-, and 12-month follow-ups compared with cast fixation.

Comparing Clinical Outcomes and Knee Stability in Remnant-Preserving ACL Reconstruction Versus Standard ACL Reconstruction: A Systematic Review and Meta-analysis

Allende F, Allahabadi S, Sachdev D, et al.

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Background: Anterior cruciate ligament reconstruction (ACLR) is one of the most frequently performed procedures in sports medicine, and undesirable outcomes still may range from 3-18%. One technique that has been explored to improve outcomes is preservation of the ACL remnant tibial stump, as opposed to stump debridement, at the time of reconstruction.

Purpose: To review current high-level evidence and compare remnant-preserving anterior cruciate ligament reconstruction (ACLR) versus standard ACLR in terms of clinical outcomes and measures of knee stability.

Study Design: Systematic review; Level of evidence, 2.

Methods: A systematic review of randomized controlled trials (RCTs) and cohort studies comparing remnant-preserving ACLR with standard ACLR with a minimum level of evidence of 2 was performed. Extracted data were summarized as general information, surgical characteristics, postoperative clinical outcomes, knee stability, graft evaluation, tunnel assessment, and postoperative complications. When feasible, a meta-analysis was performed.

Results: Seven RCTs and 5 cohort studies met the inclusion criteria. In total, 518 patients underwent remnant-preserving ACLR and 604 patients underwent standard ACLR. Ten studies performed the reconstruction with hamstring tendon (HT) autografts, 1 study with HT and bone-patellar tendon-bone autografts, and 1 study with HT and tibialis anterior allografts. On meta-analysis, remnant-preserving ACLR provided comparable outcomes with respect to International Knee Documentation Committee grades or Tegner scores. Even though there was a significant improvement in Lysholm scores (mean difference, -1.9 ; 95% CI, -2.89 to -0.91 ; $P = .0002$) with the remnant-preserving technique, this did not exceed previously reported minimal clinically important difference values. Remnant-preserving ACLR demonstrated superior knee stability in terms of patients achieving negative pivot shift when compared with the control group (88.89% vs 79.92%; $P = .006$). Although there was a significant improvement in the side-to-side difference in anterior tibial translation favoring remnant preservation ($P = .004$), the mean difference was 0.51 mm.

Conclusion: Remnant-preserving ACLR, primarily with HT autografts, results in comparable clinical outcome scores and significantly improved knee stability relative to standard ACLR without remnant preservation without increasing the complication rate. Further studies will help clarify if remnant-preserving ACLR also has benefits in terms of enhancing graft integration and maturation, improving proprioception, limiting tunnel enlargement, and reducing complications.

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