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Arthroscopy, April 2022, Volume 38, Issue 4, P 1051 – 1065

Subacromial Decompression in Patients With Shoulder Impingement With an Intact Rotator Cuff: An Expert Consensus Statement Using the Modified Delphi Technique Comparing North American to European Shoulder Surgeons

Hohman, E., Glatt, V., et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.09.031>

Purpose

To perform a Delphi consensus for the treatment of patients with shoulder impingement with intact rotator cuff tendons, comparing North American with European shoulder surgeon preferences.

Methods

Nineteen surgeons from North America (North American panel [NAP]) and 18 surgeons from Europe (European panel [EP]) agreed to participate and answered 10 open-ended questions in rounds 1 and 2. The results of the first 2 rounds were used to develop a Likert-style questionnaire for round 3. If agreement at round 3 was $\leq 60\%$ for an item, the results were carried forward into round 4. For round 4, the panel members outside consensus ($>60\%$, $<80\%$) were contacted and asked to review their response. The level of agreement and consensus was defined as 80%.

Results

There was agreement on the following items: impingement is a clinical diagnosis; a combination of clinical tests should be used; other pain generators must be excluded; radiographs must be part of the workup; magnetic resonance imaging is helpful; the first line of treatment should always be physiotherapy; a corticosteroid injection is helpful in reducing symptoms; indication for surgery is failure of nonoperative treatment for a minimum of 6 months. The NAP was likely to routinely prescribe nonsteroidal anti-inflammatory drugs (NAP 89%; EP 35%) and consider steroids for impingement (NAP 89%; EP 65%).

Conclusions

Consensus was achieved for 16 of the 71 Likert items: impingement is a clinical diagnosis and a combination of clinical tests should be used. The first line of treatment should always be physiotherapy, and a corticosteroid injection can be helpful in reducing symptoms. The indication for surgery is failure of no-operative treatment for a minimum of 6 months. The panel also agreed that subacromial decompression is a good choice for shoulder impingement if there is evidence of mechanical impingement with pain not responding to nonsurgical measures.

Level of Evidence

Level V, expert opinion.

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Multimodal Nonopioid Pain Protocol Provides Better or Equivalent Pain Control Compared to Opioid Analgesia Following Arthroscopic Rotator Cuff Surgery: A Prospective Randomized Controlled Trial

Jildeh T.R., Abbas M.J., *et al.*

DOI: <https://doi.org/10.1016/j.arthro.2021.11.028>

Purpose

To evaluate the efficacy of a multimodal nonopioid analgesic protocol in controlling postoperative pain compared to opioids following a primary arthroscopic rotator cuff repair.

Methods

Seventy consecutive patients undergoing a primary rotator cuff repair were assessed for eligibility. An observer-blinded prospective randomized controlled trial was designed in accordance with the Consolidated Standards of Reporting Trials 2010 (CONSORT) statement. The two arms of the study included a multimodal nonopioid pain regimen for the experimental group, and a standard of care narcotics for the control group. The primary outcome was visual analog scale (VAS) pain scores for the first 10 postoperative days. Secondary outcomes included PROMIS-PI (Patient-Reported Outcomes Measurement Information System-Pain Interference) scale, patient satisfaction, and adverse drug events.

Results

Thirty patients declined to participate or were excluded, and 40 patients were included in the final analysis. A total of 23 patients were in the traditional group, and 17 patients were in the nonopioid group. Control patients on opioid pain management reported a significantly higher VAS pain score on postoperative day 1 (opioid: 5.7 ± 2 , nonopioid: 3.7 ± 2.2 ; $P = .011$) and postoperative day 4 (opioid: 4.4 ± 2.7 , nonopioid: 2.4 ± 2.2 ; $P = .023$). No significant difference was seen on any other postoperative day. When mixed measured models were used to control for confounding factors, the nonopioid group demonstrated significantly lower VAS and PROMIS-PI scores ($P < .01$) at every time point. Patients in the traditional analgesia group reported significantly more days with constipation ($P = .003$) and days with upset stomach ($P = .020$) than those in the nonopioid group.

Conclusion

The present study found that a multimodal nonopioid pain protocol provided equivalent or better pain control compared to traditional opioid analgesics in patients undergoing primary arthroscopic rotator cuff repair. Minimal side effects were noted with some improvement in the multimodal nonopioid pain cohort. All patients reported satisfaction with their pain management.

Level of Evidence

Level I, prospective randomized controlled trial.

Superior Capsular Reconstruction Using Acellular Dermal Allograft Combined With Remaining Rotator Cuff Augmentation Improved Shoulder Pain and Function at 1 Year After The Surgery

Shin S., Lee S., et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.10.027>

Purpose

The purpose of this study is to report structural integrity and clinical outcomes of superior capsular reconstruction (SCR) using a 4- to 5-mm acellular dermal allograft combined with augmentation of the remaining rotator cuff to the graft.

Methods

We prospectively recruited 21 patients with symptomatic irreparable rotator cuff tear who required SCR. At least 6 months after the SCR, we evaluated each patient's graft healing by magnetic resonance imaging (MRI). We also assessed the range of motion (ROM), strength for forward flexion and external rotation, visual analog scale for pain (PVAS), American Shoulder and Elbow Surgeon (ASES) score, and Constant score. At minimum of 1 year after the surgery, we evaluated the number of patients with minimal clinically important differences (MCIDs) for each score to compare patients with healed and unhealed grafts.

Results

Postoperative MRI showed the grafts intact in 14 patients (66.7%). Among 7 patients with unhealed grafts, tears were observed in 3 patients (42.9%) on the glenoid side, 3 (42.9%) on the humeral side, and 1 (14.3%) on both sides. PVAS, ASES score, and the Constant score improved after surgery (4.0 to 0.7 for PVAS [$P < .001$], 55.5 to 87.0 for ASES score [$P < .001$], and 56.0 to 65.9 for Constant score [$P = .007$]). However, there were no differences in postoperative ROM and muscle strength compared to preoperative measurements. MCIDs were reached in 90.5% of patients ($n = 19$) for the PVAS and in 71.4% of patients ($n = 15$) for the ASES score. Only 33.3% of patients ($n = 7$) obtained MCIDs for the Constant score, and none of the patients with a graft tear obtained MCIDs in the Constant score ($P = .047$).

Conclusion

The graft complete healing rate was 66.7%, although pain relief and functional improvement were satisfactory regardless of graft structural integrity. However, muscle strength recovery was not optimal until 1 year after surgery.

Level of Evidence

Level IV; case series.

On-the-Edge Anchor Placement May Be Protective Against Glenoid Rim Erosion After Arthroscopic Bankart Repair Compared to On-the-Face Anchor Placement

Hirose T., Nakagawa S., et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.10.013>

Purpose

This retrospective study aimed to compare the effects of 2 different anchoring placements on glenoid rim erosion after arthroscopic Bankart repair (ABR).

Methods

Shoulders that underwent ABR from January 2013 to July 2020 were divided into 2 groups according to anchor placement (on-the-face, group F; on-the-edge, group E). We retrospectively calculated the percent change of glenoid width (Δ) on the first postoperative computed tomography scan (CT; performed within 6 months) and second postoperative CT (performed at 6 to 12 months) relative to the width on the preoperative CT and compared percent changes between the 2 groups. Also, we investigated the influence of preoperative glenoid structures (normal, erosion, bony Bankart) and the postoperative recurrence rate.

Results

We examined 225 shoulders in 214 patients (group F, n = 151; group E, n = 74). At first CT, anchoring placement was significantly associated with postoperative decrease of glenoid width (group F, $-7.6\% \pm 7.9\%$; group E, $-0.1\% \pm 9.7\%$; $P < .0001$). The difference between groups F and E was significant in shoulders with a preoperative glenoid defect (bony Bankart, $-6.6\% \pm 8.8\%$ vs $2.5\% \pm 11.2\%$, respectively; $P < .0001$; erosion, $-6.6\% \pm 6.2\%$ vs $-2.6\% \pm 5.3\%$, respectively; $P = .03$). In 112 shoulders, CT was performed twice; Δ was $-6.9\% \pm 7.3\%$ in group F (n = 64) and $-1.7\% \pm 10.1\%$ in group E (n = 48; $P = .005$) at the first CT and $-3.2\% \pm 10.0\%$ and $1.0\% \pm 10.6\%$ ($P = .10$), respectively, at the second CT, indicating recovery of glenoid width in both groups. The postoperative recurrence rate in patients with at least 2 years' follow-up was 14.7% in group F and 14.6% in group E.

Conclusions

In the early stage after ABR, on-the-edge glenoid anchor placement was associated with less glenoid rim erosion than on-the-face anchor placement.

Level of Evidence

Level III, retrospective comparative trial.

Subacromial Bursal Tissue and Surrounding Matrix of Patients Undergoing Rotator Cuff Repair Contains Progenitor Cells

Levy B.J., McCarthy M.B., et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.10.029>

Purpose

To build upon previous literature to identify a complete analysis of cellular contents of subacromial bursal tissue as well as the matrix surrounding the rotator cuff.

Methods

Samples of subacromial bursal tissue and surrounding matrix milieu from above the rotator cuff tendon and above the rotator cuff muscle bellies were obtained from 10 patients undergoing arthroscopic rotator cuff repair. Samples were analyzed using fluorescent-activated cell sorting and histologic analysis with staining protocols (Oil Red O, Alcian Blue, and Picro-Sirius Red), for identification of matrix components, including fat, proteoglycans, and collagen.

Results

Progenitor cells and fibroblast-type cells were present in significant amounts in subacromial bursal tissue in both tissues obtained from over the tendinous and muscle belly portions. Markers for neural tissue, myeloid cells, and megakaryocytes also were present to a lesser extent. There were prominent amounts of fat and proteoglycans present in the matrix, based on ImageJ analysis of stained histologic slides.

Conclusions

The subacromial bursal tissue and surrounding matrix of patients undergoing rotator cuff repair contains progenitor cells in significant concentrations both over the tendon and muscle belly of the rotator cuff.

Clinical Relevance

This presence of progenitor cells, in particular, in the subacromial bursal tissue provides a potential basis for future applications of augmentation purposes in rotator cuff healing, and calls into question the practice of routine bursectomy. As the potential role of bursal tissue contents in growth and regeneration in the setting of rotator cuff healing is more well understood, maintaining this tissue may become more relevant. Concentration of these cellular components for use in autologous re-implantation is also an avenue of interest.

Failed Latarjet Treated With Full Arthroscopic Eden–Hybinette Procedure Using Two Cortical Suture Buttons Leads to Satisfactory Clinical Outcomes and Low Recurrence Rate

Martinez-Catalan N., Werthel J.D., et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.10.026>

Purpose

To report clinical and radiologic outcomes of arthroscopic Eden–Hybinette using 2 cortical suture buttons in a series of patients with previous failed Latarjet and persistent glenoid bone loss.

Methods

Between 2015 and 2019, patients with recurrent anterior instability after failed Latarjet underwent arthroscopic Eden–Hybinette procedure using 2 cortical buttons for graft fixation. Exclusion criteria were open and primary Eden–Hybinette and less than one year follow-up. Functional assessment was performed using Rowe and Walch-Duplay scores, subjective shoulder value, visual analog scale, and degree of satisfaction. Iliac crest bone graft placement and healing were assessed postoperatively with computed tomography imaging.

Results

A total of 17 patients with a mean age of 28 years (range, 21-43 years) at time of revision were included. The mean glenoid bone loss was 23% (range, 18%-42%). Medium or deep Hill–Sachs lesion (Calandra 2 and 3) was present in 65% of cases. At a mean follow-up of 3 ± 1.6 years, all but 1 patient (94%) considered their shoulder stable, and 15 patients (88%) were satisfied or very satisfied. The subjective shoulder value increased from 51% to 87% ($P < .05$), the Walch–Duplay increased from 23 to 86 points ($P < .05$), and Rowe scores improved from 30 to 92 points ($P < .05$). Apprehension was still positive in 3 patients (17.6%), with this percentage being greater in the presence of Hill–Sachs Calandra 3 ($P = .02$). Postoperative computed tomography scans showed optimal bone autograft position in all patients (below the glenoid equator and flush to the glenoid rim). Iliac crest bone graft healed to the anterior glenoid neck in 16 shoulders (94%). The rate of recurrent instability was 11.7% but only 1 patient required revision surgery (5.8%).

Conclusions

Arthroscopic Eden–Hybinette using 2 cortical buttons leads to satisfactory clinical outcomes and a low recurrence rate after failed Latarjet, allowing successful reconstruction of the anterior glenoid rim and simultaneous treatment of capsular deficiency and humeral bone loss.

Level of Evidence

Therapeutic, level IV, retrospective case series.

Arthroscopic Foveal Repair of the Triangular Fibrocartilage Complex Improved the Clinical Outcomes in Patients With Persistent Symptomatic Distal Radio-Ulnar Joint Instability After Plate Fixation of Distal Radius Fractures: Minimum 2-Year Follow-Up

Park Y., Shin S., et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.11.047>

Purpose

To investigate the longitudinal trend of symptomatic distal radioulnar joint (DRUJ) instability after plate fixation for distal radius fractures (DRFs), determine which factors are associated with persistent symptomatic DRUJ instability, and evaluate the postoperative outcomes of arthroscopic foveal repair of the triangular fibrocartilage complex (TFCC) in patients with persistent symptomatic DRUJ instability after plate fixation for DRF.

Methods

All consecutive patients who underwent plate fixation for DRF between January 2014 and December 2017 and were followed up for a minimum of 1 year were included in this retrospective study. DRUJ instability was evaluated by subjective ulnar wrist pain and physical examination that included foveal sign and ballottement testing every 2 months after surgery. In patients with persistent symptomatic DRUJ instability lasting >6 months, arthroscopic transosseous foveal repair was performed with consent. Clinical outcomes were evaluated at a minimum of 2 years after surgery. The Generalized Estimating Equation model was used to analyze the incidence rate trend of symptomatic DRUJ instability.

Results

Overall, 204 patients were included. The incidence of symptomatic DRUJ instability decreased gradually with time after fixation for DRF until 6 months and was maintained thereafter. Thirty-four of 204 patients (16.6%) had persistent symptomatic DRUJ instability. In multivariable analysis, only high-energy injury was an independent risk factor for persistent symptomatic DRUJ instability ($P = .003$; odds ratio = 3.599). Seventeen patients underwent arthroscopic foveal repair. The mean follow-up period thereafter was 28.6 months. All clinical outcomes improved significantly compared with preoperative values, and no patient had residual DRUJ instability.

Conclusion

In patients who had persistent symptomatic DRUJ instability for >6 months after plate fixation for DRFs, arthroscopic foveal repair of the TFCC is considered as a treatment option. Arthroscopic foveal repair of the TFCC to stabilize the DRUJ provided satisfactory clinical and functional outcomes and decreased ulnar-side pain.

Level of Evidence

Level IV, retrospective case series.

Journal of Shoulder and elbow surgery, April 2022, volume 31, issue 4, pages 688-693

Distal clavicle “A-frame” morphology: a reliable intraoperative guide for arthroscopic distal clavicle excision

Ruder, J.A., Young, B.L. et al.

DOI: <https://doi.org/10.1016/j.jse.2021.10.013>

Background

The purpose of this cadaveric study was to describe the characteristics of the “A-frame” morphology of the distal clavicle via computed tomography (CT) to determine whether it can be used as a reliable intraoperative guide for arthroscopic distal clavicle excision.

Methods

Twenty-eight fresh-frozen human cadaveric clavicles underwent a 3-dimensional CT scan using 1.0-mm cuts. The distance from the most lateral aspect of the clavicle to the point at which the superior cortex of the clavicle paralleled the inferior cortex was measured. Measurements were performed in a blinded fashion by a single author on 2 separate occasions.

Results

The A-frame was present in all specimens (28 of 28). On the first measurement, the mean distance from the distal clavicle to the point at which the A-frame disappeared was 1.00 cm (range, 0.90-1.08 cm; standard deviation, 0.5 mm). On the second measurement, the mean distance was 1.02 cm (range, 0.90-1.11 cm; standard deviation, 0.6 mm). The intrarater reliability between measurement occasions was 0.65 (95% confidence interval, 0.36-0.82; $P < .001$).

Conclusions

This study demonstrated that the cross-sectional A-frame morphology of the distal clavicle was consistently visualized on CT scans. The A-frame disappeared 1.00-1.02 cm medial to the most lateral extent of the clavicle on CT scans. The disappearance of the A-frame morphology of the distal clavicle can serve as a reliable intraoperative guide for arthroscopic distal clavicle excision.

Level of evidence

Anatomic Study, Imaging

Operative vs. nonoperative treatment of distal biceps ruptures: a systematic review and meta-analysis

Looney, A.M., Day, J. et al.

DOI: <https://doi.org/10.1016/j.jse.2021.12.001>

Background and hypothesis

Ruptures of the distal biceps tendon are most commonly due to traumatic eccentric loading in the middle-aged male population and can result in functional deficits. Although surgical repair has been demonstrated to result in excellent outcomes, there are few comparative studies that show clear functional benefits over nonoperative management. The aim of this systematic review and meta-analysis is to compare the functional outcomes of operative and nonoperative management for these injuries. We hypothesized that operative treatment would be associated with significantly superior outcomes.

Methods

According to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, a systematic review of the literature was performed using MEDLINE, SPORTDiscus, CINAHL (Cumulative Index to Nursing and Allied Health Literature), CENTRAL (Cochrane Central Registry of Controlled Trials), Embase, and Web of Science databases. Outcomes of interest included range of motion (ROM), strength, endurance, and patient-reported outcomes including Disabilities of the Arm, Shoulder and Hand (DASH), Mayo Elbow Performance Score (MEPS), and visual analog scale (VAS) for pain scores. Summary effect estimates of the mean difference between operative and nonoperative management for each outcome were estimated in mixed effects models.

Results

Of an initially identified 6478 studies, 62 reported outcomes for a total of 2481 cases (2402 operative, 79 nonoperative), with an overall average age of 47.4 years (47.3 for operative, 50.3 for nonoperative). There were 2273 (98.5%) males and 35 (1.5%) females among operative cases, whereas all 79 (100%) nonoperative cases were males. Operative management was associated with a significantly higher flexion strength (mean difference, 25.67%; $P < .0001$), supination strength (mean difference, 27.56%; $P < .0001$), flexion endurance (mean difference, 11.12%; $P = .0268$), and supination endurance (mean difference, 33.86%; $P < .0001$). Patient-reported DASH and MEPS were also significantly superior in patients who underwent surgical repair, with mean differences of -7.81 ($P < .0001$) and 7.41 ($P = .0224$), respectively. Comparative analyses for ROM and pain VAS were not performed because of limited reporting in the literature for nonoperative management.

Conclusion

This study represents the first systematic review and meta-analysis to compare functional and clinical outcomes following operative and nonoperative treatment of distal biceps tendon ruptures. Operative treatment resulted in superior elbow and forearm strength and endurance, as well as superior DASH and MEPS.

Level of Evidence

Level IV, Systematic Review

[BACK](#)

Free bone grafting improves clinical outcomes in anterior shoulder instability with bone defect: a systematic review and meta-analysis of studies with a minimum of 1-year follow-up

Wei, J., Lu, M. et al.

Background

Evidence on the efficacy and safety of the free bone grafting in treating anterior shoulder instability is limited. The purpose of this study was to systematically evaluate the clinical and imaging results of free bone grafting in treating anterior shoulder instability with glenoid bone defect and to explore the incidence of complications in clinically relevant subgroups.

Methods

This systematic review was conducted per PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) guidelines. The PubMed, Embase, and Cochrane Library databases were searched up to January 29, 2021, for studies that had reported on free bone grafting in treating anterior shoulder instability with glenoid bone defect with a minimum of 1-year follow-up. Two researchers independently screened studies and extracted data. A random-effects model was used to pool data on clinical function scores, imaging results, and incidence of complications (recurrent instability and non–instability-related complications). Meta-regression analysis was used to evaluate the incidence of complications in different subgroups and investigate the sources of heterogeneity.

Results

A total of 29 studies were included in the meta-analysis, comprising 840 patients (845 shoulders) with average ages ranging from 21 to 34.6 years. Compared with preoperatively, free bone grafting increased the postoperative Rowe score, American Shoulder and Elbow Surgeons score, Constant score, Subjective Shoulder Value, and Oxford Shoulder Instability Score by 53.16, 31.80, 20.81, 38.63, and 4.07 points, respectively, and reduced the visual analog scale pain score by 3 points on average. During the postoperative follow-up period, the rates of return to sport and return to preoperative levels were 84.2% and 73.1%, respectively. The imaging results showed that the free bone healing rate was 98.9% and the incidence of osteoarthritis was 10.9%. The incidence rates of recurrent instability and non–instability-related complications were 3.4% and 5.6%, respectively. Meta-regression analysis showed no evidence of effect modification by the year, follow-up time, proportion of male patients, autograft or allograft, and arthroscopy or open surgery on the incidence of complications. Subgroup analysis showed that the incidence rates of recurrent instability for open surgery, arthroscopy, allograft, autograft, Latarjet revision, and non–bone block revision were 4.1%, 2.3%, 1.5%, 4.4%, 10.3%, and 3.5%, respectively.

Conclusion

The application of free bone grafting in treating anterior shoulder instability with glenoid bone defect can effectively improve shoulder joint function and is associated with a high return-to-sport rate and a low overall recurrence rate, but there were some differences in the complications of recurrent instability and non–instability-related complications among the subgroups. Given that these results need to be confirmed via head-to-head comparisons, we recommend that future clinical and biomechanical studies focus on comparing and investigating the advantages and disadvantages of different surgical approaches, thus providing a basis for orthopedic surgeons to make reliable choices.

Level of evidence

Level IV, Systematic Review/Meta-Analysis

Arthroscopic Characterization, Treatment, and Outcomes of Glenoid Labral Articular Disruption Lesions

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Background: The pathoanatomy of glenoid labral articular disruption (GLAD) lesions has been inconsistently and poorly defined in the literature.

Purpose/Hypothesis: The purpose was to characterize GLAD lesions as they pertain to the pathoanatomy of labrum, cartilage, and bony structures, and to correlate findings with patient-reported outcomes (PROs). We hypothesized that greater degrees of bony and cartilaginous involvement would correlate with worse outcomes.

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

Methods: All patients with a diagnosis of a GLAD lesion or a reverse GLAD (RGLAD) lesion at the time of diagnostic arthroscopy (January 2006–February 2019) were included in this study. Patients with $\geq 13.5\%$ bone loss or previous ipsilateral shoulder surgery were excluded. Patient charts and operative reports/photos were used to identify the location of injury, extent of injury (labral, chondral, and bony), associated injuries, demographic factors, and treatment performed. Three injury patterns were identified: small (type 1), with no chondral defect after labral repair; large (type 2), with residual chondral defect after labral repair; and bony (type 3), with associated glenoid bone loss amenable to labral repair. Characterizations were cross-referenced to PROs at a mean follow-up of 5.5 years (range, 2.6–10.5 years): American Shoulder and Elbow Surgeons (ASES), Single Assessment Numeric Evaluation, shortened version of Disabilities of the Arm, Shoulder and Hand, and patient satisfaction.

Results: In total, 50 patients were included, with 40 having GLAD and 10 having RGLAD lesions (mean age, 34.7 and 33.2 years, respectively). There were 14 (35%) type 1, 22 (55%) type 2, and 4 (10%) type 3 GLAD injuries. All PROs improved without any differences in the 3 subgroups postoperatively (ASES, 95.1 vs 91.3 vs 98.8, type 1, 2, and 3, respectively). RGLAD injuries were majority type 2 (7/10; 70%) with the remainder being type 1 (3/10; 30%).

Conclusion: With GLAD and RGLAD injuries, 3 distinct injury patterns can be observed correlating with the presence/absence of chondral loss after labral repair or the presence of associated bone loss. This descriptive characterization can facilitate arthroscopic treatment decisions. Future large studies are needed to determine if this is prognostic in nature.

Bone Fragment Resorption and Clinical Outcomes of Traumatic Bony Bankart Lesion Treated With Arthroscopic Repair Versus Open Latarjet

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Background: Bony Bankart lesions can perpetuate chronic anterior glenohumeral instability. When surgical treatment is pursued, several factors need to be considered to obtain optimal outcomes.

Purpose: To (1) quantitatively describe patterns of bone fragment resorption and associated risk factors for developing glenoid bone loss (GBL) and (2) to compare clinical and radiological results of attritional bone loss treated with either the arthroscopic Bankart or the open Latarjet procedure.

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

Methods: A retrospective analysis of prospectively collected data was conducted for patients who underwent arthroscopic stabilization (group A1, 10%-20% GBL; group A2, >20% GBL) or open Latarjet (group B, >10% GBL) for recurrent shoulder instability with bony Bankart lesion. Patient characteristics, number of dislocations, and Western Ontario Shoulder Instability Index (WOSI) scores were obtained. Pre- and postoperative computed tomography imaging was used to quantitatively describe patterns of bone fragment resorption.

Results: A total of 120 consecutive patients (group A1, 40; group A2, 23; group B, 57) were included in the study, with a mean age of 25.6 years (range, 19-35 years). The average follow-up was 5.0 years for all groups (range, 4.83-5.16 years in group A1, 4.58-5.41 years in group A2, and 4.33-5.67 years in group B). The mean times between dislocation event and surgery were 12.8 months (range, 6-32 months) and 13.6 months (range, 6-38 months) for groups A and B, respectively. Redislocation rates were 7.5% in group A1 versus 13.0% in group A2, and only occurred in patients with $\geq 13.5\%$ GBL. There were no redislocations for group B (0%). Patients had better WOSI scores in group B (234.1 ± 126.9) than in group A (576.1 ± 224.6) ($P < .0001$). In group A, smaller preoperative bone fragment size displayed a higher percentage of resorption after surgery ($r = -0.64$; $P < .05$).

Conclusion: A significant inverse relationship exists between preoperative bone fragment size and percentage of postoperative resorption. Patients treated with arthroscopic bony Bankart repair who had final GBL $\geq 13.5\%$ had worse outcomes. When planned GBL approaches 13.5% in high-demand patients, a smaller fragment size can result in worse clinical outcomes because of resorption. In these cases, choosing the open Latarjet procedure leads to better clinical results.

Arthroscopic Rotator Cuff Repair Augmentation With Autologous Microfragmented Lipoaspirate Tissue Is Safe and Effectively Improves Short-term Clinical and Functional Results: A Prospective Randomized Controlled Trial With 24-Month Follow-up

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Background: Autologous microfragmented lipoaspirate tissue has been recently introduced in orthopaedics as an easily available source of nonexpanded adipose-derived mesenchymal stem cells. Autologous microfragmented lipoaspirate tissue is expected to create a suitable microenvironment for tendon repair and regeneration. Rotator cuff tears show a high incidence of rerupture and represent an ideal target for nonexpanded mesenchymal stem cells.

Purpose: To evaluate the safety and efficacy of autologous lipoaspirate tissue in arthroscopic rotator cuff repair.

Study Design: Randomized controlled trial; Level of evidence, 2.

Methods: Consecutive patients referring to the investigation center for surgical treatment of magnetic resonance imaging–confirmed degenerative posterosuperior rotator cuff tears were assessed for eligibility. Those who were included were randomized to receive a single-row arthroscopic rotator cuff repair, followed by intraoperative injection of autologous microfragmented adipose tissue processed with an enzyme-free technology (treatment group) or not (control group). Clinical follow-up was conducted at 3, 6, 12, 18, and 24 months; at 18 months after surgery, magnetic resonance imaging of the operated shoulder was obtained to assess tendon integrity and rerupture rate.

Results: An overall 177 patients were screened, and 44 (22 per group) completed the 24-month follow-up. A statistically significant difference in favor of the treatment group in terms of Constant-Murley score emerged at the primary endpoint at 6-month follow-up (mean \pm SD; control group, 76.66 ± 10.77 points; treatment group, 82.78 ± 7.00 points; $P = .0050$). No significant differences in clinical outcome measures were encountered at any of the other follow-up points. No significant differences emerged between the groups in terms of rerupture rate, complication rate, and number of adverse events.

Conclusion: This prospective randomized controlled trial demonstrated that the intraoperative injection of autologous microfragmented adipose tissue is safe and effective in improving short-term clinical and functional results after single-row arthroscopic rotator cuff repair.

Registration: NCT02783352 (ClinicalTrials.gov identifier).

Lower Extremity

Arthroscopy, April 2022, Volume 38, Issue 4, P 1166 – 1178

Acellular Matrix-Induced Chondrogenesis Technique Improves the Results of Chondral Lesions Associated With Femoroacetabular Impingement

De Lucas Villarubia J.C., Alonso M.A.M., et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.08.022>

Purpose

The study's main objective was to evaluate, in the short-term, the result of the autologous acellular matrix-induced chondrogenesis (AMIC) technique in a selected group of patients with 2-4 cm² full-thickness chondral lesions, undergoing hip arthroscopy for femoroacetabular impingement (FAI).

Methods

A retrospective single-center Level IV case series of 25 patients (28 hips) who underwent an arthroscopic hip surgery with a liquid acellular collagen matrix. Inclusion criteria for implantation were FAI diagnosis (cam or pincer type), grade IV chondral lesions (Outerbridge size 2-4 cm²); Tönnis stage 0-II, minimum follow-up of 24 months, and 1 year (12-15 months) evaluation with very high field 3-T MRI arthrography. Exclusion criteria were Tönnis III, joint space <2 mm, center-edge angle <20°, and <24 months of follow-up. Clinical assessments involved symptoms duration until surgery, changes in physical and work activity and range of motion, modified Harris Hip Score, reporting percentages of patient acceptable symptomatic state (PASS) and minimal clinically important difference (MCID), pain with a VAS, and level of satisfaction. Radiological assessments: Tönnis stage, articular space, alpha and lateral center edge angle (Wiberg), and generated tissue characteristics at 1 year (based on the MOCART score), through 3-T MRI.

Results

25 patients (28 hips) treated; 19 men and 6 women (mean age: 40.5 years; range: 25-55). Two women underwent joint replacement surgery. Thus, 23 patients (26 hips) were analyzed. At 29 months following surgery (range: 24-48), a significant improvement was obtained in all parameters assessed, focusing on the characteristics of the generated tissue in the MRI (MOCART scores). 95% of the patients met the MCID (improvement >12 points in the modified Harris Hip Score), and 100% scored >74 points, achieving the PASS. Patients' satisfaction was 86.6% (SD 16.4). All patients who practiced sports resumed them.

Conclusions

The liquid AMIC is a safe technique that shows good clinical and radiological outcomes in a 2-year follow-up in patients with femoroacetabular impingement and grade IV acetabular 2-4 cm² chondral defects.

Level of Evidence

Level IV, retrospective case series.

[BACK](#)

Preoperative Alpha Angles Can Predict Severity of Acetabular Rim Chondral Damage in Symptomatic Cam-Type Femoroacetabular Impingement: A Prospective Observatory Study

Tang H., Chen I, et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.08.024>

Purpose

To identify the relationship between the alpha angle and the severity of chondrolabral separation as well as acetabular rim chondral damage in symptomatic cam-type femoroacetabular impingement (FAI) with or without focal pincer-type FAI.

Methods

Patients who received hip arthroscopy under the diagnosis of symptomatic cam-type FAI between January 2018 and August 2018 were identified in a prospectively collected database. Patients were excluded if preoperative lateral center-edge angle $<25^\circ$, lateral center-edge angle $\geq 40^\circ$, Tönnis grade >1 , with previous surgery on the affected hip, or with concomitant synovial disease. The chondrolabral junction was classified into intact chondrolabral junction, stable chondrolabral separation and unstable chondrolabral separation. The classification of acetabular rim chondral damage was modified from the MAHORN (Multicenter Arthroscopy of the Hip Outcomes Research Network) classification: normal/softening, bubble, pocket, flap, and exposed bone. The relationship between the hip morphology and severity of chondrolabral junction and acetabular rim chondral damage was assessed.

Results

A total of 71 patients with the mean age of 33.2 ± 11.0 years were included. Preoperative alpha angles on anteroposterior (AP) or Lauenstein view positively correlated with the severity of acetabular rim chondral damage ($P = .028$ and $P = .016$, respectively). A significant increment of the alpha angle between 2 consecutive grades of acetabular rim chondral damage was 7.1° ($P = .001$) on AP view and 5.2° on Lauenstein view ($P = .001$). The cut-off values for predicting advanced acetabular rim chondral damage (pocket, flap or bony exposure) were an AP alpha angle of 70° ($P = .025$) and a Lauenstein alpha angle of 57° ($P = .003$). There was no significant association between the alpha angle and the severity of chondrolabral separation.

Conclusions

In patients with symptomatic cam-type FAI with or without focal pincer-type FAI, greater preoperative alpha angles on AP and Lauenstein views can predict more severe acetabular chondral damage.

Level of Evidence

Level III.

Dunn View Alpha Angle More Useful Than Femoral Head-Neck Offset to Predict Acetabular Cartilage Damage in Patients With Femoroacetabular Impingement Syndrome Undergoing Hip Arthroscopy

Shapira J., Owens J.S., et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.08.039>

Purpose

To identify radiographic measurements and demographics that are predictive of acetabular cartilage damage in patients with femoroacetabular impingement syndrome (FAIS) undergoing hip arthroscopy. More specifically, to compare the predictive value of alpha angle and femoral head-neck offset, as measured on Dunn view radiographs, in determining the preoperative likelihood and severity of acetabular cartilage damage.

Methods

Patients were included if they underwent primary hip arthroscopy for FAIS between February 2008 and June 2020. Exclusion criteria were prior ipsilateral hip conditions, Tönnis grade of osteoarthritis >1, unwilling to participate, missing intraoperative, demographic or radiographic variables of interest, and lateral center-edge angle (LCEA) >40° or ≤25°. Fourteen variables were assessed in a bivariate comparison and analyzed in a multivariate logistic model. The Acetabular Labrum Articular Disruption (ALAD) and Outerbridge (OB) classifications were used to define acetabular cartilage defects. Those without damage or those with mild acetabular cartilage damage belonged to the ALAD/OB ≤2 group and those with severe damage belonged to the ALAD/OB ≥3 group.

Results

A total of 1485 patients were analyzed, including 1038 patients with ALAD/OB ≤2 and 447 patients with ALAD/OB ≥3. There was a greater proportion of males in the ALAD/OB ≥3 group (64.21% vs 25.82%; P <.001). The multivariate logistic regression selected age, sex, anterior center-edge angle (ACEA), and alpha angle. Every additional degree in the alpha angle was associated with a 6% increase in the odds of severe acetabular cartilage damage (odds ratio [OR], 1.06 [95% confidence interval [CI], 0.12-8.11]). The multivariate analysis did not identify femoral head-neck offset as a predictor. The odds of severe acetabular cartilage damage were 3.73 times higher in males than females (OR, 3.73 [95% CI, 0.01-1705.96]). Higher age was found to increase the likelihood of ALAD/OB ≥3 (OR, 1.04 [95% CI, 0.13-7.75]).

Conclusions

In a multivariate analysis, factors identified as preoperative predictors of acetabular cartilage damage in patients with FAIS were age, sex, ACEA, and alpha angle. Femoral head-neck offset was not predictive, suggesting that Dunn view alpha angle may take precedence as a predictor of acetabular cartilage damage.

Level of Evidence

Level III, cohort study.

Postoperative Alpha Angle Is Predictive of Return to Sport in Athletes Undergoing Hip Arthroscopy for Femoroacetabular Impingement

Monahan P.F., Jimenez A.E., et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.09.015>

Purpose

To identify clinical and radiographic factors that predict return to sport in athletes undergoing hip arthroscopy and to determine thresholds for significant predictors.

Methods

Data were reviewed on all patients who underwent primary hip arthroscopy between November 2008 and August 2018. Patients were included if they played professional, college, or high school sports within 1 year before surgery and had preoperative, 3-month, 1-year, and 2-year postoperative patient-reported outcome scores for modified Harris Hip Score, Hip Outcome Score-Sport Specific-Subscale, and Nonarthritic Hip Score. Rates of achieving the minimal clinically important difference also were evaluated. Patients were divided into groups based on whether they returned to sport at the same or greater level. Multivariate logistic regression and receiver operator characteristic analysis were used to evaluate the correlation between significant variables and return to sport.

Results

A total of 136 patients with a mean age of 20.8 ± 7.07 years were included. Among athletes who attempted to return, professional and collegiate athletes returned to sport at any level at a rate of 85.0% (51/60), and high-school athletes returned at a rate of 88.1% (52/59). Competition level, postoperative alpha angle, change in alpha angle, and postoperative patient-reported outcomes were significantly different between groups. Athletes who returned to sport achieved the minimal clinically important difference for Hip Outcome Score–Sport Specific-Subscale at significantly higher rates than athletes who did not return to sport (91.6% vs 71.7%, $P = .002$, $S = 8.97$). The multivariate logistic regression model identified postoperative alpha angle as a statistically significant predictor of return to sport ($P < .001$, $S > 9.97$ [odds ratio 0.85, 95% confidence interval 0.79-0.91]). The receiver operator characteristic curve for postoperative alpha angle demonstrated acceptable discrimination between patients returning to sport and patients not returning to sport with an area under the curve of 0.71 and a threshold value of 46° . Athletes with a postoperative alpha angle $\leq 46^\circ$ returned to sport at significantly higher rates than those with a postoperative alpha angle $>46^\circ$ [$P < .001$, $S > 9.97$ [odds ratio 6.3, 95% confidence interval 2.6-15.2)].

Conclusions

Postoperative alpha angle was identified as a predictor of return to sport in athletes. The odds of returning to sport were 6.3 times greater in athletes with postoperative alpha angles $\leq 46^\circ$ compared with athletes with angles $>46^\circ$.

Level of Evidence

III, retrospective cohort study.

Periarticular Local Infiltrative Anesthesia and Regional Adductor Canal Block Provide Equivalent Pain Relief After Anterior Cruciate Ligament Reconstruction

Schaver A.L., Glass N.A., *et al.*

DOI: <https://doi.org/10.1016/j.arthro.2021.10.031>

Purpose

To compare postoperative pain and recovery after anterior cruciate ligament reconstruction (ACLR) in patients who received an adductor canal block (ACB) or periarticular local infiltrative anesthesia (LIA).

Methods

A retrospective review of a prospectively collected ACL registry was performed. Patients underwent ACLR at a single institution between January 2015 and September 2020 and received long-acting local anesthesia with a preoperative ultrasound-guided ACB or periarticular LIA after surgery. Visual analog scale (VAS) pain scores, milligram morphine equivalents (MME) consumed in the post-anesthesia care unit (PACU), and total hospital recovery time were compared. Univariate analysis was used to compare VAS pain and MME totals between overall groups and groups propensity score matched for age, sex, body mass index, graft type, and meniscal treatment. Results are presented as mean (95%CI) unless otherwise indicated.

Results

There were 265 knees (253 patients) included (LIA, 157 knees; ACB, 108 knees). Overall, VAS pain scores before hospital discharge (LIA: 2.6 [2.4-2.8] vs ACB: 2.4 [2.1-2.7]; $P = .334$) and total MMEs were similar (LIA: 17.6 [16.4-18.8] vs ACB: 18.5 [17.2-19.8] (MME); $P = .134$). Median time to discharge also did not significantly differ (LIA: 137.5 [IQR: 116-178] vs. ACB: 147 [IQR: 123-183] (min); $P = .118$). Matched subanalysis (LIA and ACB; $n = 94$) did not reveal significant differences in VAS pain before discharge (LIA: 2.4 [2.1-2.7] vs ACB: 2.7 [2.4-3.0]; $P = .134$) or total MMEs (LIA: 18.6 (17.2-20.0) vs ACB: 17.9 (16.4-19.4); $P = .520$).

Conclusion

The use of ACB or LIA resulted in similar early pain levels, opioid consumption, and hospital recovery times after ACLR surgery. Level of Evidence: III, retrospective comparison study.

Transepicondylar Distance Can Predict Graft and Tunnel Length for Different Pediatric Anterior Cruciate Ligament Reconstruction Techniques: A Magnetic Resonance Imaging Study

Rosso F., Rossi R., et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.08.011>

Purpose

To find a correlation and mathematical formulas between a linear 2-dimensional (2D) magnetic resonance imaging (MRI) measurement around the knee and the length of the grafts and tunnels required for both all-inside-all-epiphyseal and Kocher–Micheli pediatric anterior cruciate ligament (ACL) reconstruction techniques.

Methods

At time 0 and 30 days after, 2 observers measured: (1) on standard 2D knee MRI, 7 linear distances, representing morphologic measurements, such as transepicondylar distance (TD), and (2) on 3-dimensional (3D) MRI, 5 curved distances, corresponding to Kocher–Micheli and all-epiphyseal ACL reconstruction techniques. Intra- and interobserver reliability was tested for all measurements. The correlation between 2D and 3D measurements was tested. The 2D measurement with highest repeatability and reproducibility and with strongest correlation with 3D measurements was used to extract formulas to calculate the tunnel and graft length for the 2 techniques.

Results

Seventy-six MRIs were used. The intra- and interobserver reliability of 2D measurement was high, with TD showing the highest reproducibility and repeatability. 3D measurements also showed good intra and inter-observer reliability. A linear correlation was found between 2D and 3D measurements, with TD showing the strongest correlation. TD was used to extract formulas to calculate graft or tunnel length for Kocher–Micheli and all-epiphyseal ACL reconstruction. All formulas were proven to be accurate. A reference chart was also created to be used in the surgical setting.

Conclusions

With specific formulas, TD can be used to calculate the length of the tunnels, intra-articular portion and graft length for an all-inside all-epiphyseal pediatric ACL reconstruction and the length of the iliotibial band required for the Kocher–Micheli technique.

Clinical Relevance

The surgeon can use these formulas in pediatric ACL reconstruction preoperative planning, graft harvesting and tunnel drilling.

Greater Psychological Readiness to Return to Sport, as Well as Greater Present and Future Knee-Related Self-Efficacy, Can Increase the Risk for an Anterior Cruciate Ligament Re-Rupture: A Matched Cohort Study

Piussi R., Beischer S., et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.08.040>

Purpose

To determine the psychological characteristics and strength outcomes of patients who sustained an early anterior cruciate ligament (ACL) re-rupture after their primary ACL reconstruction and cross-sectionally compare them with a matched cohort of patients who did not sustain a reinjury during the first 2 years after primary ACL reconstruction.

Methods

In this matched cohort study, data for quadriceps and hamstring strength and 3 hop tests and answers to standardized patient-reported outcomes (the Anterior Cruciate Ligament Return to Sport after Injury scale and a short version of the Knee Self-Efficacy Scale) were extracted from a rehabilitation outcome registry. Data for patients suffering a re-rupture were extracted, and patients were matched in terms of sex, age, and activity level with patients not suffering an ACL re-rupture within 2 years of primary reconstruction. The groups were compared 10 weeks and 4, 8, and 12 months after the primary reconstruction.

Results

A total of 36 patients suffering an ACL re-rupture were matched with 108 patients not suffering a re-rupture after ACL reconstruction. Patients who suffered an ACL re-rupture had greater psychological readiness, that is, greater confidence in performance, lesser negative emotions, and lesser risk appraisal, to return to sport (RTS) at 8 months (81.2 vs 67.9 [95% Δ confidence interval {CI} 2.7-23.8] $P = .014$) and at 12 months (95.2 vs 67.1, (95% Δ CI 14.3-41.8) $P \leq .001$), and greater knee-related self-efficacy at 8 months (8.6 vs 8.0 [95% Δ CI 0.1-1.2], $P = .021$) and 12 months (9.4 vs 8.1, [95% Δ CI 0.3-2.2] $P = .012$) after primary ACL reconstruction, compared with the matched group.

Conclusions

A stronger psychological profile, defined by a greater psychological readiness to RTS and knee-related self-efficacy, may be associated with an ACL re-rupture within 2 years of the primary reconstruction.

Level of Evidence

Matched cohort study, level III.

A Comparison Between Polyurethane and Collagen Meniscal Scaffold for Partial Meniscal Defects: Similar Positive Clinical Results at a Mean of 10 Years of Follow-Up

Reale D., Lucidi G.A., et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.09.011>

Purpose

To compare, at long-term follow-up, the clinical outcomes and failures of collagen and polyurethane meniscal scaffolds for the treatment of partial meniscal defects.

Methods

Patients affected by partial meniscal defect with intact anterior and posterior meniscal attachments and an intact rim at the circumference of the missing meniscus were included, treated with a collagen meniscal implant or with polyurethane scaffold, and clinically evaluated by analysis of the subjective International Knee Documentation Committee score, the visual analog scale score for the evaluation of knee function and symptoms, and the Tegner score to assess the activity level.

Results

After 3 patients dropped out, a total of 47 patients, comprising 31 men and 16 women, with a mean age of 43 ± 14.1 years and mean body mass index of 25 ± 1.4 , were clinically evaluated up to a mean of 10 years' follow-up. The International Knee Documentation Committee score improved from 42.9 ± 15.9 to 67.4 ± 12.4 ($P < .0005$) in the polyurethane implant group and from 46.8 ± 16.7 to 62.1 ± 22.6 ($P < .0005$) in the collagen meniscal implant group. The visual analog scale score decreased significantly from baseline values of 5.4 ± 2.3 and 4.4 ± 1.7 , to 3.4 ± 2.5 and 2.7 ± 2.4 , respectively, at final follow-up in the polyurethane implant ($P = .002$) and collagen meniscal implant ($P < .0005$) groups. The Tegner score improved in both groups without reaching the preinjury activity level. No significant differences in the scores were found between the polyurethane and collagen scaffold groups. A total of 10 implants failed, 5 per group, for a cumulative failure rate of 21.3%, with no differences between the 2 scaffolds.

Conclusions

The long-term comparison showed positive and similar results for both polyurethane- and collagen-based meniscal scaffolds, with an implant survival rate of about 80% at 10 years of follow-up and no differences in terms of pain, function, and activity level.

Level of evidence

Level IV, case-control comparative study.

Tibial Tubercle–Trochlear Groove/Trochlear Width Is the Optimal Indicator for Diagnosing a Lateralized Tibial Tubercle in Recurrent Patellar Dislocation Requiring Surgical Stabilization

Su P., Hu H., et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.11.030>

Purpose

To identify the individualized method of quantifying lateralization of the tibial tubercle with the best diagnostic effectiveness, as evaluated by measurement repeatability using the intraclass correlation coefficient (ICC), the size of the difference between the case group and the control group, and receiver operating characteristic (ROC) curve analysis.

Methods

Patients who had undergone surgery for recurrent patellar dislocation (the case group) and patients who had no history of patellar dislocation (the control group) from January 2014 to December 2019 were included in the study. Six indices that describe lateralization of the tibial tubercle were calculated using either computed tomography (CT) or magnetic resonance imaging (MRI): tibial tubercle lateralization (TTL), tibial tubercle–trochlear groove (TT-TG) ratio, tibial tubercle-posterior cruciate ligament (TT-PCL) ratio, TT-TG index, (TT-TG)/patellar width (PW), and (TT-TG)/trochlear width (TW). Diagnostic effectiveness was evaluated by 1) intra-rater reliability (measurements on two occasions) and inter-rater reliability (measurements by two assessors) using the ICC, 2) the size of the difference between the case group and the control group, and 3) ROC curve analysis, measuring the area under the ROC curve (AUC) and the post hoc power.

Results

100 knees in 88 patients who had undergone surgery for recurrent patellar dislocation and 55 knees in 53 patients who had no history of patellar dislocation were analyzed. The ICC for all the methods were higher than .75. The mean differences between the case group and the control group for TTL, TT-TG ratio, TT-PCL ratio, TT-TG index, (TT-TG)/PW, and (TT-TG)/TW were 2%, 8%, 2%, 12%, 24% and 56%, respectively. The mean differences between the case group and the control group for (TT-TG)/TW was significantly greater than those for the other methods ($P < .0001$, unpaired t-test). AUC of TTL, TT-TG ratio, TT-PCL ratio, TT-TG index, (TT-TG)/PW, and (TT-TG)/TW were .708, .880, .630, .814, .882, and .905. AUC of (TT-TG)/TW was significantly greater than those of TTL and TT-PCL ratio ($P < .0001$). The post hoc power for TT-PCL ratio, TT-TG index, (TT-TG)/PW, TT-TG ratio, (TT-TG)/TW, and TTL were 78%, 81%, 88%, 88%, 91%, and 71%, respectively.

Conclusion

Of the six indices evaluated in this study, (TT-TG)/TW showed the greatest mean difference between the two groups, had the greatest diagnostic utility (as measured by AUC values) and had excellent inter-rater and intra-rater reliability (as measured by ICCs). Thus, it may be the best individualized index for diagnosing a lateralized tibial tubercle in patients with recurrent patellar dislocation requiring surgical stabilization compared to patients with no history of patellar dislocation.

Level of Evidence

Level III, diagnostic study, retrospective cohort study.

In-Office Needle Arthroscopy for the Treatment of Anterior Ankle Impingement Yields High Patient Satisfaction With High Rates of Return to Work and Sport

Colasanti C.A., Mercer N.P., et al.

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Purpose

To evaluate the clinical outcomes of in-office needle arthroscopy (IONA) for the treatment of anterior ankle impingement in the office setting and also evaluate patient experience of the IONA procedure.

Methods

A prospectively collected database of 31 patients undergoing IONA for the treatment of anterior ankle impingement between January 2019 and January 2021 was retrospectively reviewed. Inclusion criteria for this study were patients ≥ 18 years of age, clinical history, physical examination, radiographic imaging, and magnetic resonance imaging findings consistent with anterior ankle impingement for which each patient underwent IONA and had a minimum of 12-month follow-up. Clinical outcomes were evaluated using the following methods preoperatively and at final follow-up: the Foot and Ankle Outcome Scores (FAOS) and Patient-Reported Outcomes Measurement Information System (PROMIS) Pain Interference and Pain Intensity domains. A 5-point Likert scale regarding patient satisfaction with their IONA procedure was evaluated at final follow-up. Wilcoxon signed-rank test was performed to compare preoperative and postoperative outcome scores.

Results

In total, 31 patients were included in this study, including 18 male and 13 female, with a mean age of 41.7 ± 15.5 years (range, 17-69 years) and mean body mass index of 27.3 ± 5.7 (range, 19.37-41.5). The mean follow-up time was 15.5 ± 4.9 months. The mean postoperative FAOS-reported symptoms, pain, daily activities, sports activities, and quality of life were 79.4 ± 11.9 , 82.9 ± 15.3 , 83.5 ± 15.4 , 71.9 ± 18.5 and 64.3 ± 21.4 at final follow-up respectively. Minimal clinically important difference was achieved by 84% of patients for FAOS pain, 77% for FAOS symptoms, 75% for FAOS Quality of Life, 74% for FAOS sports, 65% for PROMIS Pain Interference, 61% for FAOS Activities of Daily Living, and 42% for PROMIS Pain Intensity. Lastly, 29 patients (94 %) expressed willingness to undergo the same procedure again.

Conclusions

The current study demonstrates that IONA treatment of anterior ankle impingement results in significant pain reduction, a low complication rate and excellent patient reported outcomes with high rates of return to work/sport. Additionally, IONA for anterior ankle impingement leads to high patient satisfaction with a significant willingness to undergo the same procedure again.

Level of Evidence

IV, Case series study.

Most Analgesia Treatments Have No Clinical Significance for Anterior Cruciate Ligament Reconstruction: A Network Meta-analysis of 66 Randomized Controlled Trials

Su P., Zhang L., et al.

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Purpose

To assess the relative efficacy of several clinical treatments for postoperative analgesia of anterior cruciate ligament reconstruction through network meta-analysis based on multiple published randomized controlled trials.

Methods

We searched PubMed, the Cochrane library, EMBASE, and Web of Science, each from inception until February 15, 2021. Outcomes including pain scores at rest (visual analog scale, numerical rating scales, and other scales, which were converted to a standardized 0-10 scale), morphine consumption, and complications were meta-analyzed. Quality of the included studies was assessed using the Cochrane risk-of-bias tool. The authors defined the best choice for postoperative analgesia as the one that had significant difference in pain scores, morphine consumption, and had no significant difference in the risk of complications compared with placebo in the initial 48 postoperative hours.

Results

In total, 66 studies with 4,168 patients were included in this network meta-analysis. Only periarticular infiltration was significantly superior to placebo in pain scores and morphine consumption (pain at 2 hours: mean difference [MD] -0.74 , 95% confidence interval [CI] -1.36 to -0.12 ; pain at 6 hours: MD -0.81 , 95% CI -1.42 to -0.21 ; pain at 12 hours: MD -0.85 , 95% CI -1.53 to -0.17 ; pain at 24 hours: MD -0.80 , 95% CI -1.19 to -0.40 ; morphine consumption at 24 hours: MD -10.12 , 95% CI -14.31 to -5.93 ; morphine consumption at 48 hours: MD -5.62 , 95% CI -6.74 to -4.51). Periarticular infiltration did not increase the risk of complications compared with placebo (nausea and vomiting: odds ratio [OR] 0.63 , 95% CI 0.34 - 1.16 ; pruritus: OR 0.74 , 95% CI 0.35 - 1.58 ; urinary retention: OR 0.55 , 95% CI 0.25 - 1.23). In addition, There was no significant difference between adductor canal block and femoral nerve block in pain scores and morphine consumption (pain at 2 hours: MD -0.01 , 95% CI -1.44 to 1.42 ; pain at 6 hours: MD 0.29 , 95% CI -0.28 to 0.86 ; pain at 12 hours: MD 0.36 , 95% CI -0.44 to 1.16 ; pain at 24 hours: MD 0.26 , 95% CI -0.22 to 0.75 ; pain at 48 hours: MD -0.36 , 95% CI -0.97 to 0.24 ; morphine at 24 hours: MD 1.04 , 95% CI -4.70 to 6.79 ; morphine at 48 hours: MD -0.32 , 95% CI -0.70 to 0.07 ; postoperative nausea and vomiting: OR 1.07 , 95% CI 0.55 - 2.09 ; pruritus: OR 1.36 , 95% CI 0.66 - 2.79 ; urinary retention: OR 1.41 , 95% CI 0.37 - 5.29).

Conclusions

Based on current evidence, most analgesic methods could result in lower pain scores and decrease morphine consumption when compared with placebo; however, differences between methods were small and inconsistent. There seemed to be no significant difference between adductor canal block and femoral nerve block in pain score, morphine consumption and complications.

Level of Evidence

Level I, meta-analysis of Level I RCTs.

Segmental and Circumferential Acetabular Labral Reconstruction Have Comparable Outcomes in the Treatment of Irreparable or Unsalvageable Labral Pathology: A Systematic Review

Orner C.A., Patel U.J., et al.

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Purpose

To perform a systematic review comparing outcomes of segmental versus circumferential arthroscopic labral reconstruction as a treatment for symptomatic irreparable or unsalvageable acetabular labral pathology.

Methods

A systematic review was conducted according to PRISMA guidelines using defined inclusion and exclusion criteria. The study groups were divided into segmental and circumferential labral reconstructions. Studies with <2 years follow up, overlapping patient populations, or indications for labral reconstruction other than irreparable or unsalvageable pathology were excluded.

Results

The literature search resulted in nine included publications. Five studies presented data on segmental labral reconstruction (166 hips in 164 patients), and seven studies presented data on circumferential labral reconstruction (261 hips in 253 patients). All circumferential reconstruction studies used allograft only, while segmental studies used a combination of autograft and allograft. The range of conversion to total hip arthroplasty was 9.1% to 26.8% in the segmental studies and 3.1% to 9.9% in the circumferential studies. The modified Harris Hip Score (mHHS) was the only patient-reported outcome measure reported in three or more studies in both groups. The mean change from preoperative to postoperative mHHS ranged from 17.8 to 29 in the segmental group and from 20.4 to 31.7 in the circumferential group. Weighted estimates were not calculated due to significant heterogeneity for both the segmental and circumferential groups ($I^2 = 63.9%$ and $72.9%$, respectively).

Conclusions

Segmental and circumferential reconstructions are both reasonable options for arthroscopic treatment of irreparable or unsalvageable labral pathology. Articles in both groups demonstrated improvement in patient-reported outcomes (mHHS). Because of study heterogeneity, low level of evidence, and high risk of bias, the scores were unable to be directly compared. Although there are theoretical biomechanical and technical advantages of one technique over another, this systematic review did not demonstrate clinical superiority of either technique.

Level of Evidence

Level IV, systematic review of level III and IV studies.

Return to Sports Following Meniscal Allograft Transplantation Is Possible but Remains Questionable: A Systematic Review

Ahmed A.F., Rinaldi J., et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.11.003>

Objective

To evaluate the return to sports rate and time following meniscal allograft transplantation (MAT).

Methods

PubMed, Web of Science, and Embase were searched in December 2020. Eligibility criteria included clinical studies reporting the return to sport rate following MAT with ≥12-month follow-up.

Results

A total of 14 case series were included with 670 patients. The bone bridge technique was used for all transplantations in 5 studies, and suture fixations with bone tunnels were used for all transplantations in 5 studies. In 2 studies, bone plugs were used for medial menisci and bone bridge for lateral menisci. In 1 study, suture fixation was used for medial menisci, and bone bridge for lateral menisci. The return to sports rate ranged from 20% to 91.7%, with 2 studies reporting low return to sport rates. The return to sport time ranged between 7.6 and 16.9 months. The return to preinjury level had a rate of 7% to 100%. Return to a higher level of sports was reported in only 2 studies (28.5% to 86%). Return to a lower level of sports was reported in low proportions in most studies. In terms of patient-reported outcomes, the Lysholm knee and subjective International Knee Documentation Committee (IKDC) scores and Knee Osteoarthritis Outcome Score (KOOS) had significant improvements after MAT. The KOOS quality of life subscore did not change significantly in 1 study. The total reoperation rate after MAT ranged between 3.1% and 80%, whereas the total failure ranged between 1.1% and 30.1%.

Conclusion

Despite that most studies reporting high return to sports rates, the current level of evidence is low, with all studies being case series. There is significant variability in the reported return to sports rate, time, and level. Therefore, high-quality comparative studies are mandated to elucidate whether MAT is associated with higher return to sports rates and levels.

Level of Evidence

IV, systematic review.

Tranexamic Acid Administration in Arthroscopic Surgery Is a Safe Adjunct to Decrease Postoperative Pain and Swelling: A Systematic Review and Meta-analysis

Goldstein K., Jones C., et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.10.001>

Purpose

To systematically screen the literature in an effort to critically examine the effect of tranexamic acid (TXA) in patients undergoing arthroscopic surgery, specifically pertaining to pain, blood loss, length of surgery, and both major and minor complications.

Methods

In accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and Revised Assessment of Multiple Systematic Reviews (R-AMSTAR) guidelines, 3 databases (MEDLINE, EMBASE, and Cochrane) were searched April 2020 and screened in duplicate using inclusion and exclusion criteria for studies on the given subject. Study findings were reviewed, and meta-analysis was then performed on sufficiently congruent data using a random-effects model.

Results

There were 7 eligible randomized controlled trials, with 724 total patients, undergoing anterior cruciate ligament reconstruction (4 studies, 537 patients), meniscectomy (1 study, 45 patients), femoroacetabular impingement (1 study, 70 patients), or rotator cuff repair (1 study, 72 patients). The mean age throughout the included studies was 33.9 years, with a mean of 27.7% female patients. There was a 1% drop out rate at 3 months postoperatively. There were significantly lower visual analog scale scores at 2 weeks postoperatively in the TXA groups (mean difference: -1.65 , 95% confidence interval [CI] -3.41 to 0.10 , $P = .06$, $I^2 = 97\%$). Furthermore, there was a significant decrease in the number of patients requiring joint aspiration in the TXA groups (risk ratio 0.27 , 95% CI 0.12 - 0.56 , $I^2 = 0\%$, $P = .0006$). The drainage output in TXA groups was also significantly decreased (mean difference: -61.14 mL, 95% CI -104.43 to -17.85 , $I^2 = 94\%$, $P = .006$). Furthermore, there was a statistically significant decrease in hemarthrosis grade (Coupens & Yates) at 2 weeks postoperatively (Mean difference: -0.76 , 95% CI -0.97 to -0.54 , $I^2 = 0\%$, $P < .0001$). Finally, there was no significant difference in operating time, across all studies (Mean difference: 0.53 , 95% CI -3.43 to 4.50 , $I^2 = 57\%$, $P < .79$). The use of TXA showed no increased incidence of deep vein thrombosis, infection, arthrofibrosis, or other major complications or adverse reactions between the TXA and control groups.

Conclusions

This systematic review and meta-analysis of randomized controlled trials found that the use of TXA significantly improves pain scores up to 6 weeks postoperatively, decreases drainage output, decreases the need for joint aspirations, decreases incidence of hemarthrosis, increases visual clarity and technical ease, and has no increased incidence of other complications, at no loss to operative time. These findings indicate that TXA may be a useful adjunct in arthroscopic knee and shoulder surgery.

Level of Evidence

II.

Lower Extremity

Knee Surgery, Sports Traumatology, Arthroscopy, April 2021, volume 30, issue 4, pages: 1180 - 1186

Translation, cross-cultural adaptation and validation of the Italian version of the anterior cruciate ligament-return to sport after injury (ACL-RSI) scale

Tortoli, E., Francini, L. et al.

DOI: <https://doi.org/10.1007/s00167-020-06169-0>

Purpose

To translate and culturally adapt the anterior cruciate ligament-return to sport after injury (ACL-RSI) scale into Italian (ACL-RSI(IT)) and examine and evaluate the psychometric properties of the Italian version in individuals who have undergone anterior cruciate ligament (ACL) reconstruction.

Methods

The ACL-RSI was forward and back translated, culturally adapted and validated one hundred and twenty nine Italian individuals who had undergone ACL reconstruction (94 males, 35 females; age 28 ± 9 years). All patients completed the translated ACL-RSI, Knee injury and Osteoarthritis Outcome Score (KOOS), International Knee Documentation Committee subjective knee form (IKDC), Tampa Scale of Kinesiophobia (TSK) and the 12-item short form health survey (SF-12). We then analysed the internal consistency, reliability and validity of the newly formed ACLRSI (IT).

Results

The ACL-RSI(IT) showed excellent internal consistency (Cronbach's alpha 0.94) and was significantly correlated with the KOOS 'quality of life' ($r = 0.61$, $p < 0.00001$), 'symptoms' ($r = 0.34$, $p < 0.00001$), 'pain' ($r = 0.44$, $p < 0.00001$), and 'sports' ($r = 0.40$, $p < 0.00001$) subscales. The ACL-RSI(IT) also correlated significantly with the IKDC ($r = 0.34$, $p < 0.001$), TSK ($r = -0.48$, $p < 0.00001$) and SF-12 ($r = -0.40$, $p < 0.0001$) scores.

Conclusion

The Italian version of the ACL-RSI scale was valid, discriminant, consistent and reliable in patients who had undergone ACL reconstruction. This score could be useful to evaluate the effect of psychological factors on return to sport following ACL surgery.

Level of evidence

II.

Preexisting and treated concomitant ankle instability does not compromise patient-reported outcomes of solitary osteochondral lesions of the talus treated with matrix-induced bone marrow stimulation in the first postoperative year: data from the German Cartilage Registry (KnorpelRegister DGOU)

Ahrend, M.D., Aurich, M. et al.

DOI: <https://doi.org/10.1007/s00167-020-06172-5>

Purpose

The purpose of this study was to compare the subjective ankle function within the first year following matrix-induced bone marrow stimulation (M-BMS) of patients with a solitary osteochondral lesion of the talus (OCLT) with and without concomitant chronic ankle instability (CAI).

Methods

Data from the German Cartilage Registry (KnorpelRegister DGOU) for 78 patients with a solitary OCLT and a follow-up of at least 6 months were included. All patients received M-BMS for OCLT treatment. The cohort was subdivided into patients with OCLT without CAI treated with M-BMS alone (n=40) and patients with OCLT and CAI treated with M-BMS and additional ankle stabilisation (n=38). The Foot and Ankle Ability Measure (FAAM), the Foot and Ankle Outcome Score (FAOS), and the Numeric Rating Scale for Pain (NRS) were used to assess patient-reported outcomes (median (minimum–maximum)).

Results

From preoperatively to 12 months postoperatively, patients with OCLT without CAI treated with M-BMS alone had a significant improvement of all subscales in the FAAM [activity of daily living 64.3 (10–100) to 88.1 (39–100); sports 34.4 (0–100) to 65.6 (13–94), functional activities of daily life 50 (0–90) to 80 (30–100), functional sports 30 (0–100) to 70 (5–100)] and FAOS [pain 61.1 (8–94) to 86.1 (50–100), symptoms 60.7 (18–96) to 76.8 (29–100), activities of daily living 72.1 (24–100) to 91.9 (68–100), sport/recreational activities 30.0 (0–70) to 62.5 (0–95), quality of life 31.3 (6–50) to 46.9 (19–100)]. Within the first year, patients with OCLT and CAI treated with M-BMS and ankle stabilisation also showed significant improvement in the FAAM [activity of daily living 68.8 (5–99) to 90.5 (45–100); sports 32.8 (0–87.5) to 64.1 (0–94), functional activities of daily life 62.5 (25–100) to 80 (60–90), functional sports 30 (0–100) to 67.5 (0.95)] and the FAOS [pain 66.7 (28–92) to 87.5 (47–100), symptoms 57.1 (29–96) to 78.6 (50–100), activities of daily living 80.1 (25–100) to 98.5 (59–100), sport/recreational activities 35.0 (0–100) to 70.0 (0–100), quality of life 25.0 (0–75) to 50.0 (19–94)]. The pain level decreased significantly in both groups. No significant difference was found between both groups regarding the subscales of FAAM, FAOS and the NRS 1 year postoperatively.

Conclusion

Improvements in subjective ankle function, daily life activities and sports activities were observed within the first year following M-BMS. Our results suggest that preexisting and treated ankle instability did not compromise subjective outcome in patients treated with M-BMS in the first postoperative year.

Level of evidence

Level IV.

Similar outcomes and satisfaction after transtibial versus transportal femoral drilling for anterior cruciate ligament reconstruction in young adult recreational athletes

Ruiz-Lozano, M., Miralles-Muñoz, F.A. et al

DOI: <https://doi.org/10.1007/s00167-020-06393-8>

Purpose

Controversy continues regarding whether the transtibial (TT) and transportal (TP) methods for anterior cruciate ligament (ACL) reconstruction provide similar or different outcomes, and the evidence on patient satisfaction is very limited. The objective of this study was to compare functional outcomes and patient satisfaction in young adult recreational athletes who underwent arthroscopic hamstring ACL reconstruction using either the TT or the TP femoral tunnel drilling method.

Methods

A nonrandomized prospective study was designed to compare the outcomes of arthroscopic hamstring ACL reconstruction using TT or TP method. Functional outcome was assessed with the Lysholm score, and patient satisfaction with a 5-point Likert scale. Knee stability was measured with the KT-1000 arthrometer.

Results

42 patients in the TT group and 41 in TP group, with age ranged 18–40 years, were compared with a mean follow-up of 42 (range 24–60) months. There were no significant differences between groups in the Lysholm score (n.s.), sport return rate (n.s.) or patient satisfaction with the surgery (n.s.). Satisfaction was only significantly associated with the Lysholm score (OR 1.3; IC 95% 1.06–1.6; $p = 0.012$), but not with the return to sports (n.s.) or knee anterior laxity (n.s.).

Conclusion

This study showed no statistical differences between the TT and the TP method in functional outcomes or patient satisfaction in young adult recreational athletes. In those patients, satisfaction with the surgery was not influenced by the return to sport activities. This study can guide surgeons in the decision-making for ACL reconstruction in recreational athletes.

Level of evidence

Level II.

Knee strength deficits following anterior cruciate ligament reconstruction differ between quadriceps and hamstring tendon autografts

Johnston, P.T., Feller, J.A. et al.

DOI: <https://doi.org/10.1007/s00167-021-06565-0>

Purpose

To compare patient reported outcomes and functional knee recovery following anterior cruciate ligament (ACL) reconstruction using either a quadriceps tendon (QT) or hamstring tendon (HT) autograft.

Methods

Thirty-five QT patients (age 20; range 15–34 years) participated in this study and were matched for gender, age and pre-injury activity level to 70 HT (age 20; range 15–32 years) patients. The following assessments were performed at 6 and 12 months post-operatively; standardized patient-reported outcome measures (IKDC, KOOS-QOL, ACL-RSI, Marx activity, anterior knee pain), knee range of motion (passive and active), anterior knee laxity, hop tests (single and triple crossover hop for distance), and isokinetic strength of the knee extensors and flexors. All dependent variables were analysed using a two-way mixed ANOVA model, with within (Time; 6 and 12 months) and between-subject (Graft; QT and HT) factors.

Results

Patient reported outcome measures and hop performance improved between 6 and 12 months ($p < 0.001$), however no significant differences in either patient-reported outcomes or hop performance were found between the two grafts. Isokinetic strength testing showed both groups improved their peak knee extensor strength in the operated limb between 6 and 12 months ($p < 0.001$), but the QT group had significantly lower knee extensor strength symmetry at both time points compared to HT at 60 deg/s ($p < 0.001$) and 180 deg/s ($p < 0.01$). In contrast, the QT group had significantly greater knee flexor strength symmetry at both time points compared to HT at 60 deg/s ($p < 0.01$) and 180 deg/s ($p = 0.01$), but knee flexor strength limb symmetry did not significantly improve over time in either group.

Conclusion

Recovery of knee function following either QT or HT ACL reconstruction continues between 6 and 12 months after surgery. However, knee extensor strength deficits in the QT group and knee flexor strength deficits in the HT persisted at 12 months. This may have implications for decisions regarding return to sport.

Level of evidence

III.

Posterior knee arthroscopy facilitates the safe and effective all-inside repair of locked bucket-handle medial meniscal tear using a suture hook technique

Keyhani, S., Soleymanha, M. et al.

DOI: <https://doi.org/10.1007/s00167-021-06576-x>

Purpose

This study reported the outcomes of locked bucket-handle medial meniscal tear (BHMMT) repairs using an arthroscopic posterior approach during anterior cruciate ligament (ACL) reconstruction.

Methods

Between 2011 and 2014, 48 patients with BHMMTs and ACL tears who met the eligibility criteria were enrolled in the present study. BHMMTs were assessed using a posterolateral transseptal portal and repaired using a posteromedial portal. Transportal ACL reconstruction was performed using hamstrings autograft. Patients were assessed based on their IKDC and Lysholm scores and Tegner activity level. Meniscal healing was clinically evaluated based on the absence of swelling, joint line tenderness, locking, and catching; McMurray test results; and the need for meniscectomy.

Results

According to follow-up assessments, the average IKDC and Lysholm scores improved significantly after 3–5 years ($P < 0.001$)

Conclusion

Excellent clinical outcomes were obtained when locked BHMMTs were repaired using an all-inside suture technique that employed posteromedial and posterolateral transseptal portals.

Level of evidence

IV.

Treatment of post-meniscectomy knee symptoms with medial meniscus replacement results in greater pain reduction and functional improvement than non-surgical care

Zaslav, K.R., Farr, J. et al.

DOI: <https://doi.org/10.1007/s00167-021-06573-0>

Purpose

Partial meniscectomy is a common orthopedic procedure intended to improve knee pain and function in patients with irreparable meniscal tears. However, 6–25% of partial meniscectomy patients experience persistent knee pain after surgery. In this randomized controlled trial (RCT) involving subjects with knee pain following partial meniscectomy, it was hypothesized that treatment with a synthetic medial meniscus replacement (MMR) implant provides significantly greater improvements in knee pain and function compared to non-surgical care alone.

Methods

In this prospective, multicenter RCT, subjects with persistent knee pain following one or more previous partial meniscectomies were randomized to receive either MMR or non-surgical care. This analysis evaluated the 1-year outcomes of this 2-year clinical trial. Patient-reported knee pain, function, and quality of life were measured using nine separate patient-reported outcomes. The primary outcomes were the pain subscale of the Knee injury and Osteoarthritis Outcome Score (KOOS) and the average of all five KOOS subscales (KOOS Overall). Treatment cessation was defined as permanent device removal in the MMR group and any surgical procedure to the index knee in the non-surgical care group.

Results

Treated subjects had a median age of 52 years old (range 30–69 years) and one or more previous partial meniscectomies at a median of 34 months (range 5–430 months) before trial entry. Among 127 subjects treated with either MMR (n=61) or non-surgical care (n=66), 11 withdrew from the trial or were lost to follow-up (MMR, n=0; non-surgical care, n=11). The magnitude of improvement from baseline to 1 year was significantly greater in subjects who received MMR in both primary outcomes of KOOS Pain (P=0.013) and KOOS Overall (P=0.027). Treatment cessation was reported in 14.5% of non-surgical care subjects and only 4.9% of MMR subjects (n.s.).

Conclusion

Treatment with the synthetic MMR implant resulted in significantly greater improvements in knee pain, function, and quality of life at 1 year of follow-up compared to treatment with non-surgical care alone.

Level of evidence

I.

Psychological, physical and social factors influence decision to return to sport after revision ACL reconstruction with BPTB graft

Kiran, M., Javed, O. et al.

DOI: <https://doi.org/10.1007/s00167-021-06582-z>

Purpose

There is limited evidence in literature regarding the patient-reported factors that influence their return to sport (RTS) in revision anterior cruciate ligament reconstruction (ACLR). The medium-term results of a prospective consecutive cohort of patients undergoing single- and two-stage revision ACLR with bone patellar tendon bone graft (BPTB) and patient-reported factors that influence their decision to return to sport are presented in this study.

Methods

Seventy-two patients were included in this prospective study. Single- or two-stage revision with BPTB graft was performed based on pre-operative planning. Iliac crest bone graft was used. Pre-operative and follow-up Lysholm and Tegner activity scores and RTS, level of sport and patient-reported factors affecting RTS were recorded. The mean follow-up was 9 years (SD 2.7 years).

Results

Single-stage revision ACLR was performed in 61 patients. In 11 patients (15%), revision ACLR was performed in two stages. There was a significant improvement in Lysholm score from mean 51.1 to 86.7 ($p < 0.001$). The incidence of re-rupture in this cohort was 0%. The median Tegner score was 6 (range 2–9). Twenty-five patients (34.7%) did not return to any sport at final follow-up. Twenty-nine (40.2%) patients returned to their pre-injury level of sport. Fear of reinjury (79%, $p < 0.001$) and persistent knee symptoms (35.8%, $p = 0.03$) were the most common factors limiting RTS in non-returners.

Conclusion

Psychological and social factors may have an influence on RTS in addition to physical factors.

Level of evidence

Level III

High variability and lack of standardization in the evaluation of return to sport after ACL reconstruction: a systematic review

Marom, N., Xiang, W. et al.

DOI: <https://doi.org/10.1007/s00167-021-06594-9>

Purpose

Return to sport (RTS) after ACL reconstruction (ACLR) has been recognized as an important outcome, which is associated with success of the surgery. This study aimed to assess the methods used to determine return to sport after ACLR in the published literature, report on variability of methods and evaluate their strength in establishing accurate RTS data.

Methods

Electronic databases (PubMed, Cochrane Library and Embase) were searched via a defined search strategy with no limits, to identify relevant studies from January 2008 to December 2020 for inclusion in the review. Defined eligibility criteria included studies specifically measuring and reporting on return to sport after ACLR with a clear methodology. Each included study was assessed for the definition of successful RTS, successful return to pre-injury level of sport and for methods used to determine RTS.

Results

One hundred and seventy-one studies were included. Of the included studies, six studies (4%) were level of evidence 1 and seventy-two studies (42%) were level of evidence 4. Forty-one studies (24%) reported on return to a specific sport and 130 studies (76%) reported on return to multiple sports or general sport. Sixteen studies (9%) reported on RTS in the pediatric population, 36 (21%) in the adult population and 119 (70%) reported on a mixed-aged population. The most commonly used definition of successful RTS was return to the same sport (44 of 125 studies, 35%). The most common method used to determine RTS was a non-validated study-specific questionnaire (73 studies, 43%), which was administered in various ways to the patients. Time of RTS assessment was variable and ranged between 6 months and 27 years post-surgery.

Conclusion

This review demonstrates high variability in defining, evaluating and reporting RTS following ACLR. The findings of this study reveal low reliability and unproven validity of methods used to evaluate RTS and highlight the challenges in interpreting and using RTS data reported in literature.

Level of evidence

IV.

Non-anatomic tunnel position increases the risk of revision anterior cruciate ligament reconstruction

Byrne, K.J., Hughes, J.D. et al.

DOI: <https://doi.org/10.1007/s00167-021-06607-7>

Purpose

Anterior cruciate ligament (ACL) graft failure is a complication that may require revision ACL reconstruction (ACL-R). Non-anatomic placement of the femoral tunnel is thought to be a frequent cause of graft failure; however, there is a lack of evidence to support this belief. The purpose of this study was to determine if non-anatomic femoral tunnel placement is associated with increased risk of revision ACL-R.

Methods

After screening all 315 consecutive patients who underwent primary single-bundle ACL-R by a single senior orthopedic surgeon between January 2012 and January 2017, 58 patients were found to have both strict lateral radiographs and a minimum of 24 months follow-up without revision. From a group of 456 consecutive revision ACL-R, patients were screened for strictly lateral radiographs and 59 patients were included in the revision group. Femoral tunnel placement for each patient was determined using a strict lateral radiograph taken after the primary ACL-R using the quadrant method. The center of the femoral tunnel was measured in both the posterior–anterior (PA) and proximal–distal (PD) dimensions and represented as a percentage of the total distance (normal center of anatomic footprint: PA 25% and PD 29%).

Results

In the PA dimension, the revision group had significantly more anterior femoral tunnel placement compared with the primary group ($38\% \pm 11\%$ vs. $28\% \pm 6\%$, $p < 0.01$). Among patients who underwent revision; those with non-traumatic chronic failure had statistically significant more anterior femoral tunnel placement than those who experienced traumatic failure ($41\% \pm 13\%$ vs. $35\% \pm 8\%$, $p < 0.03$). In the PD dimension, the revision group had significantly more proximal femoral tunnel placement compared with the primary group ($30\% \pm 9\%$ vs $38\% \pm 9\%$, $p < 0.01$).

Conclusion

In this retrospective study of 58 patients with successful primary ACL-R compared with 59 patients with failed ACL-R, anterior and proximal (high) femoral tunnels for ACL-R were shown to be independent risk factors for ACL revision surgery. As revision ACL-R is associated with patient- and economic burden, particular attention should be given to achieving an individualized, anatomic primary ACL-R. Surgeons may reduce the risk of revision ACL-R by placing the center of the femoral tunnel within the anatomic ACL footprint.

Level of evidence

Level III.

Anatomical rectangular tunnel anterior cruciate ligament reconstruction provides excellent clinical outcomes

Matsuo, T., Kusano, M. et al.

DOI: <https://doi.org/10.1007/s00167-021-06609-5>

Purpose

The purpose of this study was to prospectively evaluate the clinical outcomes following anatomical rectangular tunnel anterior cruciate ligament (ACL) reconstruction with a bone–patellar tendon–bone (BTB) graft using an adjustable-length femoral cortical fixation device with enough patients and a high follow-up rate.

Methods

This study included 125 patients who underwent anatomical rectangular tunnel ACL

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reconstruction with a BTB graft. A BTB TightRope® was used for femoral graft fixation. Clinical evaluations were performed more than 2 years after surgery using the International Knee Documentation Committee (IKDC) Form. Patients interviewed by telephone were only subjectively evaluated. The side-to-side difference in anterior laxity at a manual maximum force was measured using the KT-2000 Arthrometer®.

Results

Among the 125 patients, 99 were ultimately included and 26 were lost to follow-up (follow-up rate: 79%). Eight patients had re-tear (re-tear rate: 8%) and six patients had ACL injuries to the contralateral knee. Three patients did not follow our rehabilitation programme. One patient suffered septic arthritis. These 18 patients were considered ineligible for clinical evaluations. Therefore, clinical evaluations were performed in 81 of the 99 patients (64 were available for direct follow-up and 17 were available for a telephone interview). The follow-up period was 30 ± 10 months (range 24–68 months). According to the IKDC subjective assessment, 48 (59%) and 33 (41%) knees were graded as normal and nearly normal, respectively. A loss of extension (3° – 5°) was observed in five patients (8%), whereas one patient (2%) exhibited a loss of flexion (3° – 5°). The Lachman test was negative in 63 patients (98%). The pivot shift test was negative in 59 patients (92%). The side-to-side difference in KT value was 0.4 ± 0.7 mm (range –1–4 mm).

Conclusion

Anatomical rectangular tunnel ACL reconstruction with a BTB graft using an adjustable-length femoral cortical fixation device provided excellent clinical outcomes both subjectively and objectively more than 2 years after surgery, whereas 8 of the 99 patients had re-tear of the graft. The adjustable-length femoral cortical fixation device could be safely used in anatomical rectangular tunnel ACL reconstruction with a BTB graft.

Level of evidence

III

Increased tibial tubercle-trochlear groove and patellar height indicate a higher risk of recurrent patellar dislocation following medial reefing

Ahrend, M., Eisenmann, T. et al.

DOI: <https://doi.org/10.1007/s00167-021-06581-0>

Purpose

Identifying anatomical risk factors on recurrent dislocation after medial reefing is important for deciding surgical treatment. The present study aimed to retrospectively analyze the preoperative magnetic resonance imaging (MRI)-based parameters of patients treated with medial reefing and whether these parameters lead to a higher risk of recurrent dislocation.

Methods

Fifty-five patients (18.6 ± 6.6 years) who underwent medial reefing after primary traumatic patellar dislocation (84% with medial patellofemoral ligament [MPFL] rupture) were included. Patients were followed up for at least 24 months postoperatively (3.8 ± 1.2 years) to assess the incidence of recurrent patellar dislocation. In patients without recurrent dislocation, the Kujala and subjective IKDC scores were assessed. Moreover, the tibial tubercle-trochlear groove (TT-TG), sulcus angle, patellar tilt, patellar shift, and lateral trochlea index (LTI) were measured. The patellar height was measured using the Caton-Dechamps (CDI), Blackburne-Peel (BPI), and Insall-Salvati index (ISI). The cohort was subclassified into two groups with and without recurrent dislocation. Differences between groups were analyzed with respect to the MRI parameters.

Results

Forty percent had a pathological sulcus angle of $> 145^\circ$, 7.2% had an LTI of $< 11^\circ$, 47.3% had a patellar tilt of $> 20^\circ$, and 36.4% had a TT-TG of ≥ 16 mm. Increased patellar height was observed in 34.5, 65.5, and 34.5% of the patients as per CDI, BPI, and ISI, respectively. Nineteen (34.5%) patients suffered from recurrent dislocation. Compared with patients without recurrent dislocation, those with recurrent dislocation had a significantly lower LTI ($p = 0.0467$). All other parameters were not significantly different between the groups. Risk factor analysis showed higher odds ratios ($OR > 2$), although not statistically significant, for MPFL rupture ($OR 2.05$ [95% confidence interval 0.38–11.03], LTI (6.6 [0.6–68.1]), TT-TG (2.9 [0.9–9.2]), and patellar height according to ISI (2.3 [0.7–7.5]) and CDI (2.3 [0.7–7.5])). Patients without recurrent dislocation had a Kujala score of 93.7 ± 12.1 (42–100) points and an IKDC score of 90.6 ± 11.7 (55.2–100) points.

Conclusion

Anatomical, MRI-based parameters should be considered before indicating medial reefing. A ruptured MPFL, an LTI $< 11^\circ$, a TT-TG ≥ 16 mm, a patellar tilt $> 20^\circ$, and an increased patellar height according to ISI and CDI were found to be associated, although not significantly, with a higher risk ($OR > 2$) of recurrent patellar dislocation after medial reefing. Thorough preoperative analysis is crucial to reduce the risk of recurrent dislocation in young patient cohorts.

Level of evidence

Level IV

The treatment of posterolateral knee instability with combined arthroscopic popliteus bypass and PCL reconstruction provides good-to-excellent clinical results in the mid-term follow-up

Drenck, T.C., Frings, J. et al.

DOI: <https://doi.org/10.1007/s00167-021-06590-z>

Purpose

The purpose of this study was to evaluate the clinical outcomes of patients who were treated with an arthroscopic popliteus bypass (PB) technique, in cases of a posterolateral rotational instability (PLRI) and a concomitant posterior cruciate ligament (PCL) injury of the knee.

Methods

This was a retrospective case series in which 23 patients were clinically evaluated after a minimum of 2 years following arthroscopic PB and combined PCL reconstruction. Lysholm, Tegner and Knee Injury and Osteoarthritis Outcome scores as well as visual analog scales (VAS) for joint function and pain were evaluated. Posterior laxity was objectified with stress radiography and a Rolimeter examination. Rotational instability was graded with the dial test.

Results

23 patients were available for follow-up, 46.0 ± 13.6 months after surgery. The median time interval from the initial injury to the surgery was 6.0 (3.5;10.5) months. The postoperative Lysholm Score was 95.0 (49–100); the Tegner Score changed from 6.0 (3–10) before the injury to 5.0 (0–10) at the follow-up examination ($p = 0.013$). The side-to-side difference on stress radiography (SSD) of posterior translation changed from 10.4 (6.6–14.8) mm before the injury to 4.0 (0.2–5.7) mm postoperatively ($p < 0.01$). Rotational instability was reduced to grade A (82.6%) or B (17.4%) (IKDC). The Rolimeter SSD was 2.0 (0–3) mm at the follow-up examination. VAS Function 0 (0–5), VAS pain 0 (0–6).

Conclusions

The arthroscopic PB graft technique provided good-to-excellent clinical results in the mid-term follow-up in patients with type A PLRI and concomitant PCL injury. However, an exact differentiation of lateral, rotational and dorsal instabilities of posterolateral corner (PLC) injuries is crucial, for the correct choice of therapy, as cases with lateral instabilities require more complex reconstruction techniques. Arthroscopic posterolateral corner reconstruction is a safe procedure with a high success rate in the mid-term follow-up.

Level of evidence

IV.

Meniscectomy is still a frequent orthopedic procedure: a pending need for education on the meniscus treatment possibilities

Bąkowski, P., Bąkowska-Żywicka, K. et al.

DOI: <https://doi.org/10.1007/s00167-021-06612-w>

Purpose

The purpose of this study was to evaluate the current status of education of polish surgeons in the subject of meniscus repair possibilities. The analysis of the possible correlations between the number of knee arthroscopy procedures performed by polish surgeons and their decision whether to remove or to repair the damaged meniscus has been performed.

Methods

Two-hundred and five registered orthopedic surgeons took part in surveys. The questionnaire contained the description of 20 patients with different types of meniscus damage and three questions concerning the experience in knee arthroscopy (two questions) and a choice of the treatment method (one question). Comparisons were made between knee arthroscopy experts (> 100 arthroscopies performed per year) and non-experts (\leq 100 cases).

Results

The questionnaire was completed by 194 knee surgeons from Poland with different levels in knee arthroscopy experience. For most cases, experts and non-experts agreed on the meniscus treatment method. Statistically significant differences in the recommended treatment between experts and non-experts were observed in 4 cases, where experts decided to repair the damage rather than to perform the meniscectomy.

Conclusions

Meniscectomy remains a frequent orthopedic procedure, despite meniscal sparing having been advocated for several decades now and despite the existence of meniscus repair technique which gives good clinical outcomes—augmentation of the damaged meniscus with a collagen membrane. Polish surgeons still need education on the meniscus treatment possibilities

Level of evidence

V.

Both arthroscopic and open posterior knee capsulotomy are effective in terms of extension recovery and functional improvement—systematic review

Ebisz, M., Mostowy, M. et al.

DOI: <https://doi.org/10.1007/s00167-021-06634-4>

Purpose

To assess the recovery of extension and improvement in functional scores after an arthroscopic or open posterior knee capsulotomy in the setting of an extension deficit.

Methods

A systematic search of articles published between 1980 and 2020 was performed in the MEDLINE/PubMed database, EMBASE/Ovid database and Web of Science database. The inclusion criteria consisted of patients with primary extension deficits $> 5^\circ$ who underwent an arthroscopic or open posterior knee capsulotomy. The assessed outcomes were preoperative and postoperative range of motion and functional outcome scores. Randomized controlled trials, cohort studies and case series with a follow-up longer than 6 months were included. The risk of bias was assessed using the Joanna Briggs Institute critical appraisal tool for case series. The certainty of evidence was assessed using the GRADE approach.

Results

Of 226 records identified through database searching, 7 studies were included in the final analysis. The outcomes of 107 patients with a mean age of 34.1 (range 15–63) years were available. In all the included studies, a posterior capsulotomy resulted in the restoration of knee extension to normal or nearly normal values (mean postoperative extension deficit: 0.4–4.2 degrees) with a significant increase in functional outcome scores. No neurovascular complications were reported within the studies. Due to the diverse methodology of studies, the direct comparison of arthroscopic versus open approaches was not possible. Concerning the risk of bias assessment, the greatest concerns raised the selection of participants among the included studies and the methods of outcome measurement. The certainty of evidence was very low according to the GRADE.

Conclusions

Both arthroscopic and open posterior capsulotomy of the knee results in restoration of normal or nearly normal knee extension and significant improvement in functional outcomes.

Level of evidence

IV.

Postoperative external tibial rotation is correlated with inferior meniscal healing following pullout repair of a medial meniscus posterior root tear

Hiranaka, T., Furumatsu, T. et al.

DOI: <https://doi.org/10.1007/s00167-021-06656-y>

Purpose

The purpose of this study was to evaluate the influence of tibial rotation on the postoperative healing status of the medial meniscus (MM) following pullout repair of the MM posterior root tear (MMPRT).

Methods

Ninety-one patients (68 women and 23 men; mean age 63.3 ± 8.8 years) who had undergone transtibial pullout repair of MMPRT were enrolled in the study. The tibial external rotation angle (ERA) in each patient was measured postoperatively using computed tomography in the extended knee position. The meniscal healing status following transtibial pullout repair was assessed by second-look arthroscopy (mean postoperative period 12 months) using a previously published scoring system (range 0–10). The association between the ERA and the meniscal healing score was investigated using univariate linear regression models. The ERA cut-off for improved meniscal healing score (≥ 7) was determined using receiver-operating characteristic analysis.

Results

The ERA and the meniscal healing score were significantly associated, confirming that increased ERAs were correlated with worse meniscal healing status ($R = -0.28$; $P < 0.001$). The optimum ERA cut-off value was 0.5° , with a sensitivity of 68% and a specificity of 63%. The mean meniscal healing scores were 7.3 and 6.2 among patients with ERAs $< 0.5^\circ$ and those with ERAs $\geq 0.5^\circ$, respectively ($P < 0.001$).

Conclusion

This study demonstrated that the ERA was significantly correlated with the postoperative meniscal healing status. Postoperative tibial rotation could be one of the factors affecting postoperative outcomes of pullout repair of MMPRT. Controlling the tibial rotation may possibly improve meniscal healing.

Level of evidence

III.

Predictors of Osteoarthritis Development at a Median 25 Years After Anterior Cruciate Ligament Reconstruction Using a Patellar Tendon Autograft

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Background: Few studies have investigated the outcome ≥ 20 years after an anterior cruciate ligament reconstruction (ACLR) with a bone–patellar tendon–bone autograft, and there is a wide range in the reported rates of radiographic osteoarthritis (OA).

Purpose: To report on radiographic OA development and to assess risk factors of knee OA at a median 25 years after ACLR with a bone–patellar tendon–bone autograft.

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

Methods: Unilateral ACLRs performed at a single center from 1987 to 1994 were included (N = 235). The study population was followed prospectively with clinical testing and questionnaires. Results from the 3-month, 12-month, and median 25-year follow-up are presented. In addition, a radiographic evaluation was performed at the final follow-up. Radiographic OA was defined as Kellgren-Lawrence grade ≥ 2 or having undergone ipsilateral knee replacement surgery. Possible predictors of OA development included patient age, sex, time from injury to surgery, use of a Kennedy ligament augmentation device, any concomitant meniscal surgery, and return to preinjury sports after surgery.

Results: At long-term follow-up, 60% (141/235) of patients had radiographic OA in the involved knee and 18% (40/227) in the contralateral knee ($P < .001$). Increased age at surgery, male sex, increased time between injury and surgery, a Kennedy ligament augmentation device, and medial and lateral meniscal surgery were significant predictors of OA development in univariate analyses. Return to preinjury level of sports after surgery was associated with less development of OA. In the multivariate model, medial meniscal surgery and lateral meniscal surgery were independently associated with OA development. The adjusted odds ratio was 1.88 (95% CI, 1.03-3.43; $P = .041$) for medial meniscal surgery and 1.96 (95% CI, 1.05-3.67; $P = .035$) for lateral meniscal surgery. Patients who had developed radiographic signs of OA had significantly lower Knee injury and Osteoarthritis Outcome Score and Lysholm scores at long-term follow-up.

Conclusion: At 25 years after ACLR, 60% of patients had developed OA in the involved knee, and these patients reported significantly lower subjective outcomes. Medial meniscal surgery and lateral meniscal surgery were independent predictors of OA development at long-term follow-up.

Optimal Combination of Femoral Tunnel Orientation in Anterior Cruciate Ligament Reconstruction Using an Inside-out Femoral Technique Combined With an Anterolateral Extra-articular Reconstruction

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Background: The optimal orientation of the anterolateral extra-articular reconstruction (ALLR) femoral tunnel to avoid collision with the anterior cruciate ligament reconstruction (ACLR) femoral tunnel is not clearly defined in the literature.

Purpose: To define the optimal combination of orientations of the ALLR femoral tunnel and the ACLR femoral tunnel using an inside-out technique to minimize risk of collision between these tunnels.

Study Design: Descriptive laboratory study.

Methods: Three-dimensional reconstruction of magnetic resonance imaging scans of 40 knees after an isolated ACLR with an inside-out femoral technique was used to assess the collision risk between ACLR and virtual ALLR tunnels. The optimal ACLR tunnel orientation was defined as having the safest distance from the ALLR tunnel. A second collision analysis was performed on all patients presenting with an optimal orientation of the ACLR tunnel to then define the optimal ALLR tunnel orientation. The potential for trochlear damage was also studied. A collision risk of 0% to 5% was considered acceptable and referred to as “low risk.”

Results: The only ALLR tunnel orientation presenting a low risk of collision with the ACLR tunnel was with an axial angle of 40° anteriorly and a coronal angle of 0°. This orientation presented a 48% risk of trochlear damage with the guide wire of the ALLR tunnel. The more posterior the orientation of the ACLR, the larger the distance from the ALLR tunnel. Among the 22 patients presenting with an optimal ACLR tunnel (alpha angle superior to 40°), the ALLR tunnels aimed with 1 of these 3 orientations presented a low risk of tunnel collision and trochlear damage: 40° axial and 10° coronal, 35° axial and 5° coronal, or 30° axial and 0° coronal.

Conclusion/Clinical Relevance: To minimize risk of tunnel collision or trochlear damage when combining an inside-out ACLR with an ALLR, the ACLR tunnel should be performed with a posterior orientation (alpha angle >40°), and the ALLR tunnel should be aimed with 1 of 3 orientations: 40° axial and 10° coronal, 35° axial and 5° coronal, or 30° axial and 0° coronal.

Patient Perception of Being “Completely Better” After Anterior Cruciate Ligament Reconstruction

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Background: Contextualizing patient-reported outcomes (PROs) by defining clinically relevant differences is important. Considering that anterior cruciate ligament reconstruction (ACLR) ideally results in the restoration of normal knee function, an assessment of patients’ perception of being “completely better” (CB) may be of particular value.

Purpose: The purpose of this study was to assess the prevalence and characteristics of patients who self-report a CB status after ACLR. Additionally, we aimed to determine whether PROs were associated with a CB status after ACLR as well as to determine CB status thresholds for 2-year and change in values.

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

Methods: We retrospectively analyzed data from an orthopaedic registry at a single institution. Patients were administered the Patient-Reported Outcomes Measurement Information System (PROMIS) Physical Function (PF), PROMIS Pain Interference (PI), and International Knee Documentation Committee (IKDC) Subjective Knee Form preoperatively and at 2 years after ACLR. Additionally, patients completed a CB anchor question at 2 years after ACLR. Thresholds for 2-year and change in PRO scores associated with achieving a CB status were identified with 90% specificity.

Results: Overall, 95 of the 136 patients (69.9%) considered their condition to be CB at 2 years after surgery. The 2-year and change in PROMIS PF, PROMIS PI, and IKDC scores were significantly better in the CB group than in the non-CB group. Thresholds associated with a CB status for 2-year PROMIS PF, PROMIS PI, and IKDC scores were more reliable than those for changes in scores and were ≥ 63 , ≤ 44 , and ≥ 80 , respectively. Thresholds for the change in PROMIS PF, PROMIS PI, and IKDC scores were ≥ 19 , ≤ -16 , and ≥ 44 , respectively.

Conclusion: The majority of patients reported that they were CB at 2 years after ACLR. This study may serve as a reference for orthopaedic surgeons and researchers when considering outcomes after ACLR.

Epidemiology and Revision Rates of Pediatric ACL Reconstruction in New York State

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Background: There are limited epidemiologic data examining the incidence of pediatric anterior cruciate ligament reconstruction (ACLR) over the past decade.

Purpose: To examine statewide population trends in the incidence of ACLR in a pediatric population.

Study Design: Descriptive epidemiology study.

Methods: Inpatient and outpatient claims for pediatric patients who underwent ACLR between 2009 and 2017 were identified in the New York Statewide Planning and Research Cooperative System database via International Classification of Diseases (ICD), Revision 9, Clinical Modification; ICD, Revision 10, Clinical Modification and Procedural Classification System; or Current Procedural Terminology codes. New York population data for each year between 2009 and 2017 were used from the New York State Department of Health to calculate the rates of ACLR per 100,000 people aged 3 to 19 years and determine the 95% confidence limits. The rates were then stratified by age, sex, and insurance. Two-year rates of revision and contralateral ACLR were also analyzed by sex.

Results: Between 2009 and 2017, 20,170 pediatric ACLRs were identified. The rates of pediatric ACLR increased steadily from 49.3 per 100,000 in 2009 (95% CI, 47.2-51.4) to a peak of 61.0 (95% CI, 58.6-63.4) in 2014 and decreased to 51.8 (95% CI, 49.6-54.1) by 2017. The age group 15 to 17 years had the highest rates of ACLR of all age groups, peaking at 198.5 (95% CI, 188.3-208.7) per 100,000. Analysis by sex showed that ACLR rates between males and females were not different. Males had a 2-year ipsilateral revision rate of 4.3%, while females had a rate of 3.3% ($P = .0001$). Females had a contralateral ACLR rate of 4.0%, while males had a rate of 2.6% ($P = .0002$).

Conclusion: Pediatric ACLR rates continued to rise until 2014, but there was a demonstrable decrease in rates after 2014. This decline in pediatric ACLR may point to the efficacy of injury prevention programs or changes in practice management. The high revision rate in males and high contralateral surgery rate in females can help guide patient counseling for return to play and complication risk.

Clinical Relevance: This study showed that ACLR in pediatric patients may be decreasing in recent years. There were differences in revision and contralateral ACLR by sex.

Factors Associated With an Intra-articular Infection After Anterior Cruciate Ligament Reconstruction: A Large Single-Institution Cohort Study

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Background: An intra-articular infection after anterior cruciate ligament (ACL) reconstruction (ACLR) is a rare complication but one with potentially devastating consequences. The rare nature of this complication raises difficulties in detecting risk factors associated with it and with worse outcomes after one has occurred.

Purpose: To (1) evaluate the association between an infection after ACLR and potential risk factors in a large single-center cohort of patients who had undergone ACLR and (2) assess the factors associated with ACL graft retention versus removal.

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

Methods: All ACLR procedures performed at our institution between January 2010 and December 2018 were reviewed; a total of 11,451 procedures were identified. A retrospective medical record review was performed to determine the incidence of infections, patient and procedure characteristics associated with an infection, infection characteristics, incidence of ACL graft retention, and factors associated with the retention versus removal of an ACL graft. Multivariable logistic regression analysis was used to identify potential risk factors for an infection after ACLR.

Results: Of the 11,451 ACLR procedures, 48 infections were identified (0.42%). Multivariable logistic regression analysis revealed revision ACLR (odds ratio [OR], 3.13 [95% CI, 1.55-6.32]; $P = .001$) and younger age (OR, 1.06 [95% CI, 1.02-1.10]; $P = .001$) as risk factors for an infection. Compared with bone–patellar tendon–bone autografts, both hamstring tendon autografts (OR, 4.39 [95% CI, 2.15-8.96]; $P < .001$) and allografts (OR, 5.27 [95% CI, 1.81-15.35]; $P = .002$) were independently associated with an increased risk of infections. Overall, 15 ACL grafts were removed (31.3%). No statistically significant differences besides the number of irrigation and debridement procedures were found for retained versus removed grafts, although some trends were identified ($P = .054$).

Conclusion: In a large single-center cohort of patients who had undergone ACLR and those with an infection after ACLR, patients with revision cases and younger patients were found to have a higher incidence of infection. The use of bone–patellar tendon–bone autografts was found to be associated with the lowest risk of infection after ACLR compared with both hamstring tendon autografts and allografts. Larger cohorts with a larger number of infection cases are needed to determine the factors associated with graft retention versus removal.

Optimal Tibial Tunnel Placement for Medial and Lateral Meniscus Root Repair on the Anteromedial Tibia in the Setting of Anterior and Posterior Cruciate Ligament Reconstruction of the Knee

Safa Gursoy, Allison K. Perry, et al.

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Background: Although the risk of tibial tunnel convergence in the setting of multiligamentous reconstruction has been reported in the literature, the risk of tunnel convergence in the setting of posterior cruciate ligament (PCL), anterior cruciate ligament (ACL) reconstruction and medial and lateral meniscus root repair has not been defined.

Purpose: To examine the risk of tunnel convergence and to determine optimal tunnel placement for ACL and PCL reconstruction performed in conjunction with posterior medial and lateral meniscus root repairs on the anteromedial proximal tibia.

Study Design: Descriptive laboratory study.

Methods: Three-dimensional (3D) tibial models were created using computed tomography scans of 20 cadaveric specimens. After determining optimal tunnel entry and exit points for ACL and PCL reconstructions, and medial and lateral meniscus root reattachment to the anatomic footprints, we used image processing software to create root tunnels over the anteromedial tibia on the tibial models. ACL and PCL tunnels were kept constant. The meniscus root repair tunnels were then reoriented to match the angle of the ACL tunnel, making both tunnels parallel in the sagittal plane. Tunnel convergence risk was analyzed by identifying the shortest 3D distance between tunnel axes and subtracting the radius of each tunnel from this distance for single- and double-tunnel repair techniques in both case scenarios.

Results: All specimens demonstrated convergence between the ACL and lateral meniscus root tunnels when the root tunnel's entry was created proximal to the ACL tunnel's entry for single- and double-tunnel techniques, but no convergence was seen between these tunnels using the parallel orientation in the sagittal plane. There were no cases of convergence between the ACL and medial meniscus root tunnels in any of the configurations. The greatest distance between the ACL and medial meniscus root tunnels was achieved using the single-tunnel technique in parallel orientation (12.1 ± 2.8 mm). There were no cases of convergence between the PCL and medial meniscus root tunnels in the original orientation; however, 2 of 20 specimens demonstrated convergence using the parallel orientation with the double-tunnel technique, and there were no cases of convergence using the single-tunnel technique. The PCL and lateral meniscus root tunnels did not demonstrate convergence in any configuration.

Conclusion: There was a high risk of convergence between ACL and posterior meniscus root tunnels when all the tunnels were created on the anteromedial tibia. Reorienting meniscus root tunnels parallel to ACL tunnels may help reduce this risk. There is increased risk of tunnel convergence with root repairs in cases of bicruciate reconstructions, and therefore a double-tunnel root repair technique should be used with caution.

Clinical Relevance: To avoid tibial tunnel convergence when performing ACL and PCL reconstruction with medial and lateral meniscus root repair, surgeons should reorient the meniscus root repair tunnels to be parallel on the sagittal plane to the ACL tunnel to decrease the

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risk of convergence. In cases of bicruciate ligament reconstruction, use of the double-tunnel technique requires caution to avoid convergence risk with the PCL tunnel.

Minimum 2-Year Clinical Outcomes of Medial Meniscus Root Tears in Relation to Coronal Alignment

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Background: The effect of coronal plane alignment on the outcomes of repairs of the medial meniscus root remains unclear.

Hypothesis: Increased preoperative varus alignment is associated with higher failure rates and lower patient-reported outcomes (PROs) after isolated repair of the medial meniscus root.

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

Methods: Patients aged 18 years or older who underwent arthroscopy-assisted repair of the medial posterior meniscus root over a 7-year period were included. The mechanical axis of the knee was measured preoperatively. Osteoarthritis was assessed radiographically preoperatively and at the final follow-up according to the Kellgren-Lawrence grading scale. Failure was defined as any patient having to undergo revision root repair, partial meniscectomy of the previously repaired meniscus, debridement, lysis of adhesions, or conversion to arthroplasty.

Results: A total of 53 patients (29 women, 24 men) with a mean age of 51.3 years were included in the follow-up analysis. The mean time of follow-up after surgery was 3.3 years (range, 22-77 months). Significant improvements were observed in all PROs analyzed. Decreased varus as measured by alignment percentage was correlated with baseline Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) Pain ($P = .023$) and WOMAC Stiffness ($P = .022$). Alignment percentage was also significantly negatively correlated with postoperative WOMAC Stiffness ($P = .005$) and positively correlated with Lysholm ($P = .003$) and International Knee Documentation Committee ($P = .009$) scores. Higher baseline Kellgren-Lawrence grade was correlated with worse postoperative PROs ($P < .05$), except 12-Item Short Form Health Survey Mental Component Summary and satisfaction. Eight patients who underwent a concomitant high tibial osteotomy (HTO) achieved lower PROs in all scales analyzed, regardless of their alignment. When excluding patients who underwent HTO, postoperative Lysholm score ($P = .004$) and postoperative WOMAC Stiffness ($p = 0.014$) were inferior among the patients with $>5^\circ$ of varus.

Conclusion: Lower extremity alignment closest to neutral correlated with improved PROs. Patients who underwent a concurrent HTO had worse PROs than those who did not undergo HTO.

Assessment of Skeletal Maturity and Postoperative Growth Disturbance After Anterior Cruciate Ligament Reconstruction in Skeletally Immature Patients: A Systematic Review

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Background: Growth disturbance is an uncommon but potentially serious complication after anterior cruciate ligament (ACL) reconstruction in skeletally immature patients.

Purpose: To describe how the pediatric ACL literature has assessed preoperative skeletal maturity and the amount of growth remaining and to comprehensively review the incidence, reporting, and monitoring of postoperative growth disturbance.

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

Methods: This review included studies reporting original research of clinical outcomes of skeletally immature patients after ACL reconstruction. Patient characteristics, surgical techniques, preoperative assessments of skeletal maturity or growth remaining, and postoperative assessments of growth disturbances were extracted.

Results: A total of 100 studies met inclusion criteria. All studies reported chronological age, and 28 studies (28%) assessed skeletal age. A total of 44 studies (44%) used Tanner staging, and 12 studies (12%) obtained standing hip-to-ankle radiographs preoperatively. In total, 42 patients (2.1%) demonstrated a leg length discrepancy (LLD) >10 mm postoperatively, including 9 patients (0.5%) with LLD >20 mm; furthermore, 11 patients (0.6%) with LLD underwent growth modulation. Shortening was the most common deformity overall, but overgrowth was reported more frequently in patients who had undergone all-epiphyseal techniques. Most LLDs involved the femur (83%). A total of 26 patients (1.3%) demonstrated a postoperative angular deformity $\geq 5^\circ$, and 9 of these patients underwent growth modulation. The most common deformities were femoral valgus (41%), tibial recurvatum (33%), and tibial varus (22%). Although standing hip-to-ankle radiographs were the most common radiographic assessment of growth disturbance, most studies inadequately reported the clinical and radiographic methods of assessment for growth disturbance. Additionally, only 35% of studies explicitly followed patients to skeletal maturity.

Conclusion: This systematic review described significant variability in the reporting and monitoring of growth-related complications after ACL reconstruction in skeletally immature patients. The incidence of LLD and angular deformity appeared to be low, but the quality of research was not comprehensive enough for accurate assessment.

Current Concepts on Tissue Adhesive Use for Meniscal Repair—We Are Not There Yet: A Systematic Review of the Literature

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Background: Tissue adhesives (TAs) represent a promising alternative or augmentation method to conventional tissue repair techniques. In sports medicine, TA use has been suggested and implemented in the treatment of meniscal tears. The aim of this review was to present and discuss the current evidence and base of knowledge regarding the clinical usage of TAs for meniscal repair.

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

Methods: A systematic literature search was performed using the PubMed, Embase, and Cochrane Library databases for studies reporting on clinical outcomes of TA usage for meniscal repair in humans in the English language published before January 2020.

Results: Ten studies were eligible for review and included 352 meniscal repairs: 94 (27%) were TA-based repairs and 258 (73%) were combined suture and TA repairs. Concomitant anterior cruciate ligament reconstruction was performed in 224 repairs (64%). All included studies utilized fibrin-based TA. Of the 10 studies, 9 were evidence level 4 (case series), and 8 reported on a cohort of ≤ 40 meniscal repairs. Rates of meniscal healing were evaluated in 9 of 10 studies, with repair failure seen in 39 repairs (11%).

Conclusion: The use of TAs, specifically fibrin-based TAs, for meniscal repair shows good results as either an augmentation or primary repair of various configurations of meniscal tears. However, this review reveals an absence of comparative high-quality evidence supporting the routine use of TAs for meniscal repair and emphasizes the lack of an ideal TA designed for that purpose. Further high-quality research, basic science and clinical, will facilitate the development of new materials and enable testing their suitability for use in meniscal repair.

Reliability of a New Arthroscopic Discoid Lateral Meniscus Classification System: A Multicenter Video Analysis

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Background: The discoid lateral meniscus (DLM) is one of the most common congenital anomalies of the knee. The pathomorphology of DLM varies. Current classification systems are inadequate to describe the spectrum of abnormality.

Purpose: A study group of pediatric orthopaedic surgeons from 20 academic North American institutions developed and tested the reliability of a new DLM classification system.

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

Methods: After reviewing existing classifications, we developed a comprehensive DLM classification system. Four DLM features were evaluated: meniscal width, meniscal height, peripheral stability, and meniscal tear. Stepwise arthroscopic examination using anteromedial and anterolateral viewing portals was established for evaluating these features. Three senior authors who were not observers selected 50 of 119 submitted videos with the best clarity and stepwise examination for reading. Five observers performed assessments using the new classification system to assess interobserver reliability, and a second reading was performed by 3 of the 5 observers to assess intraobserver reliability using the Fleiss κ coefficient (fair, 0.21-0.40; moderate, 0.41-0.60; substantial, 0.61-0.80; excellent, 0.81-1.00).

Results: Interobserver reliability was substantial for most rating factors: meniscal width, meniscal height, peripheral stability, tear presence, and tear type. Interobserver reliability was moderate for tear location. Intraobserver reliability was substantial for meniscal width and meniscal height and excellent for peripheral stability. Intraobserver agreement was moderate for tear presence, type, and location.

Conclusion: This new arthroscopic DLM classification system demonstrated moderate to substantial agreement in most diagnostic categories analyzed.

Synovial Fluid Cytokine Profile at the Time of Arthroscopy Explains Intermediate-Term Functional Outcomes

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Background: The intra-articular immune response after ligamentous, meniscal, or focal chondral knee injuries likely plays a role in intra-articular healing and the onset and progression of posttraumatic osteoarthritis.

Purpose: To evaluate the association of synovial fluid cytokine concentrations measured at the time of knee arthroscopy with intermediate-term functional outcomes after knee arthroscopy based on the Lysholm score.

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

Methods: This was a prospective cohort study of patients undergoing arthroscopic knee surgery. Synovial fluid was aspirated from the injured knee immediately before surgical incision, and the concentrations of 10 cytokines were analyzed using immunoassay. Principal component regression was used to create a model to predict patient-reported Lysholm score at a minimum of 5 years postoperatively. Hierarchical clustering was performed to identify groups of patients with similar synovial fluid inflammatory phenotypes. Lysholm scores and cytokine concentrations were compared between clusters.

Results: A total of 26 patients (mean age, 40.33 ± 16.40 years) were included in the analysis. The mean duration between surgery and follow-up was 6.69 ± 0.72 years. A model consisting of 2 principal components (PC1, PC2) explained 62.48% of the variance in the cytokine data and 52.03% of the variance in intermediate-term Lysholm score. Hierarchical clustering resulted in 3 patient clusters based on the principal components used in the regression model. Despite no baseline differences in Lysholm score, cluster 3 demonstrated significantly greater intermediate-term Lysholm score compared with cluster 2 (94.33 vs 76.09, respectively; 95% CI, 5.96-30.52; $P = .006$) and cluster 1 (94.33 vs 52.33, respectively; 95% CI, 24.09-59.91; $P = .003$). Cluster 3, when compared with the overall means, was characterized by greater PC1 value (1.01 vs 0.00, respectively; $P = .030$) and greater PC2 value (0.86 vs 0.00, respectively; $P = .002$).

Conclusion: The concentrations of select synovial fluid cytokines assessed at the time of knee arthroscopy can be used to explain more than half of the variance in intermediate-term functional outcomes.

Accuracy of Computer Navigation–Assisted Arthroscopic Osteochondroplasty for Cam-Type Femoroacetabular Impingement Using the Model-to-Image Registration Method

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Background: Precise osteochondroplasty is important in arthroscopic hip surgery for cam-type femoroacetabular impingement (FAI). Although computer-assisted surgery with a navigation system may enhance the accuracy of arthroscopic osteochondroplasty, few clinical studies have assessed its accuracy.

Purpose: To evaluate the accuracy of arthroscopic osteochondroplasty by a computed tomography (CT)–based navigation system for cam-type FAI, using 3-dimensional (3D) reconstruction with more detail compared with previous methods.

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

Methods: Twenty patients (14 men and 6 women) who underwent navigation-assisted arthroscopic surgery for cam-type FAI were included. The preoperative 3D model of the femur was constructed from each patient’s CT data, and a planned model with virtual cam resection was generated. A femoral model was reconstructed from CT data postoperatively. The 3 models for each patient were overlaid using a 3D model registration method. Then, the contours of the bone resection area of each model were compared by measuring them. To measure the deviation between planned and actual bone resections, 4 cross-sectional images of the 3 femoral models were set at one-quarter intervals from the femoral head radius. All measurements were based on clockface lines set around the femoral neck axis at 30-minute intervals. Differences between the planned and postoperative contour lines were deemed resection deviations.

Results: All cam resections were performed in the anterior half of the region of interest. Therefore, only the anterior half (48 points) of the 96 points per case were analyzed. In 876 (91.3%) points of the total measurement points (960 points/20 cases), the error in resection depth was within 3 mm. Overresection was observed at 35 (3.6%) points and underresection at 49 (5.1%) points. The observed maximum deviations from the planned models were 6.3 mm overresection and –7.1 mm underresection. The alpha angles of the postoperative model at the posterior 9- to 3-o’clock position were <55° in all patients.

Conclusion: Navigation-assisted arthroscopic osteochondroplasty showed favorable accuracy. Underresection was more frequent than overresection on the anterosuperior side of the femur, despite assistance of the navigation system.

Workers' Compensation Patients Improved After Hip Arthroscopy for Labral Tears: A 5-Year Outcome Propensity Score-Matched Study

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Background: The workers' compensation (WC) status has been associated with inferior outcomes in orthopaedic procedures and is usually excluded from clinical outcome studies. Therefore, comparative studies based on WC status are scarce.

Purpose: (1) To determine outcomes of patients with WC claims treated with hip arthroscopy for labral tears at a minimum 5-year follow-up and (2) to compare these findings with a propensity score-matched control group without WC claims.

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

Methods: Patients were propensity score matched to a control group without WC claims. Data were prospectively collected for all patients undergoing hip arthroscopy. Patients were included if they received primary hip arthroscopy for labral tears in the setting of femoroacetabular impingement, had a WC claim, and had preoperative and minimum 5-year follow-up patient-reported outcomes ([PROs]; modified Harris Hip Score [mHHS], Non-Arthritic Hip Score [NAHS], Hip Outcome Score-Sports Specific Subscale [HOS-SSS], and visual analog scale [VAS] for pain). Clinical outcomes were measured using the Patient Acceptable Symptom State (PASS), minimal clinically important difference (MCID), and maximum outcome improvement satisfaction threshold (MOI).

Results: A total of 111 from 132 (84.1%) eligible WC patients met the inclusion criteria with an average follow-up time of 80.3 ± 37.3 months. WC cases demonstrated significant improvement from preoperatively to a minimum 5-year follow-up for mHHS, NAHS, HOS-SSS, and VAS for pain ($P < .05$). WC patients returned to work at a 66% rate, with an average clearance time of 4.7 months to light duty and 9.5 months to heavy duty. When compared with the control group, the WC group demonstrated lower pre- and postoperative PROs ($P < .05$); however, WC cases had a greater magnitude of improvement (Δ mHHS [$P = .0012$], Δ NAHS [$P < .001$], and Δ HOS-SSS [$P = .012$]). Rates of achieving MCID and MOI were similar in both groups ($P > .05$). The WC group went on to receive a future arthroscopy in 19 cases (17.1%), while 10 cases (4.5%) in the control group required revision arthroscopy ($P < .001$). Patients in both the WC and the control groups converted to total hip arthroplasty at similar rates (13.3% and 15.4%, respectively; $P > .05$).

Conclusion: Patients with WC claims treated with hip arthroscopic surgery showed significant improvement and high rates of returning to work at a minimum 5-year follow-up. Although having lower scores in PROs and achieving PASS rates, no differences were found in MCID and MOI rates. Furthermore, WC patients had a greater magnitude of improvement from preoperatively to a minimum 5-year follow-up after hip arthroscopy. Therefore, even though more studies are needed to determine the causes of inconsistent outcomes in the WC population, hip arthroscopy can effectively treat labral tears in the setting of femoroacetabular impingement, regardless of the WC status.

[BACK](#)

Comparison of Acetabular Labral Reconstruction With 7-mm Tibialis Anterior Allograft and 5-mm Iliotibial Band Autograft at Minimum 2-Year Follow-up

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Background: Labral reconstruction has been described as a treatment option for irreparable labral tear. Labral graft size ranges from 5 to 7 mm² for reconstruction. A thicker labral graft could support mechanical stability and protect cartilage better. No study has compared the effect of graft thickness on clinical outcomes.

Purpose/Hypothesis: The purpose of this study was to compare patient-reported outcomes between hips reconstructed with an autologous iliotibial band (AUITB; 5 mm²) graft and with an allogenic tibialis anterior (ALTA; 7 mm²) tendon graft. Our hypothesis was that hips reconstructed with a thicker allograft (7 mm²) would have better clinical outcomes than those with a smaller autograft (5 mm²).

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

Methods: A total of 42 patients (aged 21 to 54 years) underwent arthroscopic hip segmental labral reconstruction during the study period of January 2016 to November 2018. Twenty patients had reconstruction with AUITB grafts (5 mm²) and 22 with ALTA grafts (7 mm²). Both groups had minimum 2 year follow-up. Patients were evaluated with patient-related outcome scores: modified Harris Hip Score, Nonarthritic Hip Score, and Hip Outcome Score–Sports Specific. Pain evaluation was performed using a visual analog scale.

Results: There were significant differences in all studied variables when comparing pre- and postoperative scores. Yet, there were no differences in terms of patient-related outcome scores between the groups postoperatively. Postoperative visual analog scale scores averaged 2.1 for the AUITB group vs 1.9 for the ALTA group ($P = .89$); modified Harris Hip Score, 82.7 vs 83.3 ($P = .77$); Nonarthritic Hip Score, 81.1 vs 82.2 ($P = .81$); and Hip Outcome Score–Sports Specific, 81.6 vs 82.5 ($P = .67$).

Conclusion: No differences were found in terms of clinical outcomes between the 7-mm² ALTA graft and the 5-mm² AUITB graft. Both graft types and thicknesses might be considered comparable choices for primary reconstruction. Although a thicker-graft labral reconstruction seemed to have more ability to cover joint surface, clinical results did not show any superiority of a thicker graft whether it is autologous or allogenic.

Midterm Outcomes After Hip Labral Augmentation in Revision Hip Arthroscopy

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Background: Labral augmentation has emerged as an essential procedure to address a deficient or irreparable labrum while preserving native labral tissue and restoring the hip suction seal mechanism.

Purpose: To evaluate midterm outcomes of arthroscopic hip labral augmentation for labral insufficiency after previous hip arthroscopy.

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

Methods: Patients were identified from a prospectively collected database who underwent arthroscopic hip labral augmentation between January 2011 and January 2017 with a minimum 3-year follow-up. Pre- and postoperative patient-reported outcome scores were compared and included the 12-Item Short Form Health Survey physical and mental component summaries, Western Ontario and McMaster Universities Osteoarthritis Index, modified Harris Hip Score (mHHS), and Hip Outcome Score (HOS) (Activities of Daily Living [ADL] and Sport). Postoperative Tegner Activity Scale and patient satisfaction (1-10) scores were also evaluated. The minimal clinically important difference (MCID) and Patient Acceptable Symptom State (PASS) between the preoperative and minimum 3-year follow-up scores were calculated.

Results: A total of 88 patients (39 men, 49 women) underwent revision hip arthroscopy with labral augmentation. The average age was 32.8 ± 11 years. Of these, 77 patients (88%) were available for the minimum 3-year follow-up. The survivorship (absence of conversion to total hip arthroplasty) at 3 years and 5 years was 93% at both time points, with a mean survival time of 8.5 years (95% CI, 8.0-8.9). Eleven patients (14%) required revision arthroscopic surgery for continued pain. Revisions occurred at a mean of 2.6 ± 1.4 years after augmentation. The mean follow-up was 5.2 ± 1.2 years (range, 3-9 years). For patients not requiring subsequent surgery ($n = 61$), all patient-reported outcome measures significantly improved, which included a 20-point increase in HOS-ADL (MCID, 82%; PASS, 72%) and mHHS (MCID, 78%; PASS, 70%). The median postoperative Tegner score was 4 (range, 1-10). The median postoperative patient satisfaction score was 9 out of 10 (range, 1-10).

Conclusion: Arthroscopic hip labral augmentation is a successful treatment option for patients with labral insufficiency after previous hip arthroscopy, demonstrating improved patient-reported outcomes and survivorship of 93% at 3 years and 5 years. This technique provides a valuable labral preservation option when addressing hip labral pathology when viable native labral tissue remains.

Bone and Joint Journal (BJJ), Volume 101, issue

Predicting Patient Loss to Follow-up in the STABILITY 1 Study: A Multicenter, International, Randomized Controlled Trial of Young, Active Patients Undergoing ACL Reconstruction

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Background: Patients lost to follow-up (LTF) impact even the most meticulously planned randomized controlled trials. Identifying patients at high risk for becoming LTF and employing strategies to retain these patients may reduce attrition bias.

Methods: A cohort of 618 young, active patients undergoing anterior cruciate ligament reconstruction in the STABILITY 1 study was analyzed. Patients completed clinical testing and 9 questionnaires at 3, 6, 12, and 24 months. Multivariable logistic regression was performed for 5 different definitions of LTF. Patient characteristics and study site were included as predictors.

Results: The LTF rate was 8.3%. Current or previous smokers (odds ratio [OR] = 2.77; 95% confidence interval [CI]: 1.20 to 5.96), those employed part-time (OR = 2.31; 95% CI: 1.04 to 5.14), and those with body mass index (BMI) of ≥ 25 kg/m² had significantly greater odds of becoming LTF compared with nonsmokers, students, and those with BMI of < 25 kg/m², respectively. Those employed part-time were > 8 times more likely (95% CI: 2.66 to 26.28) to become LTF compared with students within the first year. Postoperative BMI of ≥ 25 kg/m² was significantly associated with 2 times greater odds of missing the in-person clinical examination at any visit or becoming LTF after the first postoperative year. The clinical site was the single largest predictor of missing data at any visit.

Conclusions: Current or previous smoking, part-time employment, and BMI of ≥ 25 kg/m² were significant predictors of becoming LTF, and part-time employment was significantly associated with early LTF. BMI of ≥ 25 kg/m² was also associated with late LTF and clinical LTF. The clinical site was significantly associated with missing data at any visit. While we cannot accurately predict who will become LTF, investigators should be aware of these factors to identify high-risk patients and focus retention strategies accordingly.

Clinical Relevance: Understanding factors related to becoming LTF in young, active patients undergoing anterior cruciate ligament reconstruction can help investigators target retention strategies to reduce LTF in studies requiring clinical follow-up in similar populations.

[BACK](#)

Miscellaneous

Arthroscopy, April 2022, Volume 38, Issue 4, P 1115 – 1123

Subacromial Bursal Tissue and Surrounding Matrix of Patients Undergoing Rotator Cuff Repair Contains Progenitor Cells

Levy B.J., McCarthy M.B., et al.

DOI: <https://doi.org/10.1016/j.arthro.2021.10.029>

Purpose

To build upon previous literature to identify a complete analysis of cellular contents of subacromial bursal tissue as well as the matrix surrounding the rotator cuff.

Methods

Samples of subacromial bursal tissue and surrounding matrix milieu from above the rotator cuff tendon and above the rotator cuff muscle bellies were obtained from 10 patients undergoing arthroscopic rotator cuff repair. Samples were analyzed using fluorescent-activated cell sorting and histologic analysis with staining protocols (Oil Red O, Alcian Blue, and Picro-Sirius Red), for identification of matrix components, including fat, proteoglycans, and collagen.

Results

Progenitor cells and fibroblast-type cells were present in significant amounts in subacromial bursal tissue in both tissues obtained from over the tendinous and muscle belly portions. Markers for neural tissue, myeloid cells, and megakaryocytes also were present to a lesser extent. There were prominent amounts of fat and proteoglycans present in the matrix, based on ImageJ analysis of stained histologic slides.

Conclusions

The subacromial bursal tissue and surrounding matrix of patients undergoing rotator cuff repair contains progenitor cells in significant concentrations both over the tendon and muscle belly of the rotator cuff.

Clinical Relevance

This presence of progenitor cells, in particular, in the subacromial bursal tissue provides a potential basis for future applications of augmentation purposes in rotator cuff healing, and calls into question the practice of routine bursectomy. As the potential role of bursal tissue contents in growth and regeneration in the setting of rotator cuff healing is more well understood, maintaining this tissue may become more relevant. Concentration of these cellular components for use in autologous re-implantation is also an avenue of interest.

Knee Surgery, Sports Traumatology, Arthroscopy, April 2021, volume 30, issue 4, pages: 1471 - 1479

Ten hours of simulator training in arthroscopy are insufficient to reach the target level based on the Diagnostic Arthroscopic Skill Score

Anetzberger, H., Reppenhagen, S. et al.

DOI: <https://doi.org/10.1007/s00167-021-06648-y>

Purpose

Simulator arthroscopy training has gained popularity in recent years. However, it remains unclear what level of competency surgeons may achieve in what time frame using virtual training. It was hypothesized that 10 h of training would be sufficient to reach the target level defined by experts based on the Diagnostic Arthroscopic Skill Score (DASS).

Methods

The training concept was developed by ten instructors affiliated with the German-speaking Society of Arthroscopy and Joint Surgery (AGA). The programme teaches the basics of performing arthroscopy; the main focus is on learning and practicing manual skills using a simulator. The training was based on a structured programme of exercises designed to help users reach defined learning goals. Initially, camera posture, horizon adjustment and control of the direction of view were taught in a virtual room. Based on these skills, further training was performed with a knee model. The learning progress was assessed by quantifying the exercise time, camera path length and instrument path length for selected tasks. At the end of the course, the learners' performance in diagnostic arthroscopy was evaluated using DASS. Participants were classified as novice or competent based on the number of arthroscopies performed prior to the assessment.

Results

Except for one surgeon, 131 orthopaedic residents and surgeons (29 women, 102 men) who participated in the seven courses agreed to anonymous data analysis. Fifty-eight of them were competent with more than ten independently performed arthroscopies, and 73 were novices, with fewer than ten independently performed arthroscopies. There were significant reductions in exercise time, camera path length and instrument path length for all participants after the training, indicating a rapid increase in performance. No difference in camera handling between the dominant and non-dominant sides was found in either group. The competent performed better than the novices in various tasks and achieved significantly better DASS values on the final performance test.

Conclusions

Our data have demonstrated that arthroscopic skills can be taught effectively on a simulator, but a 10-h course is not sufficient to reach the target level set by experienced arthroscopists. However, learning progress can be monitored more objectively during simulator training than in the operating room, and simulation may partially replace the current practice of arthroscopic training.

Level
III.

of

evidence

[BACK](#)

The Bone and Joint Journal, volume 101, issue 3

PROMIS Depression and Anxiety in shoulder surgery patients

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DOI: <https://doi.org/10.1302/0301-620X.104B4.BJJ-2021-1089.R1>

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Aims

The purpose of this study was to assess the prevalence of depression and anxiety symptoms in patients undergoing shoulder surgery using the National Institutes of Health (NIH) Patient-Reported Outcomes Measurement Information System (PROMIS) Depression and Anxiety computer adaptive tests, and to determine the factors associated with more severe symptoms. Additionally, we sought to determine whether PROMIS Depression and Anxiety were associated with functional outcomes after shoulder surgery.

Methods

This was a retrospective analysis of 293 patients from an urban population who underwent elective shoulder surgery from 2015 to 2018. Survey questionnaires included preoperative and two-year postoperative data. Bivariate analysis was used to identify associations and multivariable analysis was used to control for confounding variables.

Results

Mean two-year PROMIS Depression and Anxiety scores significantly improved from preoperative scores, with a greater improvement observed in PROMIS Anxiety. Worse PROMIS Depression and Anxiety scores were also significantly correlated with worse PROMIS Physical Function (PF) and American Shoulder and Elbow Surgeons scores (ASES). After controlling for confounding variables, worse PROMIS Depression was an independent predictor of worse PROMIS PF, while worse PROMIS Anxiety was an independent predictor of worse PROMIS PF and ASES scores.

Conclusion

Mean two-year PROMIS Depression and Anxiety scores improved after elective shoulder surgery and several patient characteristics were associated with these scores. Worse functional outcomes were associated with worse PROMIS Depression and Anxiety; however, more severe two-year PROMIS Anxiety was the strongest predictor of worse functional outcomes.

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