



Issue 107.3 Arthroscopy, July 2023

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Arthroscopic Autologous Iliac Crest Grafting Results in Similar Outcomes and Low Recurrence Compared to Remplissage Plus Bankart Repair for Anterior Shoulder Instability With Bipolar Bone Defects

D. Wu, Z. Zhou

DOI: <https://doi.org/10.1016/j.arthro.2022.12.039>

Purpose: To compare the functional outcomes, range of motion (ROM), recurrence rates, and complication rates of arthroscopic autologous iliac crest grafting (AICG) and Remplissage plus Bankart repair (RB) for anterior shoulder instability with bipolar bone defects.

Methods: This study enrolled patients undergoing arthroscopic AICG or RB with 13.5-25% glenoid bone defect combined with Hill-Sachs lesion between January 2013 and April 2020, who had a minimum 2-year follow-up. Patient-reported outcomes were evaluated by Subjective Shoulder Value (SSV), Oxford Shoulder Instability Score (OSIS), Rowe score, Constant score, and visual analog scale (VAS) for pain. Active ROM, return to sports, recurrence, self-reported apprehension, and complications were recorded.

Results: This study included 60 patients, including 28 AICG (Group A) and 32 RB (Group R). Mean glenoid bone defect was similar ($17.7\% \pm 3.1\%$ vs $16.6\% \pm 2.4\%$; $P = .122$). Both groups showed significant postoperative improvement in Rowe score, SSV, OSIS, and Constant score. No significant difference was found in postoperative Rowe Score (87.7 vs 85.2; $P = .198$). A total of 20/28 (71.4%) patients in Group A versus 26/32 (81.3%) patients in Group R met the Patient Acceptable Symptomatic State determined by VAS pain score ($P = .370$). Both groups showed high return-to-sports rates (67.8% vs 71.8%; $P = .735$) and slightly decreased ROM. There were two cases of recurrence in Group A versus one in Group R ($P = .594$). Group R had insignificantly higher positive self-reported apprehension rate (40.6% vs 17.9%; $P = .055$).

Conclusion: For anterior shoulder instability with bipolar bone defects, both arthroscopic AICG and RB can result in satisfactory clinical outcomes, good postoperative ROM, and low recurrence and complication rates.

Level of evidence: Level III, retrospective cohort study.

Arthroscopic Dynamic Anterior Stabilization Using Either Long Head of the Biceps or Conjoined Tendon Transfer for Anterior Shoulder Instability Results in a Similarly Low Recurrence Rate

C. Wu, J. Xu

DOI: <https://doi.org/10.1016/j.arthro.2022.12.040>

Purpose: To compare the clinical outcomes of arthroscopic dynamic anterior stabilization (DAS) between transferring the long head of the biceps (DAS-LHB) and the conjoined tendon (DAS-CT) for anterior shoulder instability with <15% glenoid bone loss.

Methods: From January 2016 to May 2019, a total of 63 patients who underwent DAS for recurrent anterior shoulder dislocation with <15% glenoid bone loss were included, comprising 33 patients in DAS-LHB group and 30 patients in DAS-CT group. Clinical outcomes were assessed preoperatively and at a minimum 3-year follow-up, including patient-reported outcomes, range of motion, and return to sports (RTS). Postoperative recurrent instability (including dislocation, subluxation, and subjective instability with a positive apprehension test), revisions and complications also were recorded.

Results: No significant demographic characteristics difference was detected between the DAS-LHB (26.3 ± 7.9 years) and DAS-CT groups (26.0 ± 6.7 years). At the latest follow-up, there were no significant differences between the 2 groups in functional scores: Oxford Shoulder Instability Score (14.8 ± 2.8 vs 15.2 ± 3.6), Rowe score (95.9 ± 6.5 vs 93.2 ± 10.2), visual analog scale for pain (0.8 ± 1.2 vs 0.7 ± 1.7), and American Shoulder and Elbow Surgeons (95 ± 8.8 vs 95.2 ± 9.1) (all $P > .218$). No significant difference was detected between groups in the rates of RTS (90.1% vs 86.7%, $P = .700$) and RTS at previous level (78.7% vs 73.3%, $P = .258$), respectively. No recurrent dislocation occurred in either group. One patient felt occasional subluxation in the DAS-LHB group, and one was positive for the apprehension test in each group. One patient presented with postoperative shoulder stiffness and underwent a secondary arthroscopic debridement in the DAS-CT group.

Conclusion: Comparable rates of recurrence, complication, return to sports, and subjective shoulder function were observed between DAS-LHB and DAS-CT groups.

Level of evidence: Level III, retrospective comparative therapeutic trial.

Prognostic factors associated with failure to return to sport following primary arthroscopic Bankart repair: a retrospective multicenter study

T.P. van Iersel, L.P.E. Verweij

DOI: <https://doi.org/10.1016/j.jse.2023.01.003>

Background: Even though many studies have been published regarding return-to-sport (RTS) rates following arthroscopic Bankart repair (ABR), evidence regarding prognostic factors for which patients do not RTS is limited. The aim of this study was to identify prognostic factors that are associated with failure to RTS and failure to return to preinjury level of sport (RTPS) following primary ABR. The hypothesis was that prognostic factors for failure to RTS and failure to RTPS would be similar to those predisposing recurrence.

Methods: A multicenter, retrospective case-control study including 6 Dutch hospitals was performed. Consecutive patients who underwent primary ABR between 2014 and 2019 were invited to participate and received a questionnaire. Sports participation was assessed before symptom onset, at 6 months postoperatively, and at final follow-up. Failure to RTS was defined as no return to any sport, and failure to RTPS was defined as no return to the same level (or a higher level) of sport. Prognostic factors for failure to RTS or failure to RTPS were identified using logistic regression. Covariates for the regression analysis were selected based on univariate analyses.

Results: This study included 318 patients with a mean follow-up period of 4.2 years (standard deviation, 1.8 years). Of these 318 patients, 26 (8.2%) did not RTS and 100 (31%) did not RTPS. Logistic regression analysis demonstrated that glenoid bone loss (odds ratio [OR], 1.09; 95% confidence interval [CI], 1.04-1.15; $P = .001$) and overhead use of the shoulder during work (OR, 3.77; 95% CI, 1.45-9.85; $P = .007$) were prognostic factors for failure to RTS. In addition, it showed that preoperative professional sports level (OR, 2.94; 95% CI, 1.07-8.05; $P = .04$) and preoperative body mass index (OR, 1.11; 95% CI, 1.01-1.21; $P = .04$) were prognostic factors for failure to RTPS. Repair of a bony Bankart lesion (OR, 0.35; 95% CI, 0.15-0.81; $P = .02$) and the presence of an anterior labral periosteal sleeve avulsion (ALPSA) (OR, 0.44; 95% CI, 0.20-0.97; $P = .04$) were identified as factors that facilitated RTPS.

Conclusion: This study identified glenoid bone loss and overhead use of the shoulder during work to be associated with failure to RTS. Moreover, preoperative sports level and preoperative body mass index were found to be associated with failure to RTPS. In contrast, a bony Bankart lesion and an anterior labral periosteal sleeve avulsion (ALPSA) lesion facilitated RTPS. Future prospective studies are needed to confirm these factors and determine which part of the effect can be attributed to (failure of) surgical treatment or changes in behavior.

Level of evidence: Level III, Retrospective Cohort Comparison, Prognosis study

Postoperative graft integrity affects clinical outcomes after superior capsule reconstruction using fascia lata autograft in posterior-superior rotator cuff tears: a multicenter study

A. Hasegawa, T. Mihata

DOI: <https://doi.org/10.1016/j.jse.2022.12.010>

Background: Previous studies have postulated that graft thickness and graft healing may be important factors for optimizing clinical outcomes of superior capsule reconstruction (SCR) for patients with irreparable rotator cuff tears (RCTs). However, the relationship between postoperative graft integrity and clinical outcomes after SCR remains unclear. We aimed to assess the relationship between postoperative graft integrity, including graft thickness and size of graft tear, and clinical outcomes after SCR in patients with irreparable RCTs.

Methods: This retrospective multicenter study included 188 patients (86 women, 102 men; mean age, 69.2 years; range, 49-87 years) with irreparable RCTs who underwent arthroscopic SCR using fascia lata autografts. Using magnetic resonance imaging, the graft integrity was evaluated postoperatively at or after 1 year and was classified, according to Hasegawa's classification, into 4 categories: type I-II, intact graft of sufficient thickness; type III, thinned graft without discontinuity; type IV, presence of a minor discontinuity; and type V, presence of a major discontinuity. We compared (1) baseline characteristics, (2) visual analog scale (VAS) for pain, (3) American Shoulder and Elbow Surgeons (ASES) score, (4) active shoulder range of motion, and (5) acromiohumeral distance (AHD) among 4 groups based on postoperative graft integrity.

Results: Magnetic resonance imaging scans revealed 152 shoulders (80.9%) with type I-II graft, 13 (6.9%) with type III graft, 13 (6.9%) with type IV graft, and 10 (5.3%) with type V graft. VAS and ASES scores significantly improved after SCR in all graft types ($P < .0001$ to $P = .02$). However, shoulders with type V grafts had significantly inferior postoperative VAS and ASES scores compared to those with type I-II grafts ($P = .001$ and $P < .0001$, respectively). Shoulders without graft tears (types I-II and III) showed significant improvements in shoulder elevation and internal rotation after SCR ($P < .0001$ to $P = .02$). In contrast, shoulders with large graft tears (type V) showed no significant improvement in shoulder range of motion. Postoperative acromiohumeral distance significantly increased only in shoulders with type I-II grafts ($P < .0001$).

Conclusion: Postoperative graft thickness and size of graft tear affected clinical and radiographic outcomes after SCR using a fascia lata autograft. Patients with large graft tears had significantly inferior postoperative clinical scores compared to those with intact grafts of sufficient thickness, although arthroscopic SCR provided pain relief even in patients with graft tears. Shoulders with intact grafts of sufficient thickness restored glenohumeral stability and showed better clinical outcomes than those with graft thinning or tears.

Level of evidence: Level III, Retrospective Cohort Comparison, Prognosis Study

Arthroscopic tissue biopsy as a preoperative diagnostic test for periprosthetic shoulder arthroplasty infections: a systematic review and meta-analysis

J. Tat, J. Tat

DOI: <https://doi.org/10.1016/j.jse.2023.02.135>

Background: The diagnosis of periprosthetic infection in shoulder arthroplasty remains a challenge. Conventional methods for evaluating periprosthetic joint infections are poor because of lower-virulence organisms affecting the shoulder. The aim of our systematic review was to evaluate the diagnostic accuracy of preoperative arthroscopic tissue cultures compared with tissue biopsy samples obtained at the time of revision surgery.

Materials and Methods: We conducted a systematic search of the MEDLINE, Embase, and Cochrane Central databases. The inclusion criteria consisted of studies that used arthroscopy to obtain preoperative tissue cultures for the diagnosis of shoulder arthroplasty infections. Studies were excluded if they obtained non-arthroscopic tissue samples. We reported the sensitivity, specificity, positive predictive value, and negative predictive value. Culture findings from the arthroscopic biopsy samples were also compared with conventional tests of fluoroscopy-guided joint aspiration and serum inflammatory marker testing (positive erythrocyte sedimentation rate or C-reactive protein) within the included studies. A meta-analysis was performed to assess the overall diagnostic accuracy of the studies.

Results: Our search strategy yielded 795 potentially relevant publications; 572 underwent title and abstract screening, and 14 studies underwent full-text review, of which 7 were included in our systematic review. The studies represented a balance of shoulder arthroplasty types, including anatomic total shoulder arthroplasty (n = 75, 38%), reverse total shoulder arthroplasty (n = 60, 30%), and hemiarthroplasty (n = 64, 32%). There were 56 of 120 arthroscopic procedures that returned positive tissue culture findings compared with 64 of 157 positive open biopsy culture findings obtained from revision surgery. The meta-analysis total for sensitivity and specificity for all studies combined indicated that arthroscopic tissue cultures (0.76 [95% confidence interval (CI), 0.57-0.88] and 0.91 [95% CI, 0.79-0.97], respectively) were superior to both aspiration (0.15 [95% CI, 0.03-0.48] and 0.93 [95% CI, 0.65-0.99], respectively) and a positive erythrocyte sedimentation rate or C-reactive protein level (0.14 [95% CI, 0.02-0.62] and 0.83 [95% CI, 0.56-0.95], respectively) in diagnosing periprosthetic shoulder infections.

Conclusions: Our systematic review demonstrated that preoperative arthroscopic tissue biopsy used for microbiology cultures accurately predicts intraoperative culture findings obtained during revision surgery with high sensitivity and specificity. Additionally, arthroscopy appears to be superior to conventional techniques of joint aspiration and inflammatory marker testing. Therefore, arthroscopic tissue cultures may be an emerging useful tool to help guide the management of periprosthetic infections in shoulder arthroplasty.

Level of evidence: Level III, Systematic review

Minimally clinically important difference (MCID) and substantial clinical benefit (SCB) of upper extremity PROMIS scores following arthroscopic rotator cuff repairs

M.G. Alben, D. Gordon

DOI: <https://doi.org/10.1007/s00167-022-07279-7>

Purpose: To calculate and determine what factors are associated with achieving the Minimal Clinically Important Difference (MCID) and the Substantial Clinical Benefit (SCB) of Patient-Reported Outcomes Measurement Information System (PROMIS) Upper Extremity Computer Adaptive Testing v2.0 (UE), Pain Interference (P-Interference), and Pain Intensity (P-Intensity) in patients undergoing arthroscopic rotator cuff repair (aRCR).

Methods: The change in PROMIS scores representing the optimal cutoff for a ROC curve with an area under the curve analysis was used to calculate the anchor-based MCID and SCB. To assess the responsiveness of each PROM, effect sizes and standardized response means (SRM) were calculated. To identify factors associated with attaining the MCID and SCB, univariate and multivariate logistic regression analyses were performed.

Results: A total of 323 patients with an average age of 59.9 ± 9.5 were enrolled in this study, of which, 187/323 [57.9%] were male and 136/323 [42.1%] were female. The anchor-based MCID for PROMIS UE, P-Interference, and P-Intensity was: 9.0, 7.5, and 11.2, respectively. The respective SCB was 10.9, 9.3, and 12.7. Effect size and SRM were: PROMIS UE (1.4, 1.3), P-Interference (1.8, 1.5), and P-Intensity (2.3, 2.0). Lower preoperative P-Intensity scores ($p = 0.02$), dominant arm involvement ($p = 0.03$), and concomitant biceps tenodesis ($p = 0.03$) were associated with patients achieving the SCB for PROMIS UE.

Conclusion: A large responsiveness for each of the PROMIS instruments due to the majority of patients reporting great improvement after aRCR and a small standard deviation across all outcome measures was shown in our study. Lower preoperative P-Intensity scores and concomitant biceps tenodesis were associated with higher odds of achieving the SCB for PROMIS UE. The knowledge of MCID and SCB values for PROMIS instruments will allow the surgeon to determine whether the improvements in the PROMIS scores after aRCR are clinically meaningful.

Level of evidence: Level III.

Superior capsular reconstruction using hybrid graft for irreparable massive rotator cuff tear

Jong Pil Yoon, Dong-Hyun Kim

DOI: <https://doi.org/10.1007/s00167-023-07321-2>

Purpose: To evaluate the clinical and radiological outcomes of arthroscopic superior capsular reconstruction (SCR) using hybrid grafts composed of tensor fascia lata autografts and human dermal allografts.

Methods: This study included 30 patients with chronic irreparable posterosuperior rotator cuff tears (RCTs) who underwent arthroscopic SCR using a hybrid graft composed of tensor fascia lata autograft and human dermal allograft. Clinical outcomes were evaluated using the pain visual analogue scale score, shoulder range of motion, American Shoulder and Elbow Surgeons score, constant score, University of California–Los Angeles score, and simple shoulder test score preoperatively and at least 2 years after surgery. Radiographic analysis included the Hamada classification grade, acromiohumeral distance (AHD), and graft integrity at 2 years after surgery.

Results: All patients exhibited significant clinical improvement in all functional outcome measurements, except external rotation (all $P < 0.05$). The number of patients who exhibited pseudoparalysis decreased from 7 (23.3%) to 2 (6.7%) postoperatively. Complications were not observed. Radiologically, the mean postoperative AHD increased significantly from 6.9 ± 1.6 cm to 8.8 ± 2.1 cm at 2 years postoperatively ($P < 0.001$). Twenty five out of the 30 (83.3%) patients showed successful graft healing, and all healing failures occurred on the humeral side. The differences between the healed-graft and failed-graft groups were significantly lower graft thickness ($P = 0.001$) and smaller AHD ($P < 0.001$) in the failed-graft group. Every functional outcome scores were not statistically different between healed-graft and failed-graft groups.

Conclusions: An arthroscopic SCR technique using a hybrid graft consisting of a tensor fascia lata autograft and human dermal allograft showed satisfactory clinical outcomes in patients with irreparable RCTs.

Level of evidence: Level IV.

No correlation exists between coracoid tunnel widening and loss of reduction after arthroscopic acromioclavicular fixation using tightrope system

A.S. Elkalyoby, M.R. Waly

DOI: <https://doi.org/10.1007/s00167-023-07329-8>

Purpose: To detect the widening of the tunnel of the coracoid process after arthroscopic fixation of acute acromioclavicular joint (ACJ) dislocation using the TightRope system and its correlation with loss of reduction and functional scores.

Methods: From 2016 to 2018, a prospective study was performed on twenty-three patients with acute grade III–V ACJ dislocation. Arthroscopic TightRope repair of the ACJ was performed. Coracoid tunnel widening was measured by CT, and the coracoclavicular distance was measured on the radiographs immediately postoperatively and at 12 months. The Constant Shoulder Score, Oxford Shoulder Score, Nottingham Clavicle Score and Visual analog scale were used as outcome measures at 12 months.

Results: The coracoid tunnel diameter to horizontal coracoid diameter ratio increased from $22.8 \pm 3.7\%$ immediately postoperatively to $38.5 \pm 5.5\%$ at 12 months ($p < 0.001$). The coracoclavicular (CC) distance showed an increase from a mean of 10.8 ± 1.7 mm to a mean of 11.8 ± 2.5 at 12 months ($p < 0.001$). There was no correlation between the increase in the coracoclavicular distance and the patients' functional clinical scores or coracoid tunnel widening.

Conclusion: Coracoid tunnel widening and radiological loss of reduction occur after arthroscopic fixation of acute ACJ dislocation with the TightRope system. However, they do not correlate with each other or with the functional scores of the patient.

Level of evidence: Level IV.

Arthroscopic double-row bridge fixation provided satisfactory shoulder functional restoration with high union rate for acute anterior glenoid fracture

In Park, S.J. Shin

DOI: <https://doi.org/10.1007/s00167-023-07389-w>

Purpose: To introduce a novel surgical technique for arthroscopic reduction and double-row bridge fixation using trans-subscapularis tendon portal for anterior glenoid fracture and to evaluate the clinical and radiological outcomes.

Methods: A total of 22 patients who underwent arthroscopic reduction and double-row bridge fixation for an acute anterior glenoid fracture were retrospectively evaluated. Arthroscopic surgery was performed using four portals including a trans-subscapularis tendon portal. All patients underwent 3D-CT preoperatively and one day and one year postoperatively to evaluate the fracture fragment size, reduction status, and presence of fracture union. To evaluate the degree of fragment displacement, articular step-off and medial fracture gap were measured using 3D-CT. Clinical outcomes were assessed based on the ASES and Constant scores. Postoperative glenohumeral joint arthritis was evaluated using plain radiographs with the Samilson and Prieto classification.

Results: The average preoperative fracture fragment size was $25.9 \pm 5.6\%$. Articular step-off (preoperative: 6.0 ± 3.3 mm, postoperative one day: 1.1 ± 1.6 mm, $P < 0.001$) and medial fracture gap (preoperative: 5.2 ± 2.6 mm, postoperative one day: 1.9 ± 2.3 mm, $P < 0.001$) were improved after surgery. On the postoperative one year 3D-CT, 20 patients achieved complete fracture union, and two patients showed partial union. Postoperative glenohumeral joint arthritis was observed in four patients. At the last visit, the ASES score was 91.8 ± 7.0 and the Constant score was 91.6 ± 7.0 .

Conclusion: Arthroscopic reduction and double-row bridge fixation using a trans-subscapularis tendon portal for acute anterior glenoid fracture achieved satisfactory clinical outcomes and anatomical reduction as demonstrated by a low degree of articular step-off and medial fracture gap.

Level of evidence: Level IV.

Arthroscopic approach does not yield better results than open surgery after subscapularis repair: a systematic review

V.G. Rinaldi, M. La Verde

DOI: <https://doi.org/10.1007/s00167-023-07403-1>

Purpose: This study aimed to compare the long-term outcomes of arthroscopic versus mini-open repair in patients with isolated subscapularis tendon tears.

Methods: Google Scholar, PubMed, and Embase databases were searched for studies evaluating isolated subscapularis tears subsequently treated by arthroscopic or mini-open repair. The inclusion criteria were clinical studies reporting isolated subscapularis lesions treated by arthroscopic or mini-open repair, a minimum follow-up of 12 months, and clinical and functional outcomes reported in the study results. Articles not reporting functional outcomes or studies that reported results for anterosuperior rotator cuff tears without a separate analysis of subscapularis tendon tears were excluded. Studies older than 20 years and studies with a minimum follow-up of less than 12 months were also excluded.

Results: A total of 12 studies met the inclusion criteria; 8 papers were included in the arthroscopic repair group, and 6 were included in the mini-open repair group (2 studies reported results for both techniques). The mean age reported was 49.3 years, and 85.1% of patients were male. The dominant limb was involved in 77.6% of the patients, and a traumatic onset of symptoms was verified in 76.3%. The mean time to surgery was 9.6 months. The Constant–Murley score showed positive results for the arthroscopic and mini-open groups, with mean postoperative values of 84.6 and 82.1, respectively. Promising results were also observed for pain, with a mean of 13.2 (out of 15) points for the arthroscopic group and 11.7 for the mini-open group. The long head of the biceps was involved in 78% of the patients, and LHB tenodesis or tenotomy were the most common concomitant procedures performed.

Conclusions: There was no significant difference in clinical and functional outcomes between open and arthroscopic repair. Moreover, the same complication rates were reported in both treatments, but arthroscopic repair led to less postoperative pain.

Level of evidence: Level IV.

Clinical and Radiological Outcomes of Arthroscopic Superior Capsular Reconstruction Versus Primary Rotator Cuff Repair in Massive Rotator Cuff Tears: A Propensity Score-Matched Study

J.-B. Lee, E. Kholinne

DOI: <https://doi.org/10.1177/03635465231171928>

Background: Arthroscopic superior capsular reconstruction (aSCR) has emerged as a treatment option for managing massive rotator cuff tears (MRCTs) given the unpredictable results after an arthroscopic rotator cuff repair (aRCR). Yet, few comparative studies of aSCR and aRCR have been conducted.

Purpose: To compare the clinical and radiological outcomes between aRCR and aSCR in patients with MRCT.

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

Methods: A total of 163 cases of MRCT from 2010 to 2020 with follow-up ≥ 2 years were retrospectively reviewed. Among them, 102 had aRCR and 61 had aSCR using fascia lata autograft. Propensity score matching was used to select controls matched for age, sex, diabetes mellitus, osteoporosis, preoperative American Shoulder and Elbow Surgeons score, Single Assessment Numeric Evaluation score, Constant score, pain visual analog scale (pVAS) score, range of motion (ROM), tear size, global fatty degeneration index, and acromiohumeral distance (AHD). Last, 33 cases in each group were selected after propensity score matching. Radiological assessment was conducted using serial postoperative magnetic resonance imaging. Pre- and postoperative findings—including American Shoulder and Elbow Surgeons, pVAS, Single Assessment Numeric Evaluation, and Constant scores and ROM—were assessed to compare clinical outcomes. For radiological outcomes, global fatty degeneration index, AHD, and healing rate were evaluated. Healing failure was defined as Sugaya classification IV or V in the aRCR group, as compared with a full-thickness tear of the graft in the aSCR group, which corresponded to Sugaya classification IV or V.

Results: Postoperative clinical outcomes were significantly improved at the final follow-up in both groups. In the aSCR group, postoperative forward flexion, pVAS, and AHD were significantly improved as compared with the aRCR group (mean, 161° vs 148° [$P = .02$]; 1.03 vs 1.64 [$P = .047$]; 7.00 vs 5.23 mm [$P < .001$], respectively). The healing rate was 20 of 33 (60.6%) for aRCR and 29 of 33 (87.9%) for aSCR ($P = .022$).

Conclusion: aSCR and aRCR are effective and reliable treatment options for MRCT. However, when compared with aRCR, aSCR showed improved clinical outcomes, including pVAS score, postoperative ROM, and favorable radiological findings, including AHD and a higher healing rate.

Relationship of Missed Statin Therapy and 10-Year Atherosclerotic Cardiovascular Disease Risk Score to Retear Rate After Arthroscopic Rotator Cuff Repair

S.Lee, N. Lee

DOI: <https://doi.org/10.1177/03635465231175476>

Background: There is no practical consensus on managing cholesterol in patients with rotator cuff repair despite hyperlipidemia and statin therapy being well-known factors in rotator cuff healing. The 10-year atherosclerotic cardiovascular disease (ASCVD) risk score is a commonly used guideline to determine statin administration for hyperlipidemia.

Purpose: To identify the relationship between retear and preoperative factors, including 10-year ASCVD risk score and statin administration status, and to compare clinical outcomes and retear rates between patients who are taking and not taking statins.

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

Methods: This study enrolled 182 patients with a symptomatic full-thickness rotator cuff tear who underwent arthroscopic repair. Serum lipid profile, 10-year ASCVD risk score, statin eligibility, and statin administration status were assessed. Patients were categorized into 2 groups based on magnetic resonance imaging to evaluate cuff integrity at postoperative 6 months: a healed group and a retear group. Radiographic and intraoperative factors related to retear were analyzed. Multiple regression analysis was performed to evaluate factors related to rotator cuff retear. For the subgroup analysis, patients eligible for statin therapy were divided into 2 subgroups according to administration status.

Results: There were 149 (81.9%) patients in the healed group and 33 (18.1%) in the retear group. In the multiple regression analysis, missed statin therapy, 10-year ASCVD risk score, and fatty infiltration of the infraspinatus muscle were the independent factors related to retear. The cutoff value for 10-year ASCVD risk score was 11.85%, with a sensitivity of 0.75 and a specificity of 0.62. In the subgroup analysis of 104 patients eligible for statin therapy, 66 (63.5%; group 1) received statin therapy and 38 (36.5%; group 2) missed it. Group 2 showed a significantly higher retear rate than group 1 (36.8% vs 13.6%; $P = .006$).

Conclusion: Missed statin therapy, 10-year ASCVD risk score, and fatty infiltration of the infraspinatus were the independent factors associated with rotator cuff retear. Patients who missed statin therapy showed a higher retear rate than patients receiving statin therapy. Optimal statin therapy for patients who undergo arthroscopic rotator cuff repair might improve repair integrity.

Clinical Outcomes of Revision Arthroscopic Osteocapsular Arthroplasty in Primary Elbow Osteoarthritis: A Retrospective Cohort Study

S.-P. So, J.-M. Kwak

DOI: <https://doi.org/10.1177/03635465231171542>

Background: Arthroscopic osteocapsular arthroplasty (OCA) achieves significant medium-term outcomes in patients with primary elbow osteoarthritis (OA); however, outcomes after revision arthroscopic OCA are not well known.

Purpose: To assess clinical outcomes after revision arthroscopic OCA as compared with those after primary surgery in patients with OA.

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

Methods: Patients who underwent arthroscopic OCA attributed to primary elbow OA between January 2010 and July 2020 were enrolled. Range of motion (ROM), visual analog scale (VAS) pain score, and Mayo Elbow Performance Score (MEPS) were assessed. Operation time and complications were assessed by chart review. Clinical outcomes between the primary and revision surgery groups were compared, and subgroup analysis for radiologically severe OA was performed.

Results: Data from 61 patients were analyzed (primary, $n = 53$; revision, $n = 8$). The mean \pm SD age was 56.3 ± 8.5 and 54.3 ± 8.9 years in the primary and revision groups, respectively. The primary group had significantly better ROM arcs preoperatively ($89.9^\circ \pm 20.3^\circ$ vs $71.3^\circ \pm 22.3^\circ$; $P = .021$) and postoperatively ($112.4^\circ \pm 17.1^\circ$ vs $96.9^\circ \pm 16.5^\circ$; $P = .019$) than the revision group; however, the degree of improvement was comparable ($P = .445$). Postoperative VAS pain score ($P = .164$) and MEPS ($P = .581$) were comparable between the groups, as were the degrees of improvement in VAS pain score ($P = .691$) and MEPS ($P = .604$). The revision group required a significantly longer operative time than the primary group ($P = .004$) and had a nonsignificant higher complication rate ($P = .065$). Subgroup analysis showed that radiologically severe cases in the primary group had significantly better preoperative ($P = .010$) and postoperative ($P = .030$) ROM arcs than the revision group and a comparable postoperative VAS pain score ($P = .155$) and MEPS ($P = .658$).

Conclusion: Revision arthroscopic OCA is a favorable treatment option for primary elbow OA with recurrent symptoms. Postoperative ROM arc was worse after revision surgery as compared with primary surgery; however, the degree of improvement was comparable. Postoperative VAS pain score and MEPS were comparable with primary surgery.

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Arthroscopy, Volume 39, Issue 7

Class I Obesity Delays Achievement of Patient-Acceptable Symptom State but Not Minimum Clinically Important Difference or Substantial Clinical Benefit After Primary Hip Arthroscopy for Femoroacetabular Impingement Syndrome

D.S. Shankar, A.S. Bi

DOI: <https://doi.org/10.1016/j.arthro.2023.01.106>

Purpose: To identify differences in the time taken to achieve the minimum clinically important difference (MCID), substantial clinical benefit (SCB), and patient-acceptable symptom state (PASS) following primary hip arthroscopy for the treatment of femoroacetabular impingement syndrome (FAIS) among patients of different body mass index (BMI) categories.

Methods: We conducted a retrospective comparative study of hip arthroscopy patients with minimum 2-year follow-up. BMI categories were defined as normal ($18.5 \leq \text{BMI} < 25.0$), overweight ($25.0 \leq \text{BMI} < 30.0$), or class I obese ($30.0 \leq \text{BMI} < 35.0$). All subjects completed the modified Harris Hip Score (mHHS) prior to surgery and at 6 months, 1 year, and 2 years postoperative. MCID and SCB cutoffs were defined as pre-to-postoperative increases in mHHS by ≥ 8.2 and ≥ 19.8 , respectively. PASS cutoff was set at postoperative mHHS ≥ 74 . Time to achievement of each milestone was compared using the interval-censored EMICM algorithm. The effect of BMI was adjusted for age and sex using an interval-censored proportional hazards model.

Results: 285 patients were included in the analysis: 150 (52.6%) normal BMI, 99 (34.7%) overweight, and 36 (12.6%) obese. Obese patients had lower mHHS at baseline ($P = .006$) and at 2-year follow-up ($P = .008$). There were no significant intergroup differences in time to achievement for MCID ($P = .92$) or SCB ($P = .69$), but obese patients had longer time to PASS than normal BMI patients ($P = .047$). Multivariable analysis found obesity to be predictive of longer time to PASS (HR = .55; $P = .007$) but not MCID (HR = 0.91; $P = .68$) or SCB (HR = 1.06; $P = .30$).

Conclusion: Class I obesity is associated with delays in achieving a literature-defined PASS threshold after primary hip arthroscopy for FAIS.

Level of Evidence: Level III, retrospective comparative study.

Low Rates of 5-Year Secondary Surgery and Postoperative Complications After Primary Hip Arthroscopy in More Than 30,000 Patients

S.M. Gillinov, D.N. Kim

DOI: <https://doi.org/10.1016/j.arthro.2023.01.100>

Purpose: To evaluate 90-day complications, 5-year secondary surgery rates, and risk factors for secondary surgery following primary hip arthroscopy performed for femoroacetabular impingement and/or labral tears using a large national dataset.

Methods: A retrospective analysis was conducted using the PearlDiver Mariner151 database. Patients with *International Classification of Diseases, Tenth Revision*, diagnosis codes for femoroacetabular impingement and/or labral tear undergoing primary hip arthroscopy with femoroplasty, acetabuloplasty, and/or labral repair between 2015 and 2021 were identified. Those with concomitant *International Classification of Diseases, Tenth Revision*, codes for infection, neoplasm, or fracture were excluded, as were patients with a history of previous hip arthroscopy or total hip arthroplasty, or age ≥ 70 years. Rates of complications within 90 days of surgery were assessed. Five-year rates of secondary surgery—revision hip arthroscopy or conversion to total hip arthroplasty—were determined by Kaplan–Meier analysis, and risk factors for secondary surgery were identified by multivariate logistic regression.

Results: A total of 31,623 patients underwent primary hip arthroscopy from October 2015 to April 2021, with annual volumes ranging from 5,340 to 6,343 surgeries per year. Femoroplasty was the most frequent surgical procedure (performed in 81.1% of surgical encounters), followed by labral repair (72.6%) and acetabuloplasty (33.0%). Ninety-day postoperative complication rates were low, with 1.28% of patients experiencing any complication. The 5-year secondary surgery rate was 4.9% (N = 915 patients). Multivariate logistic regression identified age < 20 years (odds ratio [OR] 1.50; $P < .001$), female sex (OR 1.33; $P < .001$), class I obesity (body mass index 30–34.9: OR 1.30; $P = .04$), and class II/III obesity (body mass index ≥ 35.0 : OR 1.29; $P = .02$) as independent predictors of secondary surgery.

Conclusion: In this study of primary hip arthroscopy, 90-day adverse events were low at 1.28%, and the 5-year secondary surgery rate was 4.9%. Age younger than 20 years, female sex, and obesity were risk factors for secondary surgery, suggesting the need for increased surveillance in these patient groups.

Level of Evidence: Level IV, case series.

Patient-Reported Outcomes and Survivorship Are Not Different for Primary Hip Arthroscopy Patients of Age 50 Years and Older Compared With a 20- to 35-Year-Old Matched Cohort at Minimum 5-Year Follow-Up

D.S. Shankar, T. Wingo

DOI: <https://doi.org/10.1016/j.arthro.2023.01.105>

Purpose: To assess clinical outcomes among patients aged 50 years or older after primary hip arthroscopy for femoroacetabular impingement (FAI) with or without labral tears compared with a matched control group of younger patients aged 20 to 35 years old at minimum 5-year follow-up.

Methods: We conducted a retrospective comparative prognostic study using a prospectively collected database of patients who underwent hip arthroscopy with minimum 5-year follow-up. Subjects completed the modified Harris Hip Score (mHHS) and Non-Arthritic Hip Score (NAHS) before surgery and at 5-year follow-up. Patients aged ≥ 50 years were propensity score matched on sex, body mass index, and preoperative mHHS to controls aged 20 to 35 years. Pre- to postoperative changes in mHHS and NAHS were compared between groups using the Mann–Whitney *U* test. Hip survivorship rates and minimum clinically important difference achievement rates were compared between groups using the Fisher exact test. *P* values $< .05$ were considered statistically significant.

Results: In total, 35 older patients (mean age 58.3 years) were matched to 35 younger controls (mean age 29.2 years). Both groups were mostly female (65.7%) and had equal mean body mass index (26.0). Acetabular chondral lesions of Outerbridge grades III-IV were more prevalent in the older group (older 28.6% vs younger 0%, $P < .001$). Five-year reoperation rates were not significantly different between the groups (older 8.6% vs younger 2.9%, $P = .61$). There were no significant intergroup differences in 5-year improvement in mHHS (older 32.7 vs younger 30.6, $P = .46$) or NAHS (older 34.4 vs younger 37.9, $P = .70$) or in 5-year minimum clinically important difference achievement rates for the mHHS (older 93.6% vs younger 93.6%, $P = 1.00$) or NAHS (older 87.1% vs younger 96.8%, $P = .35$).

Conclusion: There are no significant differences in reoperation rates and patient-reported outcomes between patients aged ≥ 50 years versus matched controls aged 20 to 35 years after primary hip arthroscopy for FAI.

Level of Evidence: Level III, retrospective comparative prognostic study.

Small Hamstring Tendon Graft for Anterior Cruciate Ligament Reconstruction Combined With Anterolateral Ligament Reconstruction Results in the Same Failure Rate as Larger Hamstring Tendon Graft Reconstruction Alone

C.P. Helito, A.G.M. da Silva

DOI: <https://doi.org/10.1016/j.arthro.2023.01.101>

Purpose: To compare patients undergoing anterior cruciate ligament (ACL) reconstruction with hamstring grafts 7 mm or less in diameter combined with anterolateral ligament (ALL) reconstruction versus isolated ACL reconstruction with grafts greater than 7 mm in diameter.

Methods: We retrospectively evaluated the descriptive data and clinical outcomes of patients who underwent primary ACL reconstruction with hamstring grafts from June 2013 to January 2020 and had a minimum follow-up period of 2 years. Patients with quadrupled or quintupled semitendinosus and gracilis autograft 7 mm or less in diameter combined with single-strand ALL reconstruction (ACL-ALL group) were matched in a 1:2 propensity ratio to patients who underwent isolated single-bundle ACL reconstruction with hamstring grafts greater than 7 mm (ACL group).

Results: We identified 30 patients in our database who met the criteria for the ACL-ALL group. The patients in this group were matched to 60 patients comprising the ACL group. Both groups were similar regarding all preoperative matched and unmatched variables. The mean ACL graft diameter was 6.8 ± 0.4 mm in the ACL-ALL group and 8.6 ± 0.6 mm in the ACL group ($P < .001$). The ACL-ALL group presented 1 failure (3.3%), and the ACL group presented 3 failures (5%) ($P = .717$). Postoperative KT-1000 measurements were similar between the groups (2.1 ± 1.1 mm vs 1.9 ± 1.2 mm, $P = .114$), as were postoperative pivot-shift grades ($P = .652$). Subjective International Knee Documentation Committee scores and Lysholm scores did not present any differences between the groups ($P = .058$ and $P = .280$, respectively).

Conclusion: Patients who undergo combined ACL-ALL reconstruction with an ACL graft diameter of 7 mm or less can achieve similar results to patients who undergo isolated ACL reconstruction with a graft diameter greater than 7 mm. An associated ALL reconstruction can be performed to increase knee stability in patients with small-diameter hamstring grafts.

Level of Evidence: Level III, retrospective, comparative therapeutic trial.

Delay of Timing of Anterior Cruciate Ligament Reconstruction Is Associated With Lower Risk of Arthrofibrosis Requiring Intervention

A.R. Agarwal, A.B. Harris

DOI: <https://doi.org/10.1016/j.arthro.2023.01.102>

Purpose: To conduct 2 separate stratum-specific likelihood ratio analyses in patients younger than 40 year of age (<40 years) and those aged 40 and older (40+ years) at time of anterior cruciate ligament (ACL) reconstruction to define data-driven strata between ACL tear and primary isolated ACL reconstruction in which the risk of arthrofibrosis, using manipulation under anesthesia and arthroscopic lysis of adhesions as surrogates, is significantly different.

Methods: A retrospective cohort analysis was conducted using the PearlDiver Database. Patients who underwent ACL reconstruction were identified using the Current Procedure Terminology code 29888. Patients were stratified to those aged younger than 40 (<40) and those 40 and older (40+) at time of ACL reconstruction. The incidence of 2-year arthrofibrosis was calculated for weekly intervals from initial ACL injury to reconstruction. Stratum specific likelihood ratio analysis was conducted to determine data-driven intervals from initial ACL tear to reconstruction that optimize differences in 2-year arthrofibrosis. Following the identification of these intervals for both those <40 and 40+, multivariable analysis was conducted.

Results: For those <40, stratum-specific likelihood ratio analysis identified only 2 data-driven timing strata: 0-5 and 6-26 weeks. For those 40+, stratum-specific likelihood ratio analysis also only identified 2 data-driven strata: 0-9 and 10-26 weeks. A delay in ACL reconstruction from initial injury by at least 6 weeks in patients younger than 40 and at least 10 weeks in patients older than 40 years is associated with a 65% and 35% reduction of 2-year manipulation under anesthesia and arthroscopic lysis of adhesions, respectively.

Conclusion: Our analysis showed a delay in ACLR of at least 6 weeks in patients younger than 40 years to be associated with a 65% reduction in the risk of surgical intervention for arthrofibrosis and a delay of at least 10 weeks in patients 40 years and older to be associated with only a 35% reduction in the risk of surgical intervention for arthrofibrosis. The authors propose this difference in reduction to be multifactorial and potentially associated with mechanism of injury, activity level, and preoperative factors such as amount of physical therapy, rather than solely timing.

Level of Evidence: Level III, retrospective comparative prognostic study.

Sectioning of the Anterolateral Ligaments in Anterior Cruciate Ligament Sectioned Knees Increases Internal Rotation of the Knee Joint: A Systematic Review and Meta-analysis of Cadaveric Studies

D.-H. Lee, C.-H. Kim

DOI: <https://doi.org/10.1016/j.arthro.2022.12.038>

Purpose: To investigate whether anterolateral ligament (ALL) sectioning (sALL) in the anterior cruciate ligament (ACL)-sectioned (sACL) knee increases the anterior tibial translation (ATT) or internal rotation (IR) of the knee from previous cadaveric biomechanical studies.

Methods: Multiple comprehensive literature databases, including PubMed (MEDLINE), EMBASE, and Cochrane Library, were searched for studies evaluating the in vitro biomechanical function of ALL. This meta-analysis compared the increased ATT and IR between the sACL and sACL + sALL knees at 30°, 60°, and 90° of knee flexion. Thresholds of 2 mm for the difference in ATT and 2° for the difference in IR were considered to be clinically significant.

Results: Thirteen cadaveric biomechanical studies were included. All 13 studies satisfied the threshold for a satisfactory methodological quality (Quality Appraisal for Cadaveric Studies score >75%). At 30° of knee flexion, the meta-analysis showed a greater increase in ATT in the sACL + sALL knees than in the sACL knees by 1.23 mm (95% confidence interval [CI], 0.62–1.84; $P < .0001$). However, the mean difference was less than the minimal clinically significant difference (<2 mm). The meta-analysis also showed a greater increase in IR in the sACL + sALL knees than in the sACL knees at 30° (mean difference [MD]: 2.24°; 95% CI: 1.39–3.09; $P < .00001$), 60° (MD: 2.77°; 95% CI: 1.88–3.67; $P < .00001$), and 90° (MD: 2.29°; 95% CI: 1.42–3.15; $P < .00001$) of knee flexion. The differences in IR at 30°, 60°, and 90° of knee flexion were clinically relevant (>2°).

Conclusion: Despite the different experimental setups and protocols between studies, the meta-analysis of biomechanical cadaveric studies showed that sectioning of the ALL in sACL knees increased IR at 30°, 60°, and 90° of knee flexion.

Clinical Relevance: The results of this systematic review and meta-analysis suggest that ALL contributes to IR in ACL-deficient knees at 30°, 60°, and 90° of flexion.

Durable Outcomes After Hip Labral Reconstruction at Minimum 5-Year Follow-Up: A Systematic Review

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DOI: <https://doi.org/10.1016/j.arthro.2023.02.015>

Purpose: To systematically review and report the mid- to long-term patient-reported outcomes (PROs) after hip labral reconstruction.

Methods: A literature search of the PubMed, Embase, and Cochrane Library databases was performed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines for clinical studies reporting mid- to long-term PROs at minimum 5-year follow-up after arthroscopic hip labral reconstruction. A quality assessment was performed using the Methodological Index of Non-Randomized Studies grading system. Data collection included study characteristics, demographics, indications, radiographic metrics, perioperative findings, surgical technique, baseline and most recent PROs, and subsequent surgeries.

Results: Four studies met inclusion criteria, with 182 hips (age range, 27.9-38.7 years) undergoing labral reconstruction in primary and revision hip surgery with minimum 5-year follow-up. There were three Level III studies and one Level IV study, with an average Methodological Index of Non-Randomized Studies score of 16.6. All studies cited labral tissue characteristics as a factor for surgical indications, including the quality and/or size of the labrum. Three studies performed segmental labral reconstructions, whereas another study used a circumferential technique. Varying grafts were selected, including hamstring autograft/allograft, ligamentum teres autograft, iliotibial band autograft, and tensor fascia lata autograft. All studies demonstrated improved PROs from baseline to most recent follow-up, with 4 studies reporting modified Harris Hip Score values that increased from baseline (range, 58.9-66.8) to most recent follow-up (range, 80.1-86.3). After labral reconstruction, rates of revision arthroscopy ranged from 4.8% to 13.3% and conversion to total hip arthroplasty ranged from 1.6% to 27%.

Conclusion: Improved PROs were observed in all studies at minimum 5-year follow-up, suggesting that labral reconstruction can offer durable results beyond short-term follow-up. Although surgical indications for all studies included labral tissue characteristics, differing graft selection and surgical techniques were used across studies, limiting the ability to determine an optimal treatment approach.

Level of Evidence: Level IV, systematic review of Level III and IV studies.

Journal of Shoulder and Elbow Surgery (JSES), Volume 32, issue 7

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The traction force of the pulled limb in hip arthroscopic surgery is determined by stiffness coefficient which is significantly related to muscle volume

Y. Yin, S. Xue

DOI: <https://doi.org/10.1007/s00167-022-07261-3>

Purpose: To verify the relationship between muscle volume, lateral centre-edge angle (LCEA), alpha angle (AA), body mass index (BMI) and Beighton score with stiffness coefficient (SC). To analyse the difference of traction force at different physical states of hip joint capsule.

Methods: Thirty-six patients who underwent hip arthroscopy operation were included. The volumes of some related muscles were measured in MRI images by 3D Slicer. We recorded and tested differences in traction force of five joint capsule physical states, including before (State 1) and after joint capsule puncture (State 2), after the establishment of anterolateral and mid-anterior approaches (State 3) and after incision of the joint capsule through these two approaches (States 4, 5). The correlation between muscle volume, BMI, LCEA, AA and SC was verified by Spearman test. Poisson regression was used to explain confounding variables.

Results: The average force at State 1 was 531.8 N. There were significant differences in traction force between these five states ($p < 0.001$). There was a significant positive correlation between muscle volumes and SC ($p < 0.001$). BMI had no correlation with SC (*n.s.*). The preoperative LCEA of the affected side was correlated with SC ($p = 0.043$). AA and SC were not correlated (*n.s.*).

Conclusion: The physical states of the hip joint capsule affected traction force. Muscle volume rather than BMI is an ideal index to estimate preoperative traction force. LCEA affected traction force, whilst AA and Beighton score did not. Measuring the muscle volume can help estimate the most suitable traction force for the patient.

Level of evidence: Level IV.

Majority of competitive soccer players return to soccer following hip arthroscopy for femoroacetabular impingement: female and older aged players are less likely to return to soccer

N. Marom, R. Olsen

DOI: <https://doi.org/10.1007/s00167-023-07349-4>

Purpose: To determine return to soccer rates and soccer performance in a large cohort of competitive soccer players after hip arthroscopic surgery for the treatment of femoroacetabular impingement (FAI) and to identify possible risk factors associated with not returning to soccer.

Methods: An institutional hip preservation registry was retrospectively reviewed for patients identified as competitive soccer players who underwent primary hip arthroscopy for FAI performed between 2010 and 2017. Patient demographics and injury characteristics as well as clinical and radiographic findings were recorded. All patients were contacted for return to soccer information using a soccer-specific return to play questionnaire. Multivariable logistic regression analysis was used to identify potential risk factors for not returning to soccer.

Results: Eighty-seven competitive soccer players (119 hips) were included. 32 players (37%) underwent simultaneous or staged bilateral hip arthroscopy. The mean age at surgery was 21.6 ± 7.0 years. Overall, 65 players (74.7%) returned to soccer, of which 43 players (49% of all included players) returned to pre-injury level of play or better. Most common reasons for not returning to soccer were pain or discomfort (50%) followed by fear of re-injury (31.8%). The mean time to return to soccer was 33.1 ± 26.3 weeks. Among 22 players who did not return to soccer, 14 (63.6%) reported satisfaction from surgery. Multivariable logistic regression analysis revealed female players (odds ratio [OR] = 0.27; confidence interval [CI] = 0.083 to 0.872; $p = 0.029$) and older aged players (OR = 0.895; 95% CI = 0.832 to 0.963; $p = 0.003$) were less likely to return to soccer. Bilateral surgery was not found to be a risk factor.

Conclusion: Hip arthroscopic treatment for FAI in symptomatic competitive soccer players allowed three-quarters of them to return to soccer. Despite not returning to soccer, two-thirds of players who did not return to soccer were satisfied with their outcome. Female and older aged players were less likely to return to soccer. These data can better guide clinicians and soccer players with realistic expectations related to the arthroscopic management of symptomatic FAI.

Level of evidence: Level III.

The HAR-index: a reliable method for evaluating the risk of total hip arthroplasty conversion after hip arthroscopy for femoroacetabular impingement

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DOI: <https://doi.org/10.1007/s00167-023-07368-1>

Purpose: Hip arthroscopy is a growing technique in the treatment of femoroacetabular impingement (FAI), but can sometimes lead to unsatisfactory results such as the early conversion to total hip arthroplasty (THA). The purpose of this study is to describe a new tool for assessing the preoperative risk of THA conversion after hip arthroscopy in patients with FAI.

Methods: This study is a retrospective analysis of a prospective cohort of 584 patients with FAI who underwent hip arthroscopy at a single centre with a minimum 2 years follow-up. The preoperative variables of these patients were analysed to calculate the risk of each variable for THA. By selecting variables with an area under the receiver operating characteristic (ROC) curve greater than 0.7, a calculator was created to provide a risk index for each patient.

Results: Four variables (age, body mass index, Tönnis score and ALAD) were associated with an increased risk of THA conversion. The optimal cut-off points for each variable were determined, and a risk index was created. The Hip-Arthroplasty-Risk Index (HAR-Index) is a 0–4 points scale obtained from four binary scores of 0 or 1 depending on whether the cut-off point for each variable was reached or not. The increased risk of THA for each HAR-Index value was 1.1%, 6.2%, 17.9%, 55.1% and 79.3% respectively. The HAR-Index showed a very good predictive capacity with an area under the ROC curve of 0.89.

Conclusion: The HAR-Index is a simple and practical tool for practitioners to make more informed decisions about performing hip arthroscopy in patients with FAI. With a very good predictive capacity, the HAR-Index can help to reduce the rate of conversion to THA.

Level of evidence: Level III.

Promising functional outcomes following anterior cruciate ligament repair with suture augmentation

K.N. Schneider, G. Ahlbäumer

DOI: <https://doi.org/10.1007/s00167-022-07236-4>

Purpose: There has been a renewed interest in the repair of the torn anterior cruciate ligament (ACL). Purpose of this study was to evaluate the functional outcome of arthroscopic ACL repair with additional suture augmentation (SA), hypothesizing that isolated ACL ruptures would yield superior patient-reported outcome measures (PROMs) compared to those with concomitant meniscal and/or ligamentous injuries.

Methods: This is a retrospective analysis of 93 consecutive patients (67 female, median age 42 years) who underwent arthroscopic ACL repair with SA between January 2017 and March 2019 for an acute traumatic ACL tear confirmed by magnetic resonance imaging (MRI). Patients with pre- or intraoperative mid-substance or distal ACL tears and/or poor tissue quality of the ACL remnant were not considered for ACL repair but were scheduled for an ACL reconstruction with a tendon autograft. In patients who underwent ACL repair with SA, the SA construct was proximally stabilized with a flip-button and distally with a suture anchor. Surgery was preferably performed on the day of injury and all surgeries were performed by the same surgeon. Postoperative rehabilitation included partial weight-bearing (20 kg) for 6 weeks and immobilization in a brace limited at 90-degrees of knee flexion for 4 weeks. Patient-reported outcome measures (PROMs) were determined using International Knee Documentation Committee (IKDC) Subjective Knee Evaluation Form, Lysholm Score (LS), Tegner Activity Score (TS) and Forgotten Joint Score (FJS). Knee-laxity was assessed using the KT-1000 arthrometer (Med Metrics Corp. Inc., San Diego, USA).

Results: Nine patients underwent revision surgery for a traumatic re-tear (four patients) and chronic instability (five patients) and were excluded from further functional analysis. Functional results of 77 patients (54 female) with a median age of 44 years (IQR 33–51) on the day of surgery were available for follow-up after a median time of 35 months (IQR 33–44). Concomitant injuries were observed in 66 Patients (86%), meniscal injuries in 43 patients (55%) and ligamentous injuries in 50 patients (65%). Median interval from injury to surgery was 1 day (IQR 0–1) with 81% (62/77) of patients being treated within 24 h of injury. The median IKDC was 92 (IQR 86–99), the median LS was 95 (IQR 86–100), the median pre-traumatic TS was 7 (IQR 6–7), the median post-traumatic TS was 6 (IQR 5–7) with a non-significant median difference (TS_{Diff}) of 0 (IQR 0–1). The median FJS was 95 (IQR 78–98). KT-1000 measurements were available in 34 of 77 patients with a median postoperative laxity compared to the uninjured side of 1 mm (IQR 0–2). Interval from injury to surgery, patients' age, body mass index (BMI), knee laxity and concomitant ligamentous or meniscal injuries had no statistically significant impact on postoperative PROMs (n.s.).

Conclusion: Following arthroscopic ACL repair with SA good-to-excellent functional results were observed. However, a failure rate of 10% cannot be neglected and warrants further attention. Concomitant injuries to the meniscus and/or collateral ligaments do not seem to be associated with inferior PROMs.

Level of evidence: Level IV.

Use and Effectiveness of Physical Therapy After Hip Arthroscopy for Femoroacetabular Impingement

D.J. Kaplan, J.H. Larson

DOI: <https://doi.org/10.1177/0363546523117515>

Background: Limited literature exists regarding how postoperative physical therapy (PT) may affect outcomes in patients with femoroacetabular impingement syndrome (FAIS) undergoing hip arthroscopy. Additionally, it is unknown how PT measures relate to traditional orthopaedic patient-reported outcomes (PROs).

Purpose: To evaluate how the duration of PT may correlate with outcomes in patients with FAIS using both the Lower Extremity Functional Scale (LEFS) and standard orthopaedic PRO measures.

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

Methods: Patients from a single institution who underwent primary hip arthroscopy for FAIS between 2013 and 2016 were identified. Patients with a minimum 2-year follow-up and fully documented PT notes were included and stratified into 3 cohorts based on timing of PT discharge: 0 to 3 months, 3 to 6 months, and 6 to 12 months. Predictive regression models were developed to analyze the rate of improvement (ROI) in LEFS score as it relates to (1) postoperative day (POD) and (2) postoperative PT session number. Two-year PROs were collected, correlated with LEFS scores, and compared among cohorts.

Results: A total of 95 patients were included (mean \pm SD age, 34.6 ± 11.7 years; range, 14-55 years). Mean LEFS scores increased significantly from the initial score at 6 weeks, 3 months, and the time of PT discharge ($P < .01$ for all). The predicted ROI in LEFS score was 3.39% per PT session for sessions 0 to 13, 1.43% for sessions 14 to 27, and 0.37% for sessions 28 to 40. Patients who underwent 3 to 6 months of PT had significantly better Hip Outcome Score (HOS) relative to the 0- to 3-month cohort and significantly better visual analog scale (VAS) scores for satisfaction relative to the 6- to 12-month cohort. The predicted ROI in LEFS score was 0.96% per day from POD 0 to 45, 0.22% from POD 46 to 139, and 0.03% after POD 139. Moderate correlations were seen between LEFS score at the time of discharge and all 2-year PROs as follows: HOS Activities of Daily Living subscale ($r = 0.488$), HOS Sports-Specific subscale ($r = 0.500$), modified Harris Hip Score ($r = 0.465$), 12-item International Hip Outcome Tool ($r = 0.494$), VAS pain score ($r = -0.346$), and VAS satisfaction score ($r = 0.459$).

Conclusion: Patients undergoing hip arthroscopy for FAIS derived substantial benefit from each PT visit during their first 13 PT sessions and then a smaller, yet still meaningful benefit from sessions 13 through 27. After session 40, or approximately 4.5 to 5 months, patients no longer benefited from additional PT sessions. Based on PRO scores, patients discharged from PT between 3 and 6 months had the best 2-year outcomes. LEFS score had moderate correlation with orthopaedic PRO scores.

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Outcomes of arthroscopy of the hip for femoroacetabular impingement based on intraoperative assessment using the Outerbridge classification

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DOI: <https://doi.org/10.1302/0301-620x.105b7.bjj-2022-0989.r1>

Aims: Hip arthroscopy (HA) has become the treatment of choice for femoroacetabular impingement (FAI). However, less favourable outcomes following arthroscopic surgery are expected in patients with severe chondral lesions. The aim of this study was to assess the outcomes of HA in patients with FAI and associated chondral lesions, classified according to the Outerbridge system.

Methods: A systematic search was performed on four databases. Studies which involved HA as the primary management of FAI and reported on chondral lesions as classified according to the Outerbridge classification were included. The study was registered on PROSPERO. Demographic data, patient-reported outcome measures (PROMs), complications, and rates of conversion to total hip arthroplasty (THA) were collected.

Results: A total of 24 studies were included with a total of 3,198 patients (3,233 hips). Patients had significantly less improvement in PROMs if they had Outerbridge grade III and IV lesions ($p = 0.012$). Compared with microfracture, autologous matrix-induced chondrogenesis (AMIC) resulted in significantly reduced rates of conversion to THA ($p = 0.042$) and of revision arthroscopy ($p = 0.038$). Chondral repair procedures in these patients also did not significantly reduce the rates of conversion to THA ($p = 0.931$), or of revision arthroscopy ($p = 0.218$). However, compared with microfracture, AMIC significantly reduced the rates of conversion to THA ($p = 0.001$) and of revision arthroscopy ($p = 0.011$) in these patients. Those with Outerbridge grade III and IV lesions also had significantly increased rates of conversion to THA ($p = 0.029$) and of revision arthroscopy ($p = 0.023$) if they had associated lesions of the acetabulum and femoral head. Those who underwent labral debridement had a significantly increased rate of conversion to THA compared with those who underwent labral repair ($p = 0.015$).

Conclusion: There is universal improvement in PROMs following HA in patients with FAI and associated chondral lesions. However, those with Outerbridge grade III and IV lesions had significantly less improvement in PROMs and a significantly increased rate of conversion to THA than those with Outerbridge grade I and II. This suggests that the outcome of HA in patients with FAI and severe articular cartilage damage may not be favourable.

Miscellaneous

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