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Modified Suture-Button Latarjet Procedure With Coracoacromial Ligament and Pectoralis Minor Preservation Achieves Good Clinical Outcomes at 2-Year Follow-Up: Case Series of Latarjet Technique

W. Lu, D. Liang

DOI: <https://doi.org/10.1016/j.arthro.2024.04.037>

Purpose: To evaluate whether the modified suture-button Latarjet procedure with coracoacromial ligament (CAL) and pectoralis minor (PM) preservation could achieve excellent outcomes at the 2-year follow-up.

Methods: During January 2019 to January 2021, the data of patients who underwent modified suture-button Latarjet with CAL and PM preservation in our department were collected. The glenoid bone loss of these patients was greater than 20% or greater than 10% with high demands for exercise. Partial coracoid osteotomy was based on the results of a preoperative 3-dimensional computed tomography evaluation of the glenoid defect area and corresponding coracoid process morphology. The preoperative and postoperative clinical results were assessed. The minimal clinically important difference (MCID) was used to compare improvement in clinical outcomes. Graft-glenoid union and remodeling were assessed using postoperative 3-dimensional computed tomography, and magnetic resonance imaging was performed to confirm the integrity of the CAL and PM postoperatively.

Results: In total, 35 patients were included in this study; the mean follow-up time was 26.9 ± 1.9 months. No case of recurrent dislocation or subluxity. Significant improvements were observed in mean visual analog scale (VAS) scores for pain during motion, American Shoulder and Elbow Surgeons (ASES) score, Rowe score, and Walch-Duplay score ($P < .001$). The percentage of patients achieving at least an MCID improvement in clinical outcomes was VAS 85.71%, ASES 97.14%, Rowe 100%, and Walch-Duplay 97.14%. Thirty-three patients (94.3% of all cases) were able to return to their preoperative sport levels, 34 grafts (97.1%) achieved bone union (1 soft union) in 6.3 ± 2.2 months, and the coracoid grafts restored $97.1 \pm 4.0\%$ of the perfect-fitting circle at the last follow-up. Postoperative computed tomography scan showed that 31 grafts (88.6%) were placed ideally in vertical view. In the axial view, 25 grafts (82.9%) were flushed to the glenoid, whereas 1 and 5 grafts were fixed medially and laterally, respectively. The CAL and PM were visualized postoperatively. No arthropathy was observed in any patient at the last follow-up.

Conclusions: The modified suture-button Latarjet procedure with CAL and PM preservation obtained good clinical and radiological results without recurrence or complications. A substantial number of patients (>85%) achieved the MCID for the VAS, ASES, Rowe, and Walch-Duplay scores. In addition, the malpositioned graft (17.1%) did not cause arthropathy of the joints at 2-year follow-up.

Level of Evidence: Level IV, retrospective case series.

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Glenoid bone loss and Hill-Sachs width percentage score are useful to select optimal operation for the treatment of glenohumeral instability in overhead athletes: Arthroscopic Bankart repair with remplissage versus open Latarjet

A.Gereli, T. Koray Yozgatli

DOI: <https://doi.org/10.1002/ksa.12333>

Purpose: Glenohumeral instability with combined bone lesion in contact and overhead athletes with subcritical bone loss is challenging to treat with high recurrent instability. Treatment options are arthroscopic Bankart repair with remplissage and Latarjet operations. However, there is no consensus on their effectiveness. This study aims to compare the clinical outcomes and return to sports after both operations and whether evaluating the glenoid bone loss and Hill-Sachs width to calculate the total bone loss can help determine the appropriate operation.

Methods: In this retrospective comparative analysis, 30 athletes who underwent index arthroscopic Bankart repair with remplissage (n = 16) or Latarjet procedure (n = 14) between 2017 and 2020 were included. Computed tomography (CT) and magnetic resonance imaging (MRI) were routinely performed. The quick Disabilities of the Arm, Shoulder and Hand (qDASH), American Shoulder and Elbow Surgeons (ASES), instability severity index (ISI) scores and range of motion (ROM) were recorded preoperatively and at a mean follow-up of 53 months (SD = 12). Follow-up included time-to-return sports, self-perceived sports performance level and complications/recurrent dislocations.

Results: Preoperative qDASH, ASES, ISI scores, ages and genders were similar. The Latarjet group had significantly larger glenoid bone loss, Hill-Sachs width and total bone loss ($p < 0.01$). Both groups had significant improvement in patient-reported outcomes (PROs) after the operations ($p < 0.01$). Athletes with a total bone loss $< 25\%$ underwent arthroscopic Bankart repair with remplissage and total bone loss $\geq 25\%$ underwent Latarjet procedure, and there were no differences between the groups in terms of postoperative PROs, ROM, time-to-return sports and performance. There were no re-dislocations.

Conclusion: Arthroscopic Bankart repair with remplissage or Latarjet procedure can adequately address glenohumeral instability with combined bone lesions. Patients with total bone loss scores greater than or equal to 25 may particularly benefit from the Latarjet procedure, while the minimally invasive arthroscopic Bankart repair with remplissage can yield equally satisfying scores for total bone loss less than 25.

Level of Evidence: Level III.

Mid- to Long-Term Clinical Outcomes and Failure Rates After ALPSA Lesion Repair

Hoyt BW, Yow BG, Feeley SM, et al.

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Background: Anterior labroligamentous periosteal sleeve avulsion (ALPSA) lesions are associated with recurrent shoulder instability and higher rates of failure after capsulolabral repair compared with similarly treated Bankart lesions. Although these lesions can portend poor outcomes, there are limited data on the associated conditions and postoperative course in a young, active population.

Purpose: To evaluate the mid- to long-term clinical course and failure rates after ALPSA repairs and assess features associated with these outcomes.

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

Methods: The authors identified all patients who underwent primary arthroscopic anterior or combined anterior and posterior labral repair between January 2010 and January 2020 at a single US military academy. Patient and injury characteristics were retrospectively reviewed while excluding patients with follow-up of <2 years. Patients were divided into 2 cohorts based on the presence of an ALPSA lesion as identified using arthroscopy, and patients with non-ALPSA lesions were matched to those with ALPSA lesions in a 5:1 ratio based on age, sex, time from injury to surgery, glenoid bone loss, and follow-up duration. The primary outcome measures were failure and revision surgery. Any recurrent shoulder instability event was considered a failure, including subjective or objective subluxation and/or dislocation, recurrence of pain consistent with instability, or functionally limiting apprehension. Survival analysis and both univariate and multivariate logistic regression analyses were performed to identify factors associated with ALPSA lesions and propensity for failure.

Results: The authors compared 225 patients with non-ALPSA labral tears against 45 patients with ALPSA lesions. ALPSA lesions were associated with multiple preoperative dislocations (odds ratio [OR], 3.0; 95% CI, 1.5-5.9; $P = .00096$) and increased prevalence of Hill-Sachs lesions (HSLs) (OR, 6.7; 95% CI, 2.8-16.0; $P < .0001$) and near-track HSLs (OR, 3.6; 95% CI, 1.7-7.6; $P = .00049$). At the final follow-up, there was no difference in overall failure or recurrent instability between patients with and without ALPSA lesions (20% vs 16% [$P = .563$] and 17.8% vs 10.2% [$P = .147$], respectively). On multivariate regression, ALPSA did not affect the likelihood of failure ($P = .625$). However, those with ALPSA lesions experienced failure earlier (1.7 vs 3.1 years; $P = .020$). When revision ALPSA repairs were performed, 43% failed.

Conclusion: In patients with anterior instability treated with primary arthroscopic stabilization, ALPSA lesions were associated with HSLs and multiple dislocations. Although ALPSA repair failure occurred at a similar frequency in the mid- to long term compared with Bankart repairs, ALPSA repair failure tended to occur early in the postoperative course.

Sling Results in Better Sleep Quality and Less Anxiety Early After Arthroscopic Rotator Cuff Repair: A Randomized Single-Blinded Trial

Li X, Xu W, Liao P, et al.

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Background: Sleep disturbance is commonly reported by patients wearing an abduction brace after arthroscopic rotator cuff repair (ARCR). Although a sling has been proven noninferior to an abduction brace for function and repair integrity, there is no evidence-based medical support for the advantage of the sling in improving sleep quality compared with a brace.

Purpose: This study aimed to compare the effects of a sling and an abduction brace on sleep quality and clinical outcomes after ARCR. It was hypothesized that immobilization in a sling would result in better sleep quality while not deteriorating clinical outcomes and bone-tendon healing compared with an abduction brace.

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

Methods: A total of 142 consecutive patients with rotator cuff tears were randomly assigned to 2 groups: (1) the brace group, receiving abduction brace immobilization for 6 weeks, and (2) the sling group, receiving sling immobilization after ARCR for 6 weeks. The primary outcome was the Pittsburgh Sleep Quality Index at 6 weeks postoperatively. Secondary outcomes—American Shoulder and Elbow Surgeons score, Self-rating Anxiety Scale, pain, satisfaction, and tendon healing (using ultrasonography)—were evaluated until 1 year postoperatively.

Results: Complete outcome measurements were obtained for 131 patients. The Pittsburgh Sleep Quality Index at 6 weeks was 11.1 ± 2.7 for the brace group and 9.2 ± 2.3 for the sling group ($P < .001$), indicating a statistically significant advantage for the sling group. The sling group also reported significantly lower Self-rating Anxiety Scale, lower pain level, and higher satisfaction scores at 6 weeks. No significant difference was observed in outcome measures between groups at 1 year. The tendon healing rates (91% vs 88%, respectively) were comparable between the brace and sling groups within the first 1 year (risk ratio, 1.03 [95% CI, 0.92-1.16]; $P = .59$).

Conclusion: The use of a sling resulted in better sleep quality, less anxiety, and higher satisfaction compared with an abduction brace in the first 6 weeks after ARCR; nevertheless, functional outcomes and repair integrity were similar at 1 year postoperatively between the 2 groups. These findings indicate that a sling is appropriate for the postoperative care of ARCR. However, caution should be used when interpreting these results because the clinical relevance of sling-related benefits warrants further investigation.

Long-term Clinical and Structural Outcomes of Arthroscopic Superior Capsule Reconstruction for Irreparable Rotator Cuff Tears: 10-Year Follow-up

Mihata T, Lee TQ, Hasegawa A, Fukunishi K, Fujisawa Y, Ohue M.

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Background: Short-term follow-up studies have reported favorable clinical outcomes after arthroscopic superior capsule reconstruction (SCR) for irreparable rotator cuff tears.

Purpose: To assess whether these positive outcomes are maintained long-term and whether cuff tear arthropathy worsens over time after fascia lata autograft SCR.

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

Methods: This study analyzed data collected prospectively from 34 consecutive patients (36 affected shoulders) with irreparable rotator cuff tears who underwent arthroscopic SCR using fascia lata autograft between 2007 and 2011. Active shoulder range of motion and American Shoulder and Elbow Surgeons, Japanese Orthopaedic Association, and visual analog scale for pain scores were evaluated before SCR and at 1, 5, and 10 years after surgery; rates of return to participation in sports and physically demanding work were determined as well. In addition, radiography and magnetic resonance imaging data were collected before surgery and at 3 and 6 months and 1, 2, 3, 4, 5, and 10 years afterward. Acromiohumeral distance and Hamada grade were evaluated using radiography. We defined Hamada grades 3 and 4b as acetabularization and grades 4a and 4b as glenohumeral osteoarthritis. Graft survival rate and thickness were assessed using T2-weighted magnetic resonance imaging.

Results: When compared with preoperative values, American Shoulder and Elbow Surgeons and Japanese Orthopaedic Association scores and active range of motion (elevation and external rotation) were increased significantly at 1 year after SCR ($P < .001$) and maintained throughout follow-up. At 10 years after SCR, 88% (15 of 17) of workers with physically demanding jobs and 90% (9 of 10) of sports players still participated in these activities. Graft survival rate was 94% (34 of 36 shoulders) at 1 year after SCR, 92% (33 of 36) at 2 to 4 years, and 89% (32 of 36) at 5 to 10 years. In healed grafts, graft thickness was maintained for at least 10 years after SCR (mean \pm SD, 7.8 ± 2.0 mm at 3 months after SCR and 7.8 ± 1.6 mm at 10 years). The incidence of acetabularization (affected shoulder, 9%; unaffected shoulder, 6%) and glenohumeral osteoarthritis (affected shoulder, 28%; unaffected shoulder, 16%) during the 10 years after SCR did not significantly differ between affected and unaffected shoulders. The complication rate was 2.8% (1 of 36 patients, anchor pullout).

Conclusion: For irreparable rotator cuff tears, arthroscopic SCR using fascia lata autograft restored shoulder function and relieved shoulder pain, with high rates of return to recreational sports and physically demanding work, and it maintained significant improvements in clinical and structural outcomes for at least 10 years after surgery. In addition, graft healing completely prevented any progression of cuff tear arthropathy. Arthroscopic SCR using fascia lata autograft is an effective surgical option for irreparable rotator cuff tears and retains positive outcomes for at least 10 years.

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Patients With Lateral and Anterolateral Cam Morphology Have Greater Deformities Versus Typical Anterolateral Deformity Alone but No Differences in Postoperative Outcomes: A Propensity-Matched Analysis at Minimum 5-Year Follow-Up

J.H. Larson, R.S. Chapman

DOI: <https://doi.org/10.1016/j.arthro.2024.03.020>

Purpose: To compare pre- and postoperative findings between patients undergoing hip arthroscopy for femoroacetabular impingement syndrome with lateral impingement versus those without lateral impingement

Methods: Patients who underwent primary hip arthroscopy for femoroacetabular impingement syndrome between 2012 and 2017 with minimum 5-year follow-up were included. Alpha angle (AA) was measured on preoperative anteroposterior (AP) and 90° Dunn radiographs. Patients with AA >60° on Dunn view but not AP view (no lateral impingement) were propensity matched by sex, age, and body mass index in a 1:3 ratio to patients with AA >60° on both views (lateral impingement). Demographic characteristics, radiographic and intraoperative findings, reoperation rates, and patient-reported outcomes (PROs) were compared between groups. Categorical variables were compared using the Fisher exact testing and continuous variable using 2-tailed Student t tests.

Results: Sixty patients with lateral impingement (65.0% female, age: 35.3 ± 13.0 years) were matched to 180 patients without lateral impingement (65.0% female, age: 34.7 ± 12.5 years, P ≥ .279). Patients with lateral impingement had larger preoperative AAs on both Dunn (71.0° ± 8.8° vs 67.6° ± 6.1°, P = .001) and AP radiographs (79.0° ± 12.1° vs 48.2° ± 6.5°, P < .001). However, there were no differences in postoperative AAs on either view (Dunn: 39.0° ± 6.1° vs 40.5° ± 5.3°, AP: 45.8° ± 9.0° vs 44.9° ± 7.0°, P ≥ .074). Labral tears began more superiorly in patients with lateral impingement (12:00 ± 0:49 vs 12:17 ± 0:41, P = .030), and they demonstrated greater rates of acetabular and femoral cartilage damage (P = .030 for both); however, there were no differences in PROs or reoperation rates between the groups at 5-year follow-up.

Conclusions: Although cam deformities located laterally and anterolaterally are larger than those located anterolaterally alone, both can be resected adequately, resulting in similar postoperative radiographic measurements, PROs, and survivorship.

Level of Evidence: Level III, retrospective cohort study.

Hip Arthroscopy Patients With Lower Back Pain Show Delayed Clinical Improvement and Inferior Time-Dependent Survivorship: A Propensity Matched Study at Mid-Term Follow-Up

O. Kazi, K. Jan

DOI: <https://doi.org/10.1016/j.arthro.2024.03.044>

Purpose: To evaluate patient-reported outcomes (PROs) and survivorship at mid-term follow-up after hip arthroscopy (HA) for femoroacetabular impingement syndrome (FAIS) in patients with and without preoperative lower back pain (LBP).

Methods: Patients with self-endorsed preoperative LBP who underwent HA for FAIS with mid-term follow-up were identified and propensity matched 1:1 to patients without back pain by age, sex, and body mass index (BMI). PROs collected preoperatively and at postoperative years 1, 2, and 5 included Hip Outcome Score–Activities of Daily Living (HOS-ADL) and Hip Outcome Score–Sports Subscale (HOS-SS), 12-item International Hip Outcome Tool (iHOT-12), modified Harris Hip Score (mHHS), and Visual Analog Scale (VAS) for Pain. Achievement of minimal clinically important difference (MCID) and patient acceptable symptom state (PASS) were compared. Survivorship was compared with Kaplan-Meier analysis.

Results: In total, 119 patients with LBP were matched to 119 patients without LBP. Group demographic factors were as follows: age (37.4 ± 11.9 vs 37.6 ± 12.6 years, $P = .880$), sex (64.4% vs 67.7% female, $P = .796$), and BMI (25.3 ± 5.1 vs 25.3 ± 5.4 , $P = .930$). Average follow-up duration was 6.0 ± 1.9 years. LBP patients showed similar preoperative PROs, yet lower 1-year scores for all PROs ($P \leq .044$). At final follow-up, similar PROs were shown between groups ($P \geq .196$). LBP and non-LBP patients had similar MCID achievement for HOS-ADL (59.3% vs 63.1%, $P = .640$), HOS-SS (73.9% vs 70.8%, $P = .710$), mHHS (66.7% vs 73.4%, $P = .544$), iHOT-12 (85.1% vs 79.4%, $P = .500$), and VAS Pain (75.6% vs 69.9%, $P = .490$). Groups also had similar PASS achievement for HOS-ADL (63.5% vs 61.3%, $P = .777$), HOS-SS (57.0% vs 62.5%, $P = .461$), mHHS (81.9% vs 79.1%, $P = .692$), iHOT-12 (54.6% vs 61.2%, $P = .570$), and VAS Pain (51.0% vs 55.4%, $P = .570$). Additionally, achievement of MCID ≥ 1 PRO ($P \geq .490$) and PASS ≥ 1 PRO ($P \geq .370$) was similar across groups. Conversion to total hip arthroplasty occurred in 3.4% of hips with LBP and 0.8% of hips without LBP ($P = .370$). Back pain patients demonstrated inferior time-dependent survivorship compared with patients without back pain on Kaplan-Meier survival analysis ($P = .023$).

Conclusions: Patients undergoing primary hip arthroscopy for FAIS with LBP achieve comparable PROs and clinically significant outcomes to patients without back pain at mid-term, despite lower 1-year PRO scores. LBP patients show inferior reoperation-free time-dependent survivorship compared with those without LBP.

Level of Evidence: Level III, retrospective comparative case series.

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Long-term clinical and radiological outcomes after arthroscopic partial meniscectomy on stable knees are better for traumatic tears when compared to degenerative lesions: A systematic review

H. Bogas Droy, T. Dardenne

DOI: <https://doi.org/10.1002/ksa.12329>

Purpose: An arthroscopic partial meniscectomy (APM) for degenerative meniscus lesions and traumatic meniscus tears are two distinct entities and their long-term outcomes are rarely reported. The aim of this review was to compare the long-term (clinical and radiological) results of APM performed on stable knees for traumatic tears (TT) or degenerative lesions (DL).

Methods: Pubmed, Scopus and Embase databases were searched to identify relevant studies published between 2010 and 2023 using the keywords 'meniscectomy' OR 'meniscectomies' OR 'meniscal resection'. English-language, Levels I–IV evidence studies reporting either radiographic or clinical outcome measures with a minimum of 6 years' follow-up after APM were included. Studies including discoid meniscus, open meniscectomy, unstable knee and combination with other procedures were excluded. To rate the quality of evidence, the methodological index for non-randomized studies was used.

Results: Thirty-two studies were included, with follow-up periods ranging from 6 to 22 years. Eleven studies dealt with TT with a mean age of 31.5 ± 6.6 years and a mean follow-up of 11.6 ± 6.9 years. At the last follow-up, radiographic osteoarthritis (OA) ranged from 36% to 76%, with an average rate of $48 \pm 19\%$; functional scores ranged from 71 to 97, with a mean of 90 ± 4 for the Lysholm score, 86 ± 10 for the International Knee Documentation Committee (IKDC) and 94 ± 16 for the knee injury and osteoarthritis outcome (KOOS). Twenty-one studies dealt with DL with a mean age of 49.9 ± 7.2 years and a mean follow-up of 14.9 ± 6.3 years. At the last follow-up, radiographic OA ranged from 23% to 97%, with an average rate of $77 \pm 28\%$; functional scores ranged from 40 to 87, with a mean of 79 ± 10 for the Lysholm score and 71 ± 16 for the IKDC.

Conclusion: Ten-year clinical outcomes of APM are better for TTs when compared to DLs. Rates of OA are difficult to compare but lower for TTs.

Level of Evidence: Level IV.

Bone cysts at the meniscal attachment are associated with a longer symptom duration among patients with arthroscopically treated medial meniscus posterior root tear

H. Omae, S. Yanagisawa

DOI: <https://doi.org/10.1002/ksa.12338>

Purpose: To elucidate the features of bone cysts at attachment sites of medial meniscus posterior root tears (MMPRTs).

Methods: Knees treated using arthroscopic surgery for MMPRT between 2015 and 2022 were retrospectively reviewed. Patients without a memory of onset (painful popping), prior knee surgeries, concomitant ligament or meniscus injuries or fractures were excluded. Duration from onset to magnetic resonance imaging (MRI) and type of tear were evaluated during arthroscopy. On radiography, meniscus signs (cleft/ghost/giraffe neck), bone cysts at the attachment site of the MMPRT and posterior shiny-corner lesions (PSCLs; bone marrow lesions on the meniscal-covered portion of the posterior tibial plateau) were evaluated. The sensitivity and specificity of the bone cysts were assessed by comparison with matched patients who underwent arthroscopic surgery for medial meniscus posterior horn tear. In addition, subgroups (cyst-positive/cyst-negative) among patients with MMPRT were created to assess the features of bone cysts.

Results: A total of 275 patients with MMPRT and 275 matched patients with posterior horn tears were evaluated. The sensitivity and specificity of bone cysts for MMPRT in this study were 22.2% and 98.6%, respectively. Among the 275 knees with MMPRT, compared with the cyst-negative group, the cyst-positive group had a longer duration from onset to MRI (12.9 ± 13.1 vs. 8.3 ± 10.9 weeks, respectively, $p = 0.025$) and reduced occurrence of PSCLs (18.0% vs. 42.0%, respectively, $p = 0.031$).

Conclusion: The occurrence of bone cysts at the attachment site was helpful for the accurate diagnosis of MMPRT and related to longer duration from onset to MRI and reduced PSCLs.

Level of Evidence: Level III, cross-sectional study.

Return to Sport After ACL Reconstruction With Meniscal Allograft Transplantation Versus Isolated ACL Reconstruction: A Matched-Cohort Study

Rigsby V, Shaw J, Stankaitis C, et al.

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Background: Meniscal allograft transplantation (MAT) is indicated in the setting of anterior cruciate ligament (ACL) reconstruction to restore proper arthrokinematics and load distribution for the meniscus-deficient knee. Objective outcomes after ACL reconstruction with concomitant MAT in athletic populations are scarcely reported and highly variable.

Purpose: To compare patient outcomes using an objective functional performance battery, self-reported outcome measures, and return-to-sport rates between individuals undergoing ACL reconstruction with concomitant MAT and a matched group undergoing isolated ACL reconstruction.

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

Methods: A single-surgeon ACL reconstruction database (N = 1431) was used to identify patients undergoing ACL reconstruction with concomitant MAT between 2014 and 2019. Patients were age-, sex-, and revision-matched to a group undergoing isolated ACL reconstruction. Baseline patient and surgical data were obtained. Patients completed an objective functional performance battery at the time of return to sport that included range of motion, single-leg squat performance, single-leg hop test performance, self-reported function (International Knee Documentation Committee [IKDC] score), and psychological readiness (ACL Return to Sports After Injury scale). Between-limb comparisons were assessed using limb symmetry indices. Injury surveillance was conducted for 2 years and included the Single Assessment Numeric Evaluation (SANE), reinjury rates, complications, and current level of sports participation. Between-group comparisons at the time of return to sport and 2 years later were analyzed using generalized linear models for parametric and nonparametric equivalents with an a priori alpha level of .05.

Results: A total of 46 patients were included in the ACL reconstruction with concomitant MAT group (38 medial MAT, 8 lateral MAT), and 46 patients were included in the isolated ACL reconstruction group. Baseline differences existed between groups, with the MAT group exhibiting lower body weight (84.0 ± 14.1 vs 93.2 ± 191.8 kg; $P = .036$) and Marx scores (4.8 ± 4.5 vs 9.3 ± 4.1 ; $P = .024$) than the isolated ACL reconstruction group, respectively. At the time of return to sport, the MAT group reported lower IKDC scores (83.2 ± 12.6 vs 91.1 ± 11.3 ; $P = .037$); however, no other functional performance or self-reported differences were observed. At 2 years, no significant differences existed between groups for SANE score (87.8 ± 12.3 vs 89.3 ± 11.4 ; $P = .793$), ACL graft reinjury rates (6.5% vs 2.2%; $P = .688$), or level of return to sport ($P > .05$). The MAT group demonstrated a significantly lower rate of return to previous level of sport (69.5% vs 78.3%; $P = .026$).

Conclusion: The majority of patients (87%) undergoing ACL reconstruction with concomitant MAT were able to return to some level of sports participation at 2 years with a low risk of revision ACL reconstruction or meniscal transplant failure. Patients receiving a concomitant MAT exhibited lower self-reported function at return to sport compared with matched controls undergoing isolated ACL reconstruction; however, these differences were not present at 2 years. Clinicians should consider patient characteristics, self-reported function, and return-to-sport rates when counseling patients regarding ACL reconstruction with MAT.

Association Between Insufficient Restoration of Meniscal Tension During Surgical Repair of Medial Meniscus Root Tear and Surgical Outcomes: Clinical Implication of Curtain-Cliff Sign

Moon H-S, Choi C-H, Jung M, et al.

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Background: Despite the clinical benefits over nonoperative treatment or meniscectomy, the clinical outcomes of surgical repair for medial meniscus posterior root tear (MMRT) remain suboptimal, which may be attributed to the insufficient restoration of meniscal hoop tension during surgery.

Purpose: To analyze the clinical outcomes of surgical repair of MMRT based on the appearance of the meniscal tension observed immediately after surgery.

Study Design: Cohort study; Level of evidence, 3

Methods: Electronic medical records of patients who underwent arthroscopic transtibial pull-out repair of MMRT between 2010 and 2021 were retrospectively reviewed. Patients with at least a 2-year follow-up and whose overall meniscal status after the surgical repair could be evaluated via arthroscopic images or videos were eligible to be included. Patients were classified based on the presence of the curtain-cliff sign, potentially implying insufficient postoperative meniscal hoop tension (group 1, patients without the curtain-cliff sign; group 2, patients with the curtain-cliff sign). Regression analysis was performed to evaluate whether the curtain-cliff sign reflects postoperative meniscal extrusion. Subsequently, comparative analyses were conducted between the 2 groups regarding baseline demographic data, clinical scores, intraoperative data, and radiologic parameters.

Results: A total of 79 patients were included (group 1, 59 patients; group 2, 20 patients). Regression analysis revealed a significant association between the curtain-cliff sign and postoperative meniscal extrusion, suggesting its potential to reflect the postoperative meniscal tension. In the between-group comparisons, there were no differences in baseline demographic data, preoperative clinical scores, and preoperative radiologic variables. However, at the final follow-up, group 2 showed a significantly lower International Knee Documentation Committee subjective score compared with group 1 (group 1, 61.7 ± 14.4 ; group 2, 52.9 ± 12.5 ; $P = .017$), while no significant differences were found in the visual analog scale for pain score and Lysholm score. Additionally, group 2 exhibited significantly higher postoperative meniscal extrusion compared with group 1, which was measured at both the midpoint of the medial femoral condyle (group 1, 4.0 ± 1.1 mm; group 2, 5.1 ± 1.5 mm, $P = .004$) and the posterior border of the medial collateral ligament (group 1, 4.4 ± 1.2 mm; group 2, 5.7 ± 1.5 mm; $P = .004$), with more pronounced progression compared with the preoperative status at these sites. Consistently, the progression of both the osteoarthritis grade and the hip-knee-ankle angle compared with preoperatively was significantly greater in group 2.

Conclusion: In patients in whom the restoration of meniscal tension appears insufficient immediately after surgical repair of MMRT, relatively poor clinical outcomes can be anticipated. The findings of this study suggest that efforts to reinforce meniscal tension may be required during surgical repair of MMRT in some cases, especially those showing the curtain-cliff sign.

Rehabilitation and Return to Play Protocols After Anterior Cruciate Ligament Reconstruction in Soccer Players: A Systematic Review

Mayer MA, Deliso M, Hong IS, et al.

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Background: Rehabilitation after anterior cruciate ligament ACL reconstruction (ACLR) is crucial for safe return to play (RTP) and reducing the chances of a reinjury. Yet, there is no consensus on the ideal functional tests to assess rehabilitation progress in soccer players after ACLR.

Purpose: The primary objective was to highlight the existing gap in the literature concerning the most effective standardized rehabilitation protocols and testing for facilitating successful RTP among soccer players.

Study Design: Systematic review; Level of evidence, 4.

Methods: A systematic review using PubMed, Embase, and the Cochrane Central Register of Controlled Trials (CENTRAL) was conducted. Inclusion criteria encompassed original studies (level of evidence 1-4) that examined rehabilitation protocols, metrics of knee rehabilitation, and clinical outcomes after ACLR in soccer players.

Results: This review incorporated 23 studies, predominantly retrospective case series, with a total number of 874 soccer players who underwent ACLR and rehabilitation. 5 (21.7%) studies utilized an accelerated rehabilitation protocol, while 7 (30.4%) of studies utilized a criterion-based rehabilitation. A wide heterogeneity of data was extracted including functional tests of rehabilitation and RTP such as strength test batteries, hop test batteries, and movement quality assessments. Of the 23 selected studies, 2 (8.7%) used all 3 test batteries, 8 (34.8%) used 2 test batteries, 12 (52.2%) used 1 test battery, and 1 (4.3%) used 0 of the test batteries. The mean time between surgery and RTP ranged from 3 to 8 months with only 2 (8.7%) studies reporting complications after ACLR. Lastly, out of the total studies examined, 9 (39.1%) assessed patient-reported outcome measures (PROMs), all of which demonstrated significant improvement from the initial assessment to the final follow up.

Conclusion: Soccer-specific rehabilitation after ACLR lacks standardization. Even though many studies have assessed protocols for optimal RTP and reduced secondary ACL injuries, there is a gap in the literature regarding the most effective protocols and RTP testing. The methodology reported by Kyritsis et al could serve as a foundation for future prospective randomized multicenter studies to establish a standard rehabilitation protocol and enable a successful return to soccer.

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