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4B Arthroscopy founders: D.P. ter Meulen, B. Lubberts

Contact 4@erasmusmc.nl

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Volume 29, Issue 6

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Miscellaneous

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BACK

Upper extremity

Arthroscopy, Volume 37, Issue 6

Establishing Clinically Significant Outcomes for Patient-Reported Outcomes Measurement Information System After Biceps Tenodesis

Enrico M. Forlenza, Yining Lu, Matthew R. Cohn, James Baker, Ophelie Lavoie-Gagne, Adam B. Yanke, Brian J. Cole, Nikhil N. Verma, Brian Forsythe

https://doi.org/10.1016/j.arthro.2020.12.236

Purpose
To establish thresholds for improvement in patient-reported outcome scores that correspond with clinically significant outcomes (CSOs) including the minimal clinically important difference (MCID), substantial clinical benefit (SCB), and patient acceptable symptomatic state (PASS) for Patient-Reported Outcomes Measurement Information System (PROMIS) upper extremity (UE) computer adaptive testing (CAT) and pain interference (PIF) CAT after biceps tenodesis (BT) and to assess patient variables that are associated with achieving these outcomes.

Methods
After institutional review board approval was obtained, a prospectively maintained institutional database was queried for patients undergoing BT between December 2017 and August 2019. Patients undergoing BT in isolation or BT in conjunction with rotator cuff debridement, SLAP repair, subacromial decompression, or distal clavicle excision were included in the analysis. Anchor- and distribution-based methods were used to calculate the MCID whereas an anchor-based method was used to calculate SCB and the PASS for PROMIS UE CAT and PIF CAT.

Results
A total of 112 patients (86.8% follow-up) who underwent BT were included for analysis. The MCID, net SCB, absolute SCB, and PASS for PROMIS UE CAT were 4.02, 9.25, 43.4, and 41.1, respectively. The MCID, net SCB, absolute SCB, and PASS for PROMIS PIF CAT were –4.12, –10.7, 52.4, and 52.4, respectively. Higher preoperative UE CAT and PIF CAT scores, preoperative opioid use, depression, and living alone were negative predictors of CSO achievement. Male sex and regular participation in exercise were positive predictors of CSO achievement.

Conclusions
Patients with higher preoperative UE scores were less likely to achieve the MCID (odds ratio [OR], 0.84), whereas patients with higher preoperative PIF scores were less likely to achieve absolute SCB and the PASS (OR, 0.83-0.89). Most patients achieved the MCID for PIF CAT (70.5%) and UE CAT (62.5%) at final follow-up. Male sex (OR, 4.38-9.15) and regular exercise participation (OR, 6.45-18.94) positively predicted CSO achievement, whereas preoperative opioid use (OR, 0.06), depression (OR, 0.23), and living alone (OR, 0.90) were negative predictors of CSO achievement.

Level of Evidence
Level IV, case series.

BACK

Undergoing an Arthroscopic Procedure Prior to Shoulder Arthroplasty is Associated With Greater Risk of Prosthetic Joint Infection

Azeem Tariq Malik, Jesse Morris, Julie Y. Bishop, Andrew S. Neviaser, Safdar N. Khan, Gregory L. Cvetanovich

https://doi.org/10.1016/j.arthro.2021.01.013

Purpose
To utilize a national all-payer claims dataset to understand whether a history of a prior shoulder arthroscopy is associated with adverse outcomes or complications after the index shoulder arthroplasty itself.

Methods
The Symphony Integrated DataVerse, an all-payer claims database, was used to identify patients undergoing primary shoulder arthroplasty (hemiarthroplasty, anatomic total shoulder arthroplasty, or reverse total shoulder arthroplasty) between 2017 to 2018. Current Procedural Terminology codes were used to identify patients who had undergone a shoulder arthroscopic procedure on the ipsilateral side within 2 years before the arthroplasty. Multivariate logistic regression analyses were used to assess whether prior shoulder arthroscopy was associated with higher risks of wound complications, postoperative stiffness, mechanical complications, prosthetic joint infection, revision surgery and readmissions within 90 days of the arthroplasty.

Results
In total, 19,429 patients were included, of which 837 (4.3%) had undergone shoulder arthroscopy within 2 years before the arthroplasty. Prior shoulder arthroscopy was associated with a significantly higher risk of prosthetic joint infection (odds ratio [OR] 2.74 [95% confidence interval {CI} 1.51-4.69]; $P < .001$) within 90 days of the arthroplasty. The greatest risk of prosthetic joint infection was associated with arthroscopies that took place within 3 months before the arthroplasty (OR 5.32 [95% CI 1.42-15.14]; $P = .005$).

Conclusions
Undergoing an arthroscopic procedure of the ipsilateral shoulder before undergoing an arthroplasty was associated with greater risk of prosthetic joint infection. Furthermore, it appears that patients who received arthroscopy within the 3 months before arthroplasty had the highest risk of prosthetic joint infections. Physicians should not only anticipate possible inferior outcomes in patients who have had prior arthroscopy, but also consider delaying the arthroplasty by at least 3 months after the arthroscopy to mitigate the risks of experiencing this costly adverse event.

Level of Evidence
III

BACK

Long Head of Biceps Tenotomy Is Not Inferior to Suprapectoral Tenodesis in Arthroscopic Repair of Nontraumatic Rotator Cuff Tears: A Multicenter, Non-inferiority, Randomized, Controlled Clinical Trial

Derek F.P. van Deurzen, Kiem G. Auw Yang, Ron Onstenk, Eric E.J. Raven, Maaike P.J. van den Borne, Max A. Hoelen, Ronald N. Wessel, Nienke W. Willigenburg, Amanda D. Klaassen, Michel P.J. van den Bekerom, Jacco A.C. Zijl, Nienke Wolterbeek, Koen L.M. Koenraadt, Loes W.A.H. van Beers, W. Jaap Willems, Nina M. Mathijssen, Brechtje Hesseling, Eelke Lemmens, Roel Janssens, Frans L. Garssen, Navin Gurnani, Roos I. van Rhijn, Reinier Spek, Max Teuwen, Lukas P.E. Verweij, Mariella Volkers, Vanessa A.B. Scholtes

https://doi.org/10.1016/j.arthro.2021.01.036

Purpose
To determine if long head of the biceps (LHB) tenotomy is not inferior to suprapectoral LHB tenodesis when performed in conjunction with arthroscopic repair of small- to medium-sized nontraumatic rotator cuff tears.

Methods
This multicenter, randomized, non-inferiority trial recruited 100 participants older than 50 years who had a supraspinatus and/or infraspinatus tear sagittally smaller than 3 cm and arthroscopically confirmed LHB pathology. During arthroscopic rotator cuff repair, we randomized 48 patients to undergo suprapectoral LHB tenodesis and 52 patients to undergo LHB tenotomy. Data were collected preoperatively and at 6 weeks, 3 months, and 1 year postoperatively. The primary outcome was non-inferiority of the Constant-Murley score (CMS) at 1-year follow-up. Secondary outcomes included the Dutch Oxford Shoulder Score; Disabilities of the Arm, Shoulder and Hand questionnaire; Popeye deformity; elbow flexion strength index; arm cramping pain; and quality of life (EQ-5D score). The integrity of the rotator cuff repair was assessed with magnetic resonance imaging. Differences between intervention groups were analyzed by mixed modeling.

Results
The mean CMS in the LHB tenotomy group improved from 44 (95% confidence interval [CI], 39-48) to 73 (95% CI, 68-79). In patients with LHB tenodesis, the mean CMS improved from 42 (95% CI, 37-48) to 78 (95% CI, 74-82). The difference between groups at 1-year follow-up was 4.8 (97.5% CI, $-\infty$ to 11.4), with a P value for non-inferiority of .06. The secondary outcomes also improved over time, with no remarkable differences between groups. A Popeye deformity occurred in 33% of tenodesis patients and 47% of tenotomy patients (P = .17). Tenotomy was performed with a shorter operative time (73 minutes vs 82 minutes, P = .03). Magnetic resonance imaging showed a recurrent rotator cuff tear in 20% of all cases.

Conclusions
Although statistically “inconclusive” regarding non-inferiority of the CMS at 1-year follow-up, any observed differences between patients with LHB tenotomy and those with LHB tenodesis in all outcome scores were small.

Level of Evidence
Level I, randomized controlled trial and treatment study.

BACK

The Hook Test Is More Accurate Than the Trampoline Test to Detect Foveal Tears of the Triangular Fibrocartilage Complex of the Wrist

Andrea Atzei, Riccardo Luchetti, Daniele Carletti, Lucian Lior Marcovici, Lucia Cazzoletti, Silvia Barbon

https://doi.org/10.1016/j.arthro.2021.03.005

Purpose
To evaluate the accuracy of the trampoline and hook tests, used in the arthroscopic assessment of triangular fibrocartilage complex (TFCC) tears compared with arthroscopic direct visualization of the radiocarpal joint (RCJ) and of the distal radial ulnar joint (DRUJ).

Methods
In total, 135 patients (97 male, 38 female, mean age 43.5 years) were divided into 2 groups: (1) 80 patients with chronic ulnar-sided wrist pain and positive fovea sign and (2) 55 patients with other complaints. TFCC was assessed by RCJ and DRUJ arthroscopy and by the trampoline and hook tests to detect rupture of distal and proximal components of the TFCC. Accuracy, specificity, sensitivity, and likelihood ratio of the 2 diagnostic methods were measured and compared, using RCJ and DRUJ arthroscopy as reference.

Results
The trampoline and the hook tests showed an overall accuracy of 70.37% and 86.67%, respectively. The accuracy of the trampoline test was similar for distal (69%), proximal (66%), and complete (73%) TFCC tears. The hook test was more accurate when evaluating proximal (97%) and complete (98%) tears, rather than distal lesions (75%). Sensitivity for the trampoline and hook tests was 75.00% and 0.00% ($P < .001$) for distal tears and 78.85% and 100.00% ($P < .001$) and 58.33% and 100.00% ($P < .001$) for complete or isolated proximal tears, respectively. Specificity for the trampoline and hook tests was 67.27% and 96.36% ($P < .001$) respectively.

Conclusions
The trampoline and hook tests can assure accurate diagnosis of peripheral TFCC tear. The hook test shows greater specificity and sensitivity to recognize foveal TFCC tears. Values of positive likelihood ratio suggest a greater probability to detect foveal laceration of peripheral TFCC for the hook test than for the trampoline test. These findings suggest that DRUJ arthroscopy is not necessary to confirm foveal incompetence of the TFCC, if the hook test is positive.

Level of Evidence
Level II, retrospective diagnostic trial.

BACK

Double-Row Rotator Cuff Repair Enhanced With Platelet-Rich Therapy Reduces Retear Rate: A Systematic Review and Meta-analysis of Randomized Controlled Trials

Gregorio Alejandro Villarreal-Villarreal, Mario Simental-Mendía, Abiel Eugenio Garza-Borjón, Juan Manuel Millán-Alanís, Félix Vilchez-Cavazos, Víctor Manuel Peña-Martínez, Carlos Alberto Acosta-Olivo

https://doi.org/10.1016/j.arthro.2020.12.191

Purpose
To assess retear rates in arthroscopic double-row rotator cuff repair (double-row RCR) with and without platelet-rich therapy (PRT).

Methods
Systematic review and meta-analysis of randomized controlled trials (RCTs). MEDLINE, Embase, and Scopus databases were searched for RCTs involving use of PRT exclusively in arthroscopic double-row RCR. A random-effects model and the generic inverse variance method were used for quantitative data synthesis. Heterogeneity was tested with the I2 statistic index.

Results
The 9 RCTs included in the meta-analysis demonstrated a risk reduction of 49% for retears in patients receiving PRT (risk ratio [RR] 0.51; 95% confidence interval [CI] 0.35 to 0.76; P = .0008; I2 = 0%). Divided by tear sizes, retear risk reduction of 47% (RR 0.53; 95% CI 0.30 to 0.95; P = .03; I2 = 0%) was found in small to medium tears and 51% (RR 0.49; 95% CI 0.29 to 0.84; P = .009; I2 = 0%) in large to massive tears. Linked double-row RCR resulted in risk reduction of 51% for retears in comparison with nonlinked repairs.

Conclusion
Double-row RCR plus PRT significantly reduced retear rates in all sizes of rotator cuff tears. Linked double-row RCR and applying the PRT during the surgical procedure and in the tendon–bone interface reproduced the best outcomes. Clinically, all patients improved, and no statistically significant difference was seen in clinical and functional scores between the intervention groups. All patients achieved optimal values for patient-reported outcomes measures.

Level of Evidence
I, systematic review and meta-analysis of level I studies.

BACK

Rotator Cuff Repairs With and Without Acromioplasties Yield Similar Clinical Outcomes: A Meta-analysis and Systematic Review

Andrew Arjun Sayampanathan, Amila Nirmal Silva, Andrew Tan Hwee Chye

https://doi.org/10.1016/j.arthro.2021.01.025

Purpose
This meta-analysis reviews the current literature comparing the patient-reported outcome measures of patients who underwent rotator cuff repairs with and without acromioplasties.

Method
A comprehensive literature search was performed using PubMed, EMBASE, and Scopus databases, obtaining 1,456 studies for the review. After the filtering process, 8 studies remained for our meta-analysis, of which 7 were prospective trials. From the included studies, the postoperative outcomes of 3,034 shoulders were studied. Data were analyzed using Mantel-Haenszel statistics and random-effect models where appropriate.

Results
Our meta-analysis revealed that there was no significant difference in American Shoulder and Elbow Surgeons scores (standardized mean difference [SMD], 0.09; 95% confidence interval [CI], –0.10 to 0.28; I2 = 9%; P = .36), University of California at Los Angeles scores (SMD, 0.17; 95% CI, –0.07 to 0.40; I2 = 0%; P = .17), and rate of further surgery (odds ratio, 0.49; 95% CI, 0.04 to 5.66; I2 = 59%; P = .57) between the acromioplasty and nonacromioplasty groups. There was a statistical difference in the Constant score (SMD, 0.25; 95% CI, 0.02 to 0.48; I2 = 0%; P = .03) of both groups. However, with the Constant score having an SMD of only 0.25, the difference in Constant score was not clinically significant.

Conclusions
There were no clinically significant differences in postoperative functional scores and pain scores for patients who underwent rotator cuff repairs with and without acromioplasties.

Level of Evidence
Level II, meta-analysis of Level I and II studies.

BACK

The Use of Elbow Arthroscopy for Management of the Pediatric Elbow: A Systematic Review of Indications and Outcomes

Kyle Gouveia, Kailai Zhang, Jeffrey Kay, Muzammil Memon, Nicole Simunovic, Grant E. Garrigues, J.W. Pollock, Olufemi R. Ayeni

https://doi.org/10.1016/j.arthro.2021.01.047

Purpose
The purpose of this review was to systematically examine the literature surrounding elbow arthroscopy for pediatric patients and to assess indications, functional outcomes, and complication rates.

Methods
This systematic review was carried out in accordance with PRISMA guidelines. EMBASE, PubMed, and MEDLINE were searched for relevant literature from inception until December 2019, and studies were screened by 2 reviewers independently and in duplicate for those investigating elbow arthroscopy in a pediatric population (<18 years). Editorials, review articles, and case reports were excluded. Demographic data and data on surgical indications, treatment outcomes, and complications were recorded. A methodological quality assessment was performed for all included studies using the Methodological Index for Non-Randomized Studies.

Results
Overall, 19 studies, all of level IV evidence, were identified with a total of 492 patients (513 elbows). The patient population was 22.3% female with a mean age of 14.0 years (range, 4.0-15.7) and a mean follow-up time of 33.0 months (range, 7.4-96 months). Twelve studies (263 patients) exclusively recruited patients with osteochondritis dissecans (OCD), although other indications for elbow arthroscopy included arthrofibrosis (50 patients), elbow fracture (37 patients), medial ulnar collateral ligament injury (31 patients), and posterior impingement (17 patients). All 13 reporting studies showed a significant improvement in the elbow flexion-extension arc, and 4 of 5 that reported a functional outcome score before and after surgery demonstrating a significant improvement. Last, the overall complication rates ranged from 0% to 23.8%, with a total of 8 instances of neurological injury (5 ulnar, 2 radial, 1 unspecified), all being transient and resolving within 3 to 6 months.

Conclusion
Although elbow arthroscopy is primarily being performed for OCD in children and adolescents, there is evidence surrounding several other potential indications. Case series published to date have demonstrated significant improvements in functional outcomes and low rates of major complications.

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

BACK

Journal of Shoulder and Elbow Surgery (JSES), Volume 30, issue 6

Establishing and comparing reference preoperative Patient-Reported Outcomes Measurement Information System (PROMIS) scores in patients undergoing shoulder surgery.

Guo, E.W., Elhage, K., Cross, A.G., et al.

DOI: https://doi.org/10.1016/j.jse.2020.09.003

Background
The Patient-Reported Outcomes Measurement Information System (PROMIS) has become increasingly popular among orthopedic surgeons treating shoulder pathology. Despite this, there have been few studies that have described and compared preoperative reference scores for specific shoulder surgical procedures. The primary purpose of this study was to establish and compare baseline preoperative PROMIS scores for 3 common types of shoulder surgery: rotator cuff repair (RCR), total shoulder arthroplasty (TSA), and labral repair (LR). The secondary goal was to stratify these operative groups by diagnosis and compare preoperative PROMIS scores.

Methods
In this cross-sectional study, adult and pediatric patients who underwent surgery for either RCR, TSA, or LR were included. PROMIS–Upper Extremity (UE), PROMIS–Pain Interference (PI), and PROMIS–Depression (D) scores that were collected at each patient's preoperative visit were reviewed. Continuous and categorical variables were compared between operative groups using analysis of variance and $\chi 2$ or Fisher exact tests, respectively. Multivariable general linear models were used to identify significant independent predictors of PROMIS scores when controlling for age, sex, and body mass index.

Results
A total of 413 patients were included in the study: 272 in the RCR group, 84 in the TSA group, and 57 in the LR group. The average PROMIS-UE score was 39.8 in the LR group vs. 29.9 in the RCR group ($P < .001$) and 29.6 in the TSA group ($P < .001$). There was no difference between the mean RCR and TSA PROMIS-UE scores ($P = .93$). The average PROMIS-PI score was 56.6 in the LR group vs. 62.8 in the RCR group ($P < .001$) and 63.9 in the TSA group ($P < .001$). There was no difference between RCR and TSA PROMIS-PI scores ($P = .09$). The average PROMIS-D score was 43.5 in the LR group vs. 47.7 in the RCR group ($P = .004$) and 50.3 in the TSA group ($P < .001$). The TSA group had a higher mean PROMIS-D score than the RCR group ($P = .03$). For PROMIS-UE scores, age and body mass index were not found to be significant independent predictors ($P = .98$ and $P = .88$, respectively). For PROMIS-PI scores, age, body mass index, and sex were not found to be significant independent predictors ($P = .31$, $P = .81$, and $P = .48$, respectively).

Conclusion
Patients undergoing shoulder LR had higher preoperative function scores and lower pain interference and depression scores than those undergoing TSA and RCR. These baseline PROMIS scores should be taken into consideration when tracking a patient's outcomes after surgery, as a certain score could mean drastically different functional and pain outcomes depending on the underlying pathology.

Level of evidence
Basic Science Study

BACK

Arthroscopic Bankart repair with and without arthroscopic infraspinatus remplissage in anterior shoulder instability with a Hill-Sachs defect: a randomized controlled trial.

MacDonald, P., McRae, S., Old, J., et al.

DOI: https://doi.org/10.1016/j.jse.2020.11.013

Background
The purpose of this study was to compare patient-reported and clinic outcomes between arthroscopic Bankart repair with (REMP) and without (NO REMP) arthroscopic infraspinatus remplissage in patients with recurrent anterior shoulder instability with a Hill-Sachs lesion and minimal glenoid bone loss.

Methods
Patients 14 years or older with a recurrent anterior shoulder instability with the presence of an engaging Hill-Sachs defect (of any size) confirmed on computed tomography or magnetic resonance imaging were eligible to participate. Consented patients were randomized intraoperatively to NO REMP or REMP. Study visits were conducted preoperatively and 3, 6, 12, and 24 months postoperatively. The primary outcome was the Western Ontario Shoulder Instability score. Secondary outcomes included incidence of postoperative recurrent shoulder instability, Simple Shoulder Test, American Shoulder and Elbow Surgeons score, range of motion, complications, and revision surgery. To compare groups, a mixed-effects linear model was used for continuous variables and a $\chi 2$ or Fisher's exact test for categorical data. A Kaplan-Meier survival analysis assessed survival distribution between groups.

Results
One hundred and eight patients were randomized to Bankart repair with (n = 54) or without (n = 54) remplissage. The mean follow-up was 26.5 months (21-53 months) and 24.3 months (23-64 months) for the REMP and NO REMP groups, respectively. Rates of postoperative recurrent instability were higher (P = .027) in the NO REMP group with 9 of 50 (18%) vs. 2 of 52 (4%) postoperative dislocations in the REMP group. There were no significant differences in patient-reported outcomes between groups at any time point. Survival curve distributions were also significantly different favoring REMP ($\chi 2 = 5.255$, P = .022). There was a significant difference in rate of revision surgery between groups with 6 in the NO REMP and none in the REMP groups (P = .029). Post hoc, patients were noted to have a higher risk for re-dislocation if their Hill-Sachs lesion was ≥20 mm in width or ≥15% of humeral head diameter. One intraoperative complication was reported in the REMP group.

Conclusions
There is significantly greater risk of postoperative recurrent instability in patients who did not have a remplissage performed in conjunction with an arthroscopic Bankart repair for the treatment of traumatic recurrent anterior shoulder instability with Hill-Sachs lesions of any size and minimal glenoid bone loss (<15%) at 2 years postoperatively. Otherwise, there are no differences in patient-reported outcomes, complications, or shoulder function at 2 years postoperatively. In addition, the remplissage procedure has significantly lower rates of re-dislocation in high-risk patients with Hill-Sachs lesions ≥20 mm and/or ≥15% in size.

Level of evidence
Level I, Randomized Controlled Trial

BACK

Clinical effectiveness of mini-open superior capsular reconstruction using autologous tensor fascia lata graft.

Takayama, K., Yamada, S., Kobori, Y.

DOI: https://doi.org/10.1016/j.jse.2020.09.005

Background
When one is performing superior capsular reconstruction (SCR), graft thickness is an important factor for achieving sufficient glenohumeral stability. However, when a graft of sufficient length and thickness is prepared and inserted into the subacromial space, it is often challenging to secure the field of view arthroscopically. To solve this problem, we devised a mini-open SCR technique. This study aimed to compare the clinical effectiveness of this technique with that of arthroscopic SCR.

Methods
This retrospective cohort study included 46 consecutive patients with Hamada classification grade 2-3b who were treated between June 2014 and February 2018 with SCR performed by a single surgeon for irreparable rotator cuff tears (grade 3 or higher according to the Goutallier classification) using autologous tensor fascia lata. We evaluated the duration of the operation, length of the skin incision of the lateral portal used to insert the graft, graft size (length, width, and thickness), American Shoulder and Elbow Surgeons score, range of motion, and graft retear rate.

Results
This study included 46 patients who underwent arthroscopic SCR (n = 20) or mini-open SCR (n = 26). The mean follow-up period was 36.5 months (range, 24-66 months). The operative duration was significantly longer in the arthroscopic SCR group than in the mini-open SCR group (175 ± 48 minutes vs. 133 ± 25 minutes, P < .001); however, no significant difference was noted in the length of the skin incision (2.4 ± 0.2 cm vs. 2.5 ± 0.1 cm) and graft size. At the final follow-up, no significant differences were observed in American Shoulder and Elbow Surgeons scores, all ranges of motion (flexion, P = .60; abduction, P = .60; external rotation, P = .20; and internal rotation, P = .54), and graft retear rates (5% [1 case] vs. 3.8% [1 case], P > .999).

Conclusions
Good clinical outcomes were obtained in both the arthroscopic and mini-open SCR groups. The surgical stress experienced by the patients who underwent mini-open SCR was similar to that experienced by those who underwent the arthroscopic technique, as no significant difference was noted in the length of the skin incision. This study shows that mini-open SCR, which contributes to reductions in operative duration and difficulty associated with the surgical technique, is an effective and alternative method to arthroscopic SCR.

Level of evidence
Level III, Retrospective Cohort Comparison

BACK

The Buford complex: prevalence and relationship with labral pathologies.

Özer, M., Kaptan, Y., Ataoglu, M.B., et al.

DOI: https://doi.org/10.1016/j.jse.2020.08.037

Background
This study aimed to determine the prevalence of the Buford complex and to investigate its association with labral pathologies (superior labrum anterior-posterior [SLAP] lesion and anterior, posterior, or multidirectional instability) using a very large patient database. Furthermore, the prevalence of the Buford complex in patients without any labral pathology was also determined.

Methods
A total of 3129 consecutive shoulder arthroscopy procedures were retrospectively evaluated for the presence of the Buford complex and coexisting labral pathologies. The relationships between the Buford complex and SLAP lesions, as well as instability, were evaluated statistically.

Results
The Buford complex was observed in 83 shoulders (2.65%). SLAP lesions were significantly more frequent in patients with the Buford complex than in those without it (81.9% vs. 33.1%, $P < .001$) Shoulders with the Buford complex presented a lower frequency of anterior instability (10.8% vs. 19.3%, $P = .052$) and a higher frequency of posterior instability (1.2% vs. 0.9%, $P = .789$). The prevalence of the Buford complex in patients with and without labral pathologies was 4.6% and 0.3%, respectively ($P < .001$).

Conclusions
This study, to our knowledge, includes the largest cohort in the literature reporting the prevalence of the Buford complex (2.65%). In the 1461 patients without labral tears or multidirectional instability, the prevalence of the Buford complex was 0.3%. This result suggests that the real prevalence of the Buford complex might be lower than that reported previously. In addition to the aforementioned conclusions, the identification of the Buford complex should prompt a thorough evaluation for concomitant SLAP lesions.

Level of evidence
Level III, Cross-Sectional Design

BACK

Measurement of biceps tendon retraction after arthroscopic tenotomy.

El Helou, A., Sebaaly, A., El Rassi, J., et al.

DOI: https://doi.org/10.1016/j.jse.2020.08.027

Background
One of the treatment options for long head of the biceps tendon (LHBT) pathology is tenotomy. To our knowledge, no study in the literature has evaluated the degree of retraction after tenotomy. The goals of this study were to determine the distance of this retraction and to identify its relationship with patient characteristics.

Methods
We conducted an observational prospective survey over a 3-month period among 30 patients operated on arthroscopically by the same surgeon between August 2018 and April 2019. A radiopaque device was introduced inside the LHBT before tenotomy. Radiographs were obtained to evaluate the distance of retraction on day 1, day 30, and day 90.

Results
Thirty patients were included, of whom 63.3% (19) were women. Surgery was performed for a rotator cuff tear in 10 patients (33.3%) and for subacromial impingement in the remainder of patients (66.7%) after failure of conservative management. The mean retraction of the LHBT (distance between the glenoid and clip) increased from 1.9 cm (day 1) to 3.5 cm (day 90). Three radiographic measurements were performed, and all 3 showed significant increases from day 1 to day 90. According to the Student t test, the mean retraction in the subacromial impingement group was significantly higher than that in the rotator cuff tear group on day 1, day 30, and day 90. Body mass index, younger age, sex, and dominant hand did not show any relation with LHBT retraction ($P > .05$). The mean LHBT retraction was significantly higher on day 90 in patients presenting with a positive Popeye sign ($P < .05$).

Conclusion
At 3 months of follow-up, the mean LHBT retraction was 3.5 cm from the glenoid and 2.5 cm from the greater tuberosity. It dynamically increased from day 1 to day 90. The LHBT will retract and sit beyond the transverse humeral ligament in the bicipital groove. The LHBT retracts significantly more when early mobilization of the shoulder is allowed.

Level of evidence
Level IV, Case Series

BACK

Preliminary outcomes of arthroscopic biceps rerouting for the treatment of large to massive rotator cuff tears.

Kim, J.H., Lee, H.J., Park, T.Y., et al.

DOI: https://doi.org/10.1016/j.jse.2020.08.023

Background
We aimed to evaluate the short-term outcomes of arthroscopic biceps rerouting (ABR) for the treatment of large to massive rotator cuff tears (LMRCTs).

Methods
A prospective evaluation of patients treated with ABR for the repair of LMRCTs was performed, with a minimum follow-up period of 18 months. Range of motion and functional outcomes (visual analog scale pain score, American Shoulder and Elbow Surgeons score, and Korean Shoulder Scale score) were assessed preoperatively and at final follow-up. Radiographs were used to evaluate the acromiohumeral interval (AHI). Magnetic resonance imaging was performed at 2 and 12 months postoperatively to examine the integrity of the repaired rotator cuff tendons.

Results
Eighty patients who met the study criteria underwent ABR from March 2017 to January 2019 in our hospital. Of these patients, 61 could be evaluated ≥18 months after surgery. The average age of the enrolled patients was 64.5 years. The visual analog scale pain score decreased from 3.7 preoperatively to 1.6 at final follow-up ($P = .019$), the American Shoulder and Elbow Surgeons score improved from 60.0 to 85.2 ($P < .001$), and the Korean Shoulder Scale score improved from 64.3 to 85.3 ($P = .001$). Assessment of range of motion showed significant improvement in forward flexion (from 138° to 146°, $P < .001$), external rotation at 90° of abduction (from 80° to 85°, $P = .037$), and internal rotation (from spinal level 9 to spinal level 10, $P = .015$) from preoperatively to last follow-up. The AHI was 7.1 mm at baseline and improved significantly to 9.7 mm at 3 months postoperatively ($P < .001$). The mean AHI at last follow-up was only 9 mm, but this was still significantly better than the mean preoperative AHI ($P < .001$). Of the patients, 16 (26%) exhibited a retear of the repaired rotator cuff on magnetic resonance imaging at 12 months postoperatively. Male sex was the only significant risk factor for retear ($P = .037$).

Conclusion
ABR improved the functional and radiologic outcomes of patients with LMRCTs. The ABR technique can be a useful treatment option for LMRCTs.

Level of evidence
Level IV, Case Series

BACK

Cutibacterium acnes in shoulder surgery: a scoping review of strategies for prevention, diagnosis, and treatment.

Foster, A.L., Cutbush, K., Ezure, Y., et al.

DOI: https://doi.org/10.1016/j.jse.2020.11.011

Background
Cutibacterium acnes is a commensal, gram-positive, facultatively anaerobic bacillus that resides in the dermis. Historically thought to be a contaminant when identified on cultured specimens, recent advances in diagnostic technology have now implicated it as the most common organism responsible for postoperative shoulder infections. Despite a recognition of the role of this organism and a significant research interest in recent years, there is clear lack of consensus guideline on strategies to prevent, diagnose, and treat postoperative shoulder infection.

Method
The electronic databases PubMed, MEDLINE, CINAHL, Scopus, and Web of Science were searched in March 2020. All experimental and nonexperimental studies that investigate C acnes in shoulder surgery were included. Inclusion was limited to articles published after 2000 and written in English; reviews, gray literature, or abstracts were excluded. A total of 70 studies were included in this review. This scoping review was performed in accordance with the Extended Preferred Reporting Items of Systematic Reviews and Meta-Analyses Statement for Scoping Reviews (PRISMA-ScR).

Results
Standard surgical prophylactic regimens such as intravenous antibiotics and topical chlorhexidine are ineffective at removing C acnes from the deep layer of the dermis, and there is a shift toward using topical benzoyl peroxide with significantly improved efficacy. An improved understanding of the bacteria has demonstrated that a prolonged culture time of up to 14 days is needed, especially in cases of established infection. Advances in diagnostics such as sonication and molecular-based testing are promising. Although usually thought to be susceptible to a broad range of antibiotics, resistance is emerging to clindamycin. An improved understanding of its ability to form a biofilm highlights the difficulty in treating an established infection.

Conclusion
The role of C acnes causing postoperative infection following shoulder surgery is being increasingly recognized. Strategies for prevention, diagnosis, and treatment have been outlined from both an antimicrobial and surgical perspective. A number of these strategies are emerging and require further research to demonstrate efficacy before implementation into clinical guidelines.

Level of Evidence
Level IV, Scoping Review

BACK

Early postoperative complications after Latarjet procedure: a single-institution experience over 10 years.

Hendy, B.A., Padegimas, E.M., Kane, L., et al.

DOI: https://doi.org/10.1016/j.jse.2020.09.002

Background
The Latarjet procedure is an effective procedure for the treatment of anterior glenohumeral joint instability; however, the complications are concerning. The purpose of this study was to review a single institution's experience with the Latarjet procedure for recurrent anterior glenohumeral instability specifically focusing on early complications.

Methods
This was a retrospective review of all Latarjet procedures performed at a single institution from August 2008 to July 2018. The 90-day complication rate and associated risk factors for all complications and graft failure were recorded. Postoperative radiographs were reviewed for coracoid graft position and screw divergence.

Results
During the study period, 190 Latarjet procedures were performed with 90-day follow-up. The average age was 28.7 ± 11.3 years, male patients comprised 84.2% of the population, and 62.6% of patients had undergone a prior stabilization procedure. We observed 15 complications, for a 90-day complication rate of 9.0%; of the patients, 8 (4.2%) underwent reoperations. Graft or hardware failure occurred in 9 patients (4.7%) with loosened or broken screws, and 6 required reoperations (revision Latarjet procedure in 4, distal tibia allograft in 1, and iliac crest autograft in 1). Fixation with only 1 screw ($P < .001$) and an increased screw divergence angle (37° ± 8° vs. 24° ± 11°, $P = .0257$) were statistically associated with graft failure, whereas the use of cannulated screws ($P = .487$) was not. There were 6 nerve injuries (3.2%), including 2 combined axillary and suprascapular nerve injuries, 1 musculocutaneous nerve injury, 1 brachial plexopathy, 1 peripheral sensory nerve deficit (likely axillary), and 1 sensory plexopathy. Suprascapular nerve injury at the spinoglenoid notch was associated with a longer superior screw (41.0 ± 1.4 mm vs. 33.5 ± 3.5 mm, $P = .035$) and increased screw divergence angle (40° ± 6° vs. 24° ± 11°, $P = .0197$). The coracoid graft was correctly positioned in the axial plane in 71% of cases and in the coronal plane in 73% of cases.

Conclusion
The Latarjet procedure is a procedure that can reliably restore shoulder stability; however, graft- and nerve-related complications are relatively common. Two-thirds of the graft failures required reoperations, and half of the nerve injuries in this study led to residual symptoms. Fixation with only 1 screw and an increased screw divergence angle were significant predictors of graft failure. Suprascapular nerve injury at the spinoglenoid notch was associated with an increased screw divergence angle and longer superior screw.

Level of evidence
Level IV, Case Series

BACK

Return to play criteria among shoulder surgeons following shoulder stabilization.

Hurley, E.T., Matache, B.A., Colasanti, C.A., et al.

DOI: https://doi.org/10.1016/j.jse.2021.01.026

Purpose
The purpose of this study was to survey the members of North American and European shoulder surgery and sports medicine societies to evaluate their criteria for deciding when an athlete can safely return to play (RTP) following shoulder stabilization surgery.

Methods
A survey was sent to the members of the American Shoulder and Elbow Surgeons (ASES), American Orthopaedic Society for Sports Medicine (AOSSM), European Society for Sports Traumatology, Knee Surgery and Arthroscopy (ESSKA), and European Society for Surgery of the Shoulder and the Elbow (SECEC). Surgeons were asked which criteria they used to determine when an athlete can return to play following the arthroscopic Bankart repair and Latarjet procedures, with additional questions on how time from surgery and participation in collision sports affect return.

Results
Overall, 317 surgeons responded to the survey. Following arthroscopic Bankart repair, the most common criteria used were time (98.7%), strength (74.8%), and range of motion (70%). The most commonly reported time point was 4 months (43.8%), and the majority used an additional time period, most commonly 2 months (38.2%), before allowing a collision athlete to return to play (75.4%). Interestingly, the addition of a remplissage procedure did not affect decision making regarding RTP in most cases (92.1%). Following the Latarjet procedure, the most common criteria used were time (98.4%), strength (67.5%), and range of motion (65.9%). Less than half reported using imaging to assess for radiographic union before allowing patients to return to play (47%), and the most common modality was plain radiography (80%). The most common time point was 4 months (33.1%), and the majority reported waiting an additional period of time, most commonly by 2 months (25.9%), before allowing a collision athlete to return to play (59.6%).

Conclusion
Despite the absence of evidence-based guidelines on when athletes can safely return to play following shoulder stabilization surgery, there exists minimal variability in recommendations between North American and European shoulder surgeons. Further research is required to better define criteria for RTP after the arthroscopic Bankart repair and Latarjet procedures.

Level of evidence
Survey Study

BACK

Arthroscopic surgical management of shoulder secondary to shoulder injury related to vaccine administration (SIRVA): a case report.

Wong, W., Okafor, C., Belay, E., et al.

DOI: https://doi.org/10.1016/j.jse.2021.01.027

Over the last decade, the proportion of Americans receiving the influenza vaccine has increased across all age groups and is increasingly mandated by employers.5 Minor injection site reactions after intramuscular administration of the inactivated influenza vaccine in the deltoid, such as transient pain and erythema, are frequently reported in both children and adults.4 However, a small proportion of patients report persistent shoulder pain and shoulder dysfunction after inactivated influenza vaccine administration. These sequelae after vaccine administration may present as subacromial or subdeltoid bursitis,1,6,12,16,20 glenohumeral joint effusion with synovitis,1,18 tendinopathy of the rotator cuff,1,12,19 or bone lytic lesions.8 This adverse reaction after vaccine administration has collectively been categorized as “shoulder injury related to vaccine administration” (SIRVA), and was officially added to the National Vaccine Injury Compensation Program’s Vaccine Injury Table in 2017.10

Currently, literature on surgical management of SIRVA is limited. In this case, we describe a patient who presented with significant rotator cuff bursitis and bursal foreign body reaction 12 weeks after influenza vaccine administration managed with arthroscopic surgical intervention after failed conservative management.

Jeong, H.J., Kim, H.S., Rhee, S.M., et al.

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

Background
The prognosis of rotator cuff repair (RCR) may be affected by the shape and quality of the torn rotator cuff tendon. However, only a few studies have reported on folded rotator cuff tears (FCTs). Therefore, this study aimed to evaluate the prognostic factors for FCT and clinical outcomes of FCT repair.

Methods
Through propensity score matching (PSM), 200 (40 patients with FCTs and 160 controls) of 1927 patients who underwent RCR from 2010 to 2016 were included. The variables not used for PSM were compared. The anatomic and functional outcomes were assessed at the final follow-up (32.3 ± 21.2 months), and the related prognostic factors for FCTs were evaluated.

Results
The risk factors for FCT were heel-type spur (odds ratio [OR], 11.6; $P < .001$) and delamination (OR, 2.3; $P = .034$). Although the functional scores at the final follow-up for both groups improved postoperatively and were not significantly different, the visual analog scale scores for pain (1.9 ± 2.1 vs. 1.2 ± 1.7, $P = .034$) and American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES) scores (83.1 ± 14.3 vs. 88.5 ± 12.2, $P = .018$) were significantly worse in the FCT group at 6 months postoperation. The retear rate was significantly higher in the FCT group (25.0 vs. 10.0%, $P = .018$). An FCT was a significant risk factor for retears (OR, 3.0; $P = .015$); however, a subgroup analysis revealed that the retear rate according to the management strategy for the folded portion (débridement of the folded portion vs. en masse repair including the folded portion) was not significantly different (26.7 vs. 24.0%, $P > .99$).

Conclusion
The risk factors for FCTs were heel-type spur and delamination. The retear rate was significantly higher for patients with FCTs. An FCT was indicative of poor quality of the remaining tendon;

BACK

therefore, FCT may be a prognostic factor for worse functional outcomes during the early postoperative period and poor healing potential.

Level of evidence
Level III, Retrospective Cohort Comparison Treatment Study

BACK

Knee Surgery, Sports Traumatology, Arthroscopy, volume 29, issue 6

Arthroscopic lateral capsule resection is enough for the management of lateral epicondylitis.

Paksoy, A.E., Laver, L., Tok, O., et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06255-3

Purpose
Controversy exists with regards to the etiology and treatment of lateral epicondylitis and the role of the lateral capsule in this pathology. The aim of this study was to compare arthroscopic lateral capsule resection with or without extensor carpi radialis brevis (ECRB) tendon debridement for treatment of lateral epicondylitis.

Methods
This is a retrospective study of 38 patients who underwent arthroscopic surgery for LE with two different techniques: Eighteen patients were treated with arthroscopic lateral capsular resection (LCR) + ECRB debridement and 20 patients were treated with arthroscopic LCR alone, without ECRB debridement. Both groups were assessed with Quick Disabilities of the Arm, Shoulder and Hand (QDASH) score for function and Visual Analog Scale (VAS) score for pain.

Results
Quick DASH scores were 12 ± 5 and 13 ± 4 at Groups 1 and 2, respectively, without any statistically significant difference. VAS pain scores were 15 ± 2 for both groups. VAS function scores were 85 ± 22 and 86 ± 18 at Groups 1 and 2 respectively. Sick leave periods in terms of weeks were 7 ± 5 and 7 ± 4 at Groups 1 and 2, respectively. There was no statistically significant difference in outcome of the two groups compared in terms of VAS pain, function scores, failure (re-operation) rates and sick leave period at the end of final follow-up.

Conclusion
Both arthroscopic LCR alone and Arthroscopic LCR with ECRB debridement for the management of refractory LE provide significant improvement in pain and function. Isolated Arthroscopic LCR could be a sufficient surgical treatment for refractory LE. Thus, ECRB debridement or release may not be necessary in every case.

Level of evidence
IV.

BACK

American Journal of Sports Medicine (AJSM), Volume 49, Issue 6

Total Shoulder Arthroplasty After Previous Arthroscopic Surgery for Glenohumeral Osteoarthritis: A Case-Control Matched Cohort Study

Philip-C. Nolte, MD, MA, Bryant P. Elrick, MSc, Justin W. Arner, MD, T.J. Ridley, MD, Thomas E. Woolson, BS, Anna-K. Tross, MD, Kaare S. Midtgaard, MD, Peter J. Millett, MD, MSc#

First Published April 29, 2021; pp. 1839–1846

https://doi.org/10.1177/03635465211006479

Background: When comprehensive arthroscopic management (CAM) for glenohumeral osteoarthritis fails, total shoulder arthroplasty (TSA) may be needed, and it remains unknown whether previous CAM adversely affects outcomes after subsequent TSA.

Purpose: To compare the outcomes of patients with glenohumeral osteoarthritis who underwent TSA as a primary procedure with those who underwent TSA after CAM (CAM-TSA).

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

Methods: Patients younger than 70 years who underwent primary TSA or CAM-TSA and were at least 2 years postoperative were included. A total of 21 patients who underwent CAM-TSA were matched to 42 patients who underwent primary TSA by age, sex, and grade of osteoarthritis. Intraoperative blood loss and surgical time were assessed. Patient-reported outcome (PRO) scores were collected preoperatively and at final follow-up including the American Shoulder and Elbow Surgeons (ASES) score, Single Assessment Numeric Evaluation (SANE), shortened version of Disabilities of the Arm, Shoulder and Hand (QuickDASH), 12-Item Short Form Health Survey Physical Component Summary (SF-12 PCS), visual analog scale, and patient satisfaction. Revision arthroplasty was defined as failure.

Results: Of 63 patients, 56 of them (19 CAM-TSA and 37 primary TSA; 88.9%) were available for follow-up. There were 16 female (28.6%) and 40 male (71.4%) patients with a mean age of 57.8 years (range, 38.8-66.7 years). There were no significant differences in intraoperative blood loss ($P > .999$) or surgical time ($P = .127$) between the groups. There were 4 patients (7.1%) who had failure, and failure rates did not differ significantly between the CAM-TSA (5.3%; $n = 1$) and primary TSA (8.1%; $n = 3$) groups ($P > .999$). Additionally, 2 patients underwent revision arthroplasty because of trauma. A total of 50 patients who did not experience failure (17 CAM-TSA and 33 primary TSA) completed PRO measures at a mean follow-up of 4.8 years (range, 2.0-11.5 years), with no significant difference between the CAM-TSA (4.4 years [range, 2.1-10.5 years]) and primary TSA (5.0 years [range, 2.0-11.5 years]) groups ($P = .164$). Both groups improved significantly from preoperatively to postoperatively in all PRO scores ($P < .05$). No significant differences in any median PRO scores between the CAM-TSA and primary TSA groups, respectively, were seen at final follow-up: ASES: 89.9 (interquartile range [IQR], 74.9-96.6) versus 94.1 (IQR, 74.9-98.3) ($P = .545$); SANE: 84.0 (IQR, 74.0-94.0) versus 91.5 (IQR, 75.3-99.0) ($P = .246$); QuickDASH: 9.0 (IQR, 3.4-27.3) versus 9.0 (IQR, 5.1-18.1) ($P = .921$); SF-12 PCS: 53.8 (IQR, 50.1-57.1) versus 49.3 (IQR, 41.2-56.5) ($P = .065$); and patient satisfaction: 9.5 (IQR, 7.3-10.0) versus 9.0 (IQR, 5.3-10.0) ($P = .308$).

Conclusion: Patients with severe glenohumeral osteoarthritis who failed previous CAM benefited similarly from TSA compared with patients who opted directly for TSA.

BACK

Bankart Repair Versus Latarjet Procedure for Recurrent Anterior Shoulder Instability: A Systematic Review and Meta-analysis of 3275 Shoulders

Mohamed A. Imam, MD, MSc(Hons), PhD, Mohamed S.A. Shehata, MD, Alexander Martin, BMedSci(Hons), BMBS (Hons), MRCSⅡ, Hamdy Attia, MD, Muhammad Sinokrot, MD, Eshak I. Bahbah, MD, Stephen Gwilym, MBBS, BSc, PhD, FRCS, Joshua Jacob, MBBS, D.Orth, MSc, FRCS, A. Ali Narvani, BSc, MBBS(Hons), MSc, FRCS, FSEM, Dominik C. Meyer, MD

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https://doi.org/10.1177/0363546520962082

Background: Little consensus is available regarding the standard treatment for recurrent anterior instability of the shoulder. Typically, treatment selection has been based on training and tradition rather than the available evidence.

Purpose: This study aimed to compare the clinical outcomes between arthroscopic Bankart procedure and the Latarjet procedure in the treatment of recurrent anterior shoulder instability with emphasis on follow-up time.

Study Design: Systematic review and meta-analysis.

Methods: We searched PubMed, Cochrane Central Register of Controlled Trials, Scopus, Ovid, and Web of Science up to January 2018 and included studies that compared arthroscopic Bankart versus Latarjet for treatment of anterior shoulder instability. Continuous data, such as operative time and patient-reported outcomes, were pooled as mean differences (MDs), whereas dichotomous data, such as recurrence, revision, redislocation, arthropathy, infection, and hematoma, were pooled as risk ratios (RRs), with 95% CIs.

Results: Pooling data from 7 cohort studies (3275 patients) showed that arthroscopic Bankart was associated with a higher risk of redislocation (RR, 2.74; 95% CI, 1.48-5.06; P = .03), a higher risk of recurrence (RR, 2.87; 95% CI, 1.91-4.30; P < .0001), and a lower risk of infection (RR, 0.16; 95% CI, 0.06-0.43; P = .0002) compared with Latarjet, while the effect size did not favor arthroscopic Bankart or Latarjet in terms of Rowe score (MD, 0.22; 95% CI, –5.64 to 6.08; P = .94), revision (RR, 0.34; 95% CI, 0.08-1.39; P = .13), and hematoma (RR, 0.20; 95% CI, 0.03-1.19; P = .07). The effect estimate showed a pronounced advantage for Latarjet from 6 to 10 years postoperatively in terms of recurrence and redislocation (RR, 3.00; 95% CI, 1.98-4.56 and RR, 2.85; 95% CI, 1.51-5.38, respectively).

Conclusion: Our results showed that Latarjet had less risk of recurrence and redislocation with longer follow-up time. Both procedures were comparable in terms of Rowe score, the need for revision, and postoperative hematoma formation, whereas Bankart repair was associated with a lower risk of infection.

BACK

The Journal of Bone and Joint Surgery (JBJS), Volume 103, Issue 11

On-Track Lesions with a Small Distance to Dislocation Are Associated with Failure After Arthroscopic Anterior Shoulder Stabilization

Li, Ryan T., MD; Kane, Gillian, BS; Drummond, Mauricio, MD; Golan, Elan, MD; Wilson, Kevin, MD; Lesniak, Bryson P., MD; Rodosky, Mark, MD; Lin, Albert, MD;

DOI: 10.2106/JBJS.20.00917

Background: Off-track lesions are strongly associated with failure after arthroscopic Bankart repair. However, on-track lesions with a small distance-to-dislocation (DTD) value, or "near-track lesions," also may be at risk for failure. The purpose of the present study was to determine the association of DTD with failure after arthroscopic Bankart repair.

Methods: We performed a retrospective analysis of 173 individuals who underwent primary arthroscopic Bankart repair between 2007 and 2015. Glenoid bone loss and Hill-Sachs lesion size were measured with use of previously reported methods. Patients with failure were defined as those who sustained a dislocation after the index procedure, whereas controls were defined as individuals who did not. DTD was defined as the distance from the medial edge of the Hill-Sachs lesion to the medial edge of the glenoid track. Receiver operating characteristic (ROC) curves were constructed for DTD to determine the critical threshold that would best predict failure. The study population was subdivided into individuals ≥20 years old and <20 years old.

Results: Twenty-eight patients (16%) sustained a recurrent dislocation following Bankart repair. Increased glenoid bone loss ($p < 0.001$), longer Hill-Sachs lesion length ($p < 0.001$), and decreased DTD ($p < 0.001$) were independent predictors of failure. ROC curve analysis of DTD alone demonstrated that a threshold value of 8 mm could best predict failure (area under the curve [AUC] = 0.73). DTD had strong predictive power (AUC = 0.84) among individuals ≥20 years old and moderate predictive power (AUC = 0.69) among individuals <20 years old. Decreasing values of DTD were associated with a stepwise increase in the failure rate.

Conclusions: A "near-track" lesion with a DTD of <8 mm, particularly in individuals ≥20 years old, may be predictive of failure following arthroscopic Bankart repair. When using the glenoid track concept as the basis for surgical decision-making, clinicians may need to consider the DTD value as a continuous variable to estimate failure instead of using a binary on-track/off-track designation.

Level of Evidence: Prognostic Level III. See Instructions for Authors for a complete description of Levels of Evidence.

BACK

Lower Extremity

Arthroscopy, Volume 37, Issue 6

Ligamentum Teres Reconstruction May Lead to Improvement in Outcomes Following a Secondary Hip Arthroscopy for Symptomatic Microinstability: A Systematic Review

Jacob Shapira, Mitchell J. Yelton, Philip J. Rosinsky, David R. Maldonado, Mitchell B. Meghpara, Hari K. Ankem, Ajay C. Lall, Benjamin G. Domb

https://doi.org/10.1016/j.arthro.2021.01.022

Purpose
To present the indications, surgical technique, outcomes, and complications for patients undergoing arthroscopic reconstruction of the ligamentum teres (LT).

Methods
Articles were included if they had postoperative patient-reported outcomes (PROs) for arthroscopic LT reconstruction. Studies were analyzed for patient demographics, clinical assessment and indications, radiographic and magnetic resonance imaging data, concomitant procedures performed, PROs, surgical techniques, intra-articular classifications, complications, and need for follow-up surgeries. For PROs, the standard mean difference was calculated. The proportion of patients achieving patient acceptable symptomatic state for postoperative modified Harris Hip Score (≥74) was recorded. The number of patients achieving minimal clinically important difference for modified Harris Hip Score (Δ ≥8) was calculated.

Results
The majority of the cases were revision arthroscopies. Of the 3 studies reporting on patients undergoing LT reconstruction due to microinstability, 4, 9, and 11 patients demonstrated a mean improvement of 25.7, 35.2, and 27.7 in modified Harris Hip, respectively. In addition, one of the studies reported a mean improvement of 31.1 and 4.2 in Nonarthritic Hip Score and visual analog scale, respectively. Of the 3 studies, the percentile of patients surpassing minimal clinically important difference and patient acceptable symptomatic state ranged between 50% and 100% and 33.3% and 88.8%, respectively. Overall, 5 patients underwent revision hip arthroscopy due to adhesions, iliopsoas impingement, and persistent microinstability, and 3 patients underwent a secondary hip arthroplasty due to refractory pain and radiographic evidence of hip osteoarthritis.

Conclusion
Reconstruction of the LT may be considered in surgical management for patients with symptomatic hip instability due to soft-tissue causes. Current evidence supports for LT reconstruction predominantly for patients experiencing refractory instability following previous hip preservation procedures. Patients' expectations as well as the relatively high reoperation rate (i.e., 33%) should be discussed before the procedure.

Level of Evidence
Level IV, systematic review of Level IV studies

BACK

Osteoarthrosis, Advanced Age, and Female Sex Are Risk Factors for Inferior Outcomes After Hip Arthroscopy and Labral Debridement for Femoroacetabular Impingement Syndrome: Case Series With Minimum 10-Year Follow-Up

Alexander Zimmerer, Annalena Ramoser, Marcus Streit, Viktor Janz, Christian Sobau, Georgi I. Wassilew, Wolfgang Miehlke

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Purpose
(1) To determine the cumulative survivorship using the endpoint of total hip arthroplasty (THA) correlated with osteoarthrosis (Tönnis grade ≤ 1 vs Tönnis grade > 1) at a minimum 10-year follow-up and (2) to identify risk factors for THA conversion.

Methods
This study examined 112 patients who underwent hip arthroscopy for femoroacetabular impingement syndrome (FAIS) between 2007 and 2009. The inclusion criterion was primary hip arthroscopy to treat FAIS with corresponding chondrolabral pathologies. The exclusion criteria were secondary hip pathologies, revision hip arthroscopy, or dysplasia. The mean follow-up period was 11 years. Cumulative survival was estimated by Kaplan-Meier analysis using the endpoint of THA. Risk factors for THA conversion were identified using a multivariate Cox proportional hazards model.

Results
Forty patients underwent THA. The cumulative survivorship rate at 11 years was 86% for patients with a Tönnis grade of 1 or less and 46% for those with a Tönnis grade greater than 1. Osteoarthrosis, advanced age, and female sex were associated with lower hip survival rates. In particular, the risk of THA conversion was 24% higher for patients with an advanced age at the time of surgery, 97% higher for female patients, and 133% higher for hips with a Tönnis grade greater than 1.

Conclusions
The survivorship rate at a mean 11-year follow-up after arthroscopic FAIS therapy was 86.3% in the group with a Tönnis grade of 1 or less and 46.4% in the group with a Tönnis grade greater than 1. The presence of osteoarthrosis, advanced age, and female sex adversely affected the outcome.

Level of Evidence
Level III, retrospective comparative study.

BACK

Complete Capsular Closure Provides Higher Rates of Clinically Significant Outcome Improvement and Higher Survivorship Versus Partial Closure After Hip Arthroscopy at Minimum 5-Year Follow-Up

Edward C. Beck, Benedict U. Nwachukwu, Jorge Chahla, Ian M. Clapp, Kyleen Jan, Shane J. Nho

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Purpose
To (1) compare the rates of reaching threshold hip-specific outcome scores for achieving the minimal clinically important difference (MCID) and patient acceptable symptomatic state (PASS) in patients who underwent partial versus complete T-capsulotomy repair and (2) identify the failure rates in each group 5 years after undergoing hip arthroscopy for femoroacetabular impingement syndrome (FAIS).

Methods
Data from consecutive patients who underwent hip arthroscopy for FAIS performed by a single fellowship-trained surgeon from January 2011 to March 2013 were collected and analyzed. Baseline data, hip-specific outcomes, and clinical failure rates were recorded at a minimum of 5 years postoperatively. Patients with partial T-capsulotomy repair were matched 1:3 by age, body mass index, and sex to patients with complete T-capsulotomy repair. Threshold scores for achieving the MCID and PASS were calculated and compared between the 2 groups. Additionally, rates of revision and conversion to total hip arthroplasty (THA) were compared between the groups.

Results
A total of 379 patients were available for analysis (39 partial and 340 complete repairs), with 100 patients included in the matching process (25 in the partial-repair group and 75 in the complete-repair group). Comparison of radiographic parameters, including the Tönnis grade, alpha angle, and lateral center-edge angle, between the 2 groups showed no statistically significant difference ($P > .05$ for all). Comparison of postoperative score averages between the partial- and complete-closure groups showed a significant difference in the Hip Outcome Score–Activities of Daily Living Subscale (85.4 ± 17.7 vs 94.6 ± 7.8, $P < .001$), Hip Outcome Score–Sports Subscale (76.6 ± 26.2 vs 89.3 ± 16.8, $P = .034$), modified Harris Hip Score (83.2 ± 19.7 vs 90.5 ± 11.2, $P = .035$), and visual analog scale pain score (24.5 ± 30.8 vs 13.4 ± 15.8, $P = .035$). A total of 65 complete-repair patients (95.6%) achieved the MCID for at least 1 outcome measure versus 18 patients with partial repair (78.3%) ($P = .04$). A total of 69 complete-repair patients (92%) achieved the PASS for at least 1 outcome measure versus 18 partial-repair patients (72%) ($P = .017$). Of the 39 partial-repair patients, 35.9% (n = 14) underwent revision or conversion to THA, as compared with 2.9% (n = 10) in the overall cohort.

Conclusions
At a minimum 5-year follow-up, patients with complete capsular closure after hip arthroscopy for FAIS show superior long-term outcomes and achieve higher rates of meaningful clinical success when compared with patients with partial capsular closure. Furthermore, patients with partial capsular repair undergo revision or conversion to THA at high rates.

Level of Evidence
Level III, retrospective comparative study.

BACK

Endoscopic Iliotibial Band Release During Hip Arthroscopy for Femoroacetabular Impingement Syndrome and External Snapping Hip Had Better Patient-Reported Outcomes: A Retrospective Comparative Study

Shanxing Zhang, Chenhui Dong, Zhongli Li, Zhigang Wang, Ming Wei, Peijian Tong, Chunbao Li

https://doi.org/10.1016/j.arthro.2021.01.040

Purpose
To compare patient-reported outcomes (PROs) in patients with femoroacetabular impingement (FAI) syndrome and external snapping hip (ESH) treated with hip arthroscopy with or without endoscopic iliotibial band (ITB) release.

Methods
Retrospective review case series with both FAI syndrome and ESH who underwent surgical treatment under same indications. According to the primary operation that was determined by patients themselves, the patients undergoing ITB release during hip arthroscopy for FAI syndrome were enrolled in the ITB-R group, and patients undergoing hip arthroscopy without ITB release were enrolled in non-ITB-R group. Patients with dysplasia, severe osteoarthritis, revision, and bilateral surgery were excluded. PROs including international Hip Outcome Tool (iHOT-33), modified Harris Hip Score (mHHS), visual analog scale for pain (VAS-pain) and VAS-satisfaction, and the rates of achieving minimal clinically important difference, patient acceptable symptomatic state (PASS), and substantial clinical benefit for the PROs at 2 years operatively were comparative analyzed.

Results
The prevalence of ESH in patients with FAI syndrome who underwent hip arthroscopy in our institution was 4.9% (30 of 612 hips). The mean age at the time of surgery was 33.1 ± 6.9 years (range 22-48 years). After exclusion, 16 patients (16 hips) were enrolled into ITB-R group and 11 patients (11 hips) enrolled into non-ITB-R group. PROs including iHOT-33, mHHS, VAS-pain, and VAS-satisfaction in patients in ITB-R group were better than that in non-ITB-R group at 2 years postoperatively (P = .013, .016, .002, and .005, respectively). The rates of achieving PASS for mHHS, PASS for VAS-pain, and substantial clinical benefit for iHOT-33 of patients in ITB-R group were significantly better than that in non-ITB-R group (P = .009, .006, and .027, respectively).

Conclusions
Patients with both FAI syndrome and ESH undergoing ITB release during hip arthroscopy had better PROs than those undergoing hip arthroscopy without ITB release.

Level of Evidence
Level III, retrospective comparative study.

BACK

Results of Arthroscopic Treatment of Acute Posterior Cruciate Ligament Avulsion Fractures With Suspensory Fixation

Wei Zheng, Wanxing Hou, Ziyang Zhang, Peicong Li, Bing Zhou, Hongwei Li, Bin Pan

https://doi.org/10.1016/j.arthro.2021.01.044

Purpose
This study aimed to evaluate the clinical outcomes for arthroscopic treatment for acute posterior cruciate ligament (PCL) avulsion fractures with a suspensory technique.

Methods
A total of 30 acute (<3 weeks) isolated PCL tibial avulsion fractures were fixed under arthroscopy using the Endobutton device. After arthroscopic exploration and reduction of the bony fragment, a single tibia tunnel was established; then, the titanium button was guided through the tunnel and flipped onto the bony fragment to stabilize the fracture. Finally, an interference screw was squeezed into the tunnel to fix the end of the loop. Clinical and functional outcomes were evaluated using the Lysholm score, the 2000 International Knee Documentation Committee (IKDC) subjective score, and the IKDC examination form.

Results
The mean follow-up time was 32 months (range, 24-47 months). The mean age of the patients was 41 years (range, 21-65 years). All patients achieved bony union and regained satisfactory knee function. No popliteal neurovascular complications or implant loosening was observed. The mean Lysholm score increased from 20.9 ± 7.0 before operation to 97.1 ± 2.7 at the final follow-up. The mean 2000 IKDC subjective score improved from 17.2 ± 5.2 to 96.8 ± 2.6. The IKDC examination grade also improved significantly.

Conclusions
This suspensory technique under arthroscopy is a simple, safe, and minimally invasive treatment for PCL tibial avulsion fracture. Suspensory fixation resulted in satisfactory outcomes, including good knee stability and fracture union; this technique can be a reliable alternative to various surgical methods.

Level of Evidence
Level IV, therapeutic study.

BACK

Tranexamic Acid Has No Effect on Postoperative Hemarthrosis or Pain Control After Anterior Cruciate Ligament Reconstruction Using Bone–Patellar Tendon–Bone Autograft: A Double-Blind, Randomized, Controlled Trial

Jordan W. Fried, David A. Bloom, Eoghan T. Hurley, Samuel L. Baron, Jovan Popovic, Kirk A. Campbell, Eric J. Strauss, Laith M. Jazrawi, Michael J. Alaia

https://doi.org/10.1016/j.arthro.2021.01.037

Purpose
The purpose of this double-blind, randomized, controlled trial was to evaluate the use of intravenous (IV) tranexamic acid (TXA) in patients undergoing primary bone–patellar tendon–bone (BPTB) anterior cruciate ligament reconstruction (ACLR) regarding postoperative hemarthrosis, pain, opioid consumption, and quadriceps atrophy and activation.

Methods
A controlled, randomized, double-blind trial was conducted in 110 patients who underwent ACLR with BPTB autograft. Patients were equally randomized to the control and experimental groups. The experimental group received two 1-g boluses of IV TXA, one prior to tourniquet inflation and one prior to wound closure; the control group did not receive TXA. If a clinically significant hemarthrosis was evident, the knee was aspirated and the volume of blood (in milliliters) was recorded. Additionally, we recorded perioperative blood loss (in milliliters); visual analog scale scores on postoperative days 1, 4, and 7 and at postoperative weeks 1, 6, and 12; postoperative opioid consumption on postoperative days 1, 4, and 7; range of motion (ROM) and ability to perform a straight leg raise at postoperative weeks 1, 6, and 12; and preoperative and postoperative thigh circumference ratio.

Results
There was no significant difference in perioperative blood loss between the TXA and control groups (32.5 mL vs 35.6 mL, P = .47). In the TXA group, 23 knees were aspirated; in the control group, 26 knees were aspirated (P = .56). No significant difference in postoperative hemarthrosis volume was seen in patients who received IV TXA versus those who did not (26.7 mL vs 37.3 mL, P = .12). There was no significant difference in visual analog scale scores between the 2 groups (P = .15); in addition, there was no difference in postoperative opioid consumption (P = .33). No significant difference in ROM, ability to perform a straight leg raise, or postoperative thigh circumference ratio was observed (P > .05 for all).

Conclusions
IV TXA in patients who undergo ACLR with BPTB autograft does not significantly impact perioperative blood loss, postoperative hemarthrosis, or postoperative pain levels. Additionally, no significant differences were seen in early postoperative recovery regarding ROM or quadriceps reactivation.

Level of Evidence
Level I, randomized controlled trial.

BACK

All-Arthroscopic Hydrogel-Based Autologous Chondrocyte Transplantation in the Knee Joint: Good Clinical and Magnetic Resonance Imaging Outcome After 24 Months

Fabian Blanke, Nicola Oehler, Maximilian Haenle, Robert Lenz, Stephan Vogt, Thomas Tischer

https://doi.org/10.1016/j.arthro.2021.01.038

Purpose
To evaluate subjective and objective clinical and magnetic resonance imaging–based radiologic outcomes after short-term follow-up in patients with focal full-size cartilage lesions of the knee joint treated with all-arthroscopic hydrogel-based autologous chondrocyte transplantation.

Methods
A retrospective study on patients with isolated focal cartilage defects of the knee joint who were treated with arthroscopically conducted matrix-induced autologous chondrocyte transplantation was performed. Clinical scores were assessed at baseline and final follow-up using the Tegner Score, visual analog scale, the International Knee Documentation Committee, and the 5 subscales of the Knee Injury and Osteoarthritis Outcome Score. Magnetic resonance imaging scans of the treated knee joints were evaluated with the updated MOCART (Magnetic Resonance Observation of Cartilage Repair Tissue) 2.0 scoring system at follow-up.

Results
Twenty-nine consecutive patients were included in the study. Mean time to follow-up was 24.9 ± 1.1 months. Average visual analog scale decreased significantly from 6.5 ± 3.1 preoperatively to 2.3 ± 1.6 at follow-up ($P < .0001$). Tegner score increased from 3.1 ± 1.3 to 4.3 ± 1.2 ($P < .0001$) and the International Knee Documentation Committee from 43.8 ± 21.9 to 64.9 ± 18.9 ($P < .0001$). Also, all Knee Injury and Osteoarthritis Outcome Score subscales displayed significant improvements. Patients showed similar improvements of nearly all clinical scores independent of the defect size. Average MOCART2.0 score was 70.0 ± 13.6 and 20 patients scored ≥70 points. All 8 patients with large defects (>5 cm2) scored ≥75 points.

Conclusions
In this small study, injectable matrix-induced autologous chondrocyte transplantation therapy in the knee joint led to favourable clinical and radiologic short-term results with significant improvements in all clinical scores and MOCART2.0 scores, confirming morphologic integrity of the transplanted chondrocytes. Therefore, this minimally invasive procedure represents a promising operative technique for cartilage regeneration, even for large-diameter lesions.

Level of Evidence
IV, therapeutic case series

BACK

Surgical Timing Does Not Interfere on Clinical Outcomes in Combined Reconstruction of the Anterior Cruciate Ligament and Anterolateral Ligament: A Comparative Study With Minimum 2-Year Follow-Up

Camilo Partezani Helito, Marcel Faraco Sobrado, Pedro Nogueira Giglio, Marcelo Batista Bonadio, José Ricardo Pécora, Riccardo Gomes Gobbi, Gilberto Luis Camanho

https://doi.org/10.1016/j.arthro.2021.01.045

Purpose
To compare the functional outcomes, knee stability, failure rate and complication rates of combined anterior cruciate ligament (ACL) and anterolateral ligament (ALL) reconstruction with hamstrings grafts between acute and chronic cases.

Methods
Consecutive patients who underwent combined ACL and ALL reconstruction with hamstrings grafts were evaluated. Patients operated on less than 8 weeks after injury were allocated to group 1, and the others were allocated to group 2. Demographic data, knee stability, and functional outcomes of the 2 groups were evaluated.

Results
Thirty-four patients in the acute group and 96 in the chronic group were evaluated. The follow-up time was similar between the groups (28.7 ± 5.2 [24-43] months vs 29.4 ± 7.2 [24-58] months; P = 0.696). No differences were found between the groups in age, sex, trauma mechanism, presence of knee hyperextension, graft diameter, and meniscal injuries. There was no difference between the groups in the postoperative KT-1000 and in the pre- or postoperative pivot shift. The preoperative KT-1000 was higher in group 2 (7.9 ± 1.1 vs 7.4 ± 1.2; P = 0.031). There were no differences in the International Knee Documentation Committee or Lysholm. Three (2.3%) patients developed failure, 1 (2.9%) in group 1 and 2 (2.1%) in group 2. The total complication rate was 10% and did not differ between the groups.

Conclusions
Combined ACL and ALL reconstruction has similar outcomes in patients undergoing surgery in the acute and chronic phases. Patients with chronic injury have similar knee stability, functional scores, and failure rates as acute-injury patients, and patients with acute injury have no more complications than chronic patients.

Level of Evidence
Level III, retrospective comparative therapeutic trial.

BACK

Outcomes After Arthroscopic Osteochondroplasty for Femoroacetabular Impingement Secondary to Slipped Capital Femoral Epiphysis: A Systematic Review

Masayoshi Saito, Yuichi Kuroda, Karadi Hari Sunil Kumar, Vikas Khanduja

https://doi.org/10.1016/j.arthro.2020.12.213

Purpose
To determine the efficacy of arthroscopic osteochondroplasty for patients with femoroacetabular impingement (FAI) secondary to slipped capital femoral epiphysis (SCFE).

Methods
A systematic review was performed based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines using Embase, PubMed (Medline), and Cochrane Library up to November 1, 2019. Data including patient demographics, slip severity according to Southwick, outcomes, and complications were retrieved from eligible studies that reported a minimum 3-month follow-up of arthroscopic osteochondroplasty for FAI secondary to SCFE. Methodological Index for Non-Randomized Studies (MINORS) criteria was used to assess quality of studies. Heterogeneity and quality were evaluated using P values and the I2 statistic.

Results
Six studies (90 hips) were analyzed. The range of MINORS scores was 8 to 11. Most studies were level of evidence 4 (n = 4, 66.7%), with more men than women (n = 5, 83.3%). The ranges of age, body mass index, and follow-up length after surgery were 10 to 42 years, 17.5 to 32.3 kg/m2, and 3 to 56 months, respectively. The Modified Harris Hip Score (mHHS) was the most commonly used score to report on clinical outcomes (n = 2 studies, 28 hips) with a significant improvement following surgery. Three studies reported an improvement in internal rotation (IR) of the hip with a range of improvement of 17° to 32°, with low heterogeneity (I2 = 0% and P = .531). Five studies reported a significant correction of the α angle, with range of improvement of 19.9° to 37.3°. The range of postoperative α angle was 32° to 67°, and 3 studies achieved appropriate postoperative α angle (40° to 50°), with low heterogeneity (I2 = 8.4% and P = .336). The total number of complications was 8 (1 major complication) and there were 6 revisions, with low heterogeneity.

Conclusion
Arthroscopic osteochondroplasty for FAI secondary to SCFE provides good short- to medium-term outcomes and improves IR of the hip, with the ability to potentially correct the α angle with a low rate of complications and revision.

Level of Evidence
IV, systematic review of level II to IV studies.

BACK

Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA), Volume 29, Issue 6

Higher risk of contralateral anterior cruciate ligament (ACL) injury within 2 years after ACL reconstruction in under-18-year-old patients with steep tibial plateau slope.

Grassi, A., Pizza, N., Zambon Bertoja, J. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06195-y

Purpose
To assess the role of Tibial Plateau Slope (TPS) as risk factor for early Anterior Cruciate Ligament (ACL) reconstruction failure and contralateral ACL injury in a population of patients with less than 18 years of age and operated on with the same surgical technique.

Methods
Ninety-four consecutive patients (mean age 15.7 ± 1.5 years) with at least 2 years of follow-up, who underwent ACL reconstruction with a single-bundle plus lateral-plasty hamstring technique in the same centre were included. Subsequent ACL injuries (ipsilateral ACL revision or contralateral ACL reconstruction) were assessed within the first 2 years after surgery. Anterior, central, posterior TPS of medial compartment were measured on lateral radiographs and compared between patients with intact graft and those with a second injury. Cut-off values with sensitivity and specificity were calculated with receiver operating characteristic (ROC) analysis. Survival analysis for second ACL injuries and multivariate analysis were performed.

Results
Eight patients (9%) had ipsilateral ACL Revision and eight patients (9%) had contralateral ACL reconstruction. Patients with contralateral injury had a higher Central TPS with respect to those without second injury (12.6° ± 2.8° vs 9.3° ± 3.7°, p = 0.042). No differences were present in patients with ipsilateral ACL revision. Sensitivity and specificity for central TPS slope ≥ 12° to detect a contralateral rupture were 63% and 75% (p = 0.0092), for Anterior TPS were 100% and 52% (p = 0.0009). Patients with TPS values exceeding these cut-offs had higher rate of contralateral ACL injuries (19%vs4%, p = 0.0420) and lower 2-year survival (p = 0.0049). Multivariate analysis identified pre-operative sport level and TPS (either anterior or central) as risk factors for contralateral injuries.

Conclusions
Steep tibial plateau slope ≥ 12° is associated with a higher risk of contralateral ACL injury within 2 years after ACL reconstruction in patients less than 18 years of age. However, TPS has no role in early ipsilateral re-injury after combined ACL reconstruction and lateral plasty. The clinical relevance is that both the surgeon and the patient should be aware of this higher risk and consider it in the rehabilitation phase to reduce the incidence of such injuries.

Level of evidence
III.

BACK

Excellent medium-term survival of an all-inside tensionable knotted suture device justifies repair of most meniscal tears encountered during reconstructive knee ligament surgery.

Shearman, A.D., Foster, A.J., Wilson, A.J. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06189-w

Purpose
All-inside meniscal repair devices have evolved to allow surgeons to undertake complex repairs in a timely and efficient manner. This is advantageous in active patients, where meniscus preservation is critical in preserving joint function and stability. The aim of the study was to evaluate the failure rate of all-inside meniscal repair performed in patients undergoing reconstructive ligament surgery using a particular meniscal repair device.

Methods
Patients were identified using a single-site prospectively maintained patient registry. Primary outcome was failure, defined as return to surgery with documented failure of repair. Complication rates and functional scores were also recorded. Patients in whom meniscal repair failure was identified were further assessed, to identify any common features.

Results
Over an 8-year period, 323 patients underwent meniscal repair at the time of ligament reconstruction, compared to 244 meniscectomies. Of these, 286 patients underwent repair using an all-inside suture device. One-hundred and twenty-seven repairs were to the medial meniscus only, 124 were lateral, and in 35 patients both menisci were repaired. Follow-up was to a median of 51.5 months. There were 31 (9.7%) failures reported at a median of 22 months post-operatively (IQR 13.5–41.5). Medial repair failures were seen more frequently than lateral (13.6% versus 5.6% OR 2.62 95% CI 1.17–5.88 p = 0.022). Failure of ACL reconstruction was associated with meniscal repair failure (OR 5.83 95% CI 1.55–21.95 p = 0.0039). Multi-ligament reconstruction was undertaken in 70/286 patients receiving meniscal repair and was not associated with failure (OR 1.3 95% CI 0.57–2.98 p = 0.51). Mode number of all-inside sutures used was 3 in both medial and lateral repairs (Range 1–9 lateral; 1–7 medial).

Conclusions
All-inside repair is a safe and versatile technique which can be used in the majority of meniscal tears encountered during ligament reconstruction with excellent mid-term success. Failure is seen more commonly in medial sided repairs and with failure of ACL reconstruction.

Level of evidence
IV.

BACK

Distal avulsion of reconstituted hamstring tendons.

Ahearn, N., Wood, D.G.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06202-2

Purpose
Hamstring tendon autograft (semitendinosus and gracilis) is the most commonly used graft in anterior cruciate ligament (ACL) reconstruction. Distal hamstring tendons avulsion is a rare condition, and this paper describes a previously unreported injury, local management of this rare injury pattern, and the existing literature regarding treatment options.

Methods
Two cases are presented of distal hamstring avulsion from the tibia of reconstituted tendons, together with additional 12 cases of distal hamstrings tendon avulsion. Functional outcomes following treatment of this injury are presented, together with a literature review of management options.

Results
Early surgical reattachment using suture anchor fixation was performed and excellent results were achieved in 93% of cases (13 out of 14 patients). Patient-reported outcome measures demonstrated a median Marx score 14.5 (IQR 4) and median SHORE score 34.5 (IQR 4). The mean time to surgery was 22 days (range 5–60), with mean time to return to sport at pre-injury level 5.5 months (range 2.5–12).

Conclusions
Distal hamstring tendon avulsion is a rare condition, with no consensus regarding optimal management options. Acute surgical repair leads to excellent results, with a return to pre-injury level of sporting activity.

Level of evidence
IV.

BACK

Trends of anterior cruciate ligament reconstruction in children and young adolescents in Italy show a constant increase in the last 15 years.

Longo, U.G., Salvatore, G., Ruzzini, L. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06203-1

Purpose
The aim of this 15-year nationwide study was to investigate the trend in ACL reconstructive surgeries in patients younger than 15 years old in Italy, as well as their social and economic impact.

Materials and methods
The National Hospital Discharge records (SDO) collected by the Italian Ministry of Health in the 15-year period between 2001 and 2015 were analyzed. This contains anonymous data including patients' age, gender, ICD-9-CM codes for diagnosis and intervention, census region, region of hospitalization, length of the hospitalization, and public or private reimbursement.

Results
1,350 ACL reconstructions were performed in Italy in the population younger than 15 years old, with an incidence rate ranging from 0.16 to 2.04 procedures per 100,000 age-matched individuals. Similarly, the percentage of surgeries in 0–14 year old patients increased with respect to the total number of ACL reconstruction from 0.13% in 2001 to 0.95% in 2015. The age range 10–14 years is the most involved, accounting for 97.3% of surgeries recorded in the study period. The male:female ratio was 1.05 and most of these procedures were performed in the North of Italy (78.3%).

Conclusion
ACL reconstructions in patients aged 10–14 years are increasing constantly since 2001, and thus, specific actions aimed to define the best management strategy as well as national educational programs to prepare the future surgeons to this new reality are mandatory in the interest of the public health.

Level of evidence
Level III.

BACK

No differences in clinical outcomes and graft healing between anteromedial and central femoral tunnel placement after single bundle ACL reconstruction.

Zhang, J., Ma, Y., Pang, C. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06206-y

Purpose
The purpose of this study was to compare clinical outcomes and graft healing after anterior cruciate ligament (ACL) reconstruction with anteromedial and central femoral tunnel placement.

Methods
During 2016 and 2018, 110 consecutive patients underwent single bundle ACL reconstruction; 85 patients met the inclusion criteria, and each patient underwent 3D-CT within 1 week and MRI 1.5 years after the operation. The central point of the femoral tunnel and signal/noise quotient (SNQ) of three regions of interest (ROI) in the intra-articular graft were measured to analyse the tunnel position and graft healing extent. Clinical assessments, including functional scores, KT-2000 arthrometer measurements and pivot-shift tests, were evaluated at the 2-year follow-up. Patients were divided into two groups depending on the femoral tunnel position: the anteromedial position group (Group A) and the centre position group (Group B).

Results
Seventy-one patients were available for the 2-year follow-up and MRI examination: 34 patients in Group A and 35 patients in Group B, and 2 patients were excluded for an eccentric tunnel position. No graft failure occurred, and compared with the preoperative assessment outcomes, the outcomes of both groups improved at the final follow-up. Group A was significantly better than Group B regarding the KT-2000 arthrometer measurements ($P = 0.031$). No significant differences were observed in terms of functional scores, pivot-shift test results, or the SNQ between groups.

Conclusions
No differences in clinical outcomes or graft healing were found between AM and central femoral tunnel placements in single bundle ACL reconstruction. Therefore, satisfactory clinical outcomes, knee stability and graft healing can be obtained for both femoral tunnel placements.

Level of evidence
II.

BACK

Press-fit fixation in anterior cruciate ligament reconstruction yields low graft failure and revision rates: a systematic review and meta-analysis.

Shanmugaraj, A., Mahendralingam, M., Gohal, C. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06173-4

Purpose
Press-fit fixation is a hardware-free technique in anterior cruciate ligament reconstruction (ACLR). The purpose of this review was to quantitatively assess the risk profile and outcomes of press-fit fixation and provide an update on its effectiveness compared to more standard fixation techniques of ACLR.

Methods
The electronic databases PUBMED, MEDLINE, and EMBASE were searched on March 26, 2020 for therapeutic randomized controlled trials (RCT) addressing press-fit fixation for primary ACLR. The Grading of Recommendations Assessment, Development and Evaluation tool was used to assess the quality for randomized studies. A meta-analysis with a random-effects model was used to pool applicable outcomes data.

Results
A total of six eligible RCTs were included in this review. There were 292 patients (72.9% male) with a mean age of 28.8 ± 3.8 years and a mean follow-up of 81.3 ± 88.3 months that underwent press-fit ACLR on the femoral, tibial or both tunnels. Femoral fixation techniques included press-fit fixation (96.6%) and cross-pin fixation (3.4%). Tibial fixation techniques included press-fit (37.0%), staples (28.1%), interference screws (21.2%) and abarticular post-screws (13.7%). Graft options included bone–patellar tend–-bone autografts (73.6%) and semitendinosus and gracilis tendon autograft (26.4%). Significant improvements ($p < 0.05$) from baseline to follow-up were found for clinical outcomes. Significantly less postoperative bone tunnel enlargement ($p < 0.05$) was found with tibial press-fit fixation when compared to biodegradable screws. The overall complication rate was 13.3%. There were no significant differences in complication rates [odds ratio = 0.84 (95%CI 0.43–1.66); p = n.s.] ($I2 = 0\%$) between patients undergoing femoral press-fit fixation and femoral metal interference screw fixation.

Conclusion
The overall graft failure and revision rates with press-fit ACLR were low. There were no significant differences in complication rates between patients undergoing femoral press-fit and femoral metal interference screw fixation. Included studies found that patients undergoing press-fit fixation for ACLR had significant improvements in functional outcome scores postoperatively and had significantly reduced postoperative bone tunnel enlargement compared to patients undergoing bioabsorbable fixation. Thus, early evidence suggests that press-fit fixation appears to be a good option for patients undergoing ACLR.

Level of evidence
I.

BACK

Intrasubstance degeneration of medial meniscus horizontal cleavage tear in young patients is associated with increased joint line obliquity in the coronal plane of the knee.

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

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06214-y

Purpose
To evaluate the effect of joint line obliquity of the knee on intrasubstance degeneration of isolated medial meniscus horizontal cleavage tear (HCT) in young patients.

Methods
Sixty knees of 50 patients aged < 40 years (mean age, 33.3 ± 5.5 years old), who underwent arthroscopic partial meniscectomy (APM) for HCT, were retrospectively reviewed. The radiologic parameters of alignment, including mechanical hip-knee-ankle (mHKA) angle, posterior tibial slope, and joint line obliquity, were measured on preoperative long-standing whole-leg radiographs. The patients were classified into two groups, simple horizontal type (type 1) and complicated type (type 2), according to the presence of diffuse intrasubstance degeneration of the meniscus on preoperative magnetic resonance imaging. The risk factors for intrasubstance degeneration of HCT were analyzed using multiple logistic regression analysis. Medial joint space width (JSW) on weight-bearing 45° flexion posteroanterior radiographs and the mHKA were measured to evaluate the radiographic outcomes. The clinical outcomes were evaluated using the modified Lysholm score. Among patients followed-up for > 5 years, the clinical and radiologic outcomes were compared between the two groups.

Results
The joint line obliquity was significantly greater in the type 2 group than in the type 1 group (2.9 ± 1.3 vs. 0.9 ± 1.4, P < 0.001), and a significant risk factor for diffuse intrasubstance degeneration (P < 0.001; odds ratio, 2.88; 95% confidence interval, 1.27–6.54). The relative changes in the JSW in the type 2 group were greater than those in the type 1 group during the mean follow-up period of 7.9 ± 2.5 years (26% vs 10%, P = 0.045). The modified Lysholm score was not significantly different between the two groups (n.s).

Conclusion
The diffuse intrasubstance degeneration of medial meniscus HCTs in young patients is associated with increased joint line obliquity of the knee joints. The radiologic outcomes after APM were inferior in the patients with diffuse intrasubstance degeneration. However, the clinical outcomes were not different during the mid-term follow-up.

Level of evidence
Level III.

BACK

Contralateral ACL tears strongly contribute to high rates of secondary ACL injuries in professional ski racers.

Csapo, R., Runer, A., Hoser, C. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06234-8

Purpose
To analyse the effects of graft selection, sex, injury complexity and time to return to competition on the odds to suffer secondary ACL injury (either re-rupture or contralateral ACL tear) in professional alpine skiers.

Methods
The database of a specialised joint surgery clinic was screened for professional alpine skiers who had participated in competitions at the FIS race, European Cup and World Cup level prior to having to undergo a primary ACL reconstruction, and who had returned to the same competitional level at least one year prior to the end of the observation period. The rates of secondary ACL injuries were statistically compared between athletes with hamstring and quadriceps tendon autografts, men and women, simple and complex (involvement of menisci or cartilage) primary ACL injuries, and between early (≤ 300 days after primary reconstruction) and late (> 300 days) returners to competition.

Results
Fourteen out of the 30 athletes included (46.7%) suffered secondary ACL injuries on average 29.4 ± 22.5 months after primary reconstruction. The secondary injuries comprised five re-ruptures (16.7%) and nine contralateral ACL tears (30.0%). The odds to suffer contralateral ACL tears were non-significantly higher in patients with hamstring tendon autografts (OR 5.69, n.s.) and in those whose primary injuries were classified as simple ACL tears (OR 5.31, n.s.). None of the factors assessed was associated with the odds of graft failure.

Conclusion
The odds of ACL-injured professional alpine ski racers to suffer secondary ACL tears are nearly 50%, with subsequent contralateral ACL injuries being more common than graft failures. While statistical significance could not be established due to a lack of power, greater odds of contralateral ACL tears were observed in athletes with hamstring tendon grafts as well as those with simple primary ACL injuries. No factors potentially predisposing athletes for graft failure could be identified.

Level of evidence
III.

BACK

Matrix-assisted chondrocyte transplantation with bone grafting for knee osteochondritis dissecans: stable results at 12 years.

Andriolo, L., Di Martino, A., Altamura, S.A. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06230-y

Purpose
To document clinical and radiological results of arthroscopic matrix-assisted autologous chondrocyte transplantation (MACT) combined with bone grafting for the treatment of knee osteochondritis dissecans (OCD) at long-term follow-up.

Methods
Thirty-one knees in 29 patients (20.4 ± 5.7 years) were treated for symptomatic unfixable OCD lesions (2.6 ± 1.1 cm2) and prospectively evaluated at 2, 5, and 12 years (average, minimum 10 years). Patients were evaluated over time with IKDC subjective score, EQ-VAS, and Tegner scores. Failures were also documented. At the final follow-up, MRI evaluation was performed in 14 knees with the MOCART 2.0 score.

Results
Beside 4 early failures, an overall clinical improvement was documented: the IKDC subjective score improved from 39.9 ± 16.8 to 82.1 ± 17.0 and 84.8 ± 17.2 at 2 and 5 years, respectively ($p < 0.0005$), and remained stable for up to 12 years (85.0 ± 20.2). EQ-VAS and Tegner scores presented similar trends, but patients did not reach their original activity level. Worse results were obtained for lesions bigger than 4 cm2. At MRI evaluation, subchondral bone abnormalities were detected in over 85% of knees at long-term follow-up.

Conclusions
Arthroscopic bone grafting followed by MACT for unfixable knee OCD can offer a promising and stable clinical outcome over time in lesions smaller than 4 cm2, with a low failure rate of 13%. Persistent subchondral alterations were documented at long-term MRI evaluation, suggesting the limits of this approach to regenerate the osteochondral unit in patients affected by knee OCD.

Level of evidence
IV.

BACK

Interference screws are more likely to perform better than cortical button and cross-pin fixation for hamstring autograft in ACL reconstruction: a Bayesian network meta-analysis.

Yan, L., Li, J.J., Zhu, Y. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06231-x

Purpose
Anterior cruciate ligament (ACL) reconstruction is widely accepted as the first choice of treatment for ACL injury, but there is disagreement in the literature regarding the optimal femoral fixation method. This meta-analysis assesses the evidence surrounding three common femoral fixation methods: cortical button (CB), cross-pin (CP) and interference screws (IS).

Methods
A systematic search was conducted in Medline, EMBASE and the Cochrane Library to identify studies with evidence level I or II that compared at least two femoral fixation methods with hamstring autograft for ACL reconstruction. Ten primary outcomes were collected. Risk of bias was assessed following the Cochrane Handbook for Systematic Reviews of Interventions. Standardized mean differences (SMD) were estimated using random-effects network meta-analysis in a Bayesian framework. Probability of ranking best (ProBest) and surface under the cumulative ranking curve (SUCRA) were used to rank all treatments. Funnel plots were used to identify publication bias and small-study effects.

Results
Sixteen clinical trials were included for analysis out of 2536 retrieved studies. Bayesian network meta-analysis showed no significant differences among the three fixation methods for the ten primary outcome measures. Based on the 10 outcome measures, the IS, CB and CP had the highest ProBest in 5, 5 and 0 outcomes, and the highest SUCRA values in 5, 4 and 1 outcomes, respectively. No substantial inconsistency between direct and indirect evidence, or publication bias was detected in the outcomes.

Conclusion
There were no statistical differences in performance among the CP, CB and IS femoral fixation methods with hamstring autograft in ACL reconstruction, although the IS was more likely to perform better than CB and CP based on the analysis of outcome measures from the included studies.

Level of evidence
1.

BACK

Treatment of medial-sided injuries in patients with early bicruciate ligament reconstruction for knee dislocation.

Jokela, M.A., Mäkinen, T.J., Koivikko, M.P. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06207-x

Purpose
In knee dislocation with bicruciate ligament and medial side injury (KDIIIM), treatment method of medial side injuries is controversial. The purpose of this study was to evaluate the outcomes of non-operative treatment of proximal and midsubstance and operative treatment of distal avulsion medial collateral ligament (MCL) ruptures in patients with early bicruciate reconstruction.

Methods
One-hundred and forty-seven patients with a knee dislocation and bicruciate ligament injury (KDII-KDV) were identified. Sixty-two patients had KDIIIM injury. Of these, 24 patients were excluded and 13 were lost to follow-up. With a minimum of 2 years of follow-up, IKDC2000 (subjective and objective), Lysholm and Tegner scores and stress radiographs were recorded.

Results
Twenty-five patients were available for follow-up: 18 had a proximal or midsubstance grade-III MCL rupture (proximal MCL group) and 7 had a distal MCL avulsion (distal MCL group). In the proximal MCL and distal MCL groups, respectively, median IKDC2000 subjective scores were 80 (range 57–99) and 62 (range 39–87), and median Lysholm scores were 88 (range 57–99) and 75 (range 40–100). The median medial opening (side-to-side difference) was 2.4 mm (range 0.1–9.2) in the proximal MCL group and 2.5 mm (range 0.2–4.8) in the distal MCL group.

Conclusion
We found acceptable recorded outcomes in patients who underwent non-operative treatment of proximal and midsubstance grade-III MCL rupture and operative treatment of distal MCL avulsion with early bicruciate ligament reconstruction.

Level of evidence
Level IV

BACK

Low surgical routine increases revision rates after quadriceps tendon autograft for anterior cruciate ligament reconstruction: results from the Danish Knee Ligament Reconstruction Registry.

Lind, M., Strauss, M.J., Nielsen, T. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06220-0

Purpose
Recent registry data have demonstrated a higher revision rate of quadriceps tendon (QT) graft compared with hamstring tendon (HT) and patellar tendon (PT) grafts. Clinic routines could be an important factor for revision outcomes. The purpose of this study is to use the Danish Knee Ligament Reconstruction Registry (DKRR) to compare revision rates in patients who have undergone ACLR with QT, HT and PT grafts related to individual clinic surgical routine.

Methods
Data on primary ACLRs entered in the DKRR from 2012 through 2019 were analysed since QT graft usage started in 2012. Revision rates for QT, HT and PT grafts were compared according to clinic activity (0–100 and > 100 procedures). Revision rates for the three autograft cohorts are presented, as well as adjusted revision hazard rates. Instrumented knee stability and pivot-shift tests were performed at a one-year follow-up.

Result
QT revision rate (6.4%) for low-activity clinics was higher than for high-activity clinics (2.9%) ($p = 0.003$). The adjusted revision hazard ratio for low-activity clinics was 2.3 ($p = 0.01$). QT autograft was associated with statistically significant, increased side-to-side laxity at follow-up (1.4 mm) compared with HT and PT autografts (1.0 mm) ($p < 0.01$), as well as an increased positive pivot-shift rate.

Conclusion
QT autografts for ACLR were associated with higher revision rates in clinics with lower than 100 procedures performed from 2012 to 2019. QT graft usage is not associated with a high revision rate when routinely performed. Learning curve is an important factor when introducing QT ACLR.

Level of evidence
Level III

BACK

Perioperative nonopioid analgesia reduces postoperative opioid consumption in knee arthroscopy: a systematic review and meta-analysis.

Gazendam, A., Ekhtiari, S., Horner, N.S. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06256-2

Purpose
The opioid epidemic has prompted an emphasis on investigating opioid-sparing alternatives for pain management following knee arthroscopy. This review evaluated the effects of perioperative nonopioid adjunct analgesia on postoperative opioid consumption and pain control in patients undergoing knee arthroscopy.

Methods
A systematic review and meta-analysis was performed using the following databases: PubMed, Embase, Web of Science, MEDLINE, and SCOPUS. Prospective comparative studies assessing the efficacy of various perioperative nonopioid analgesic strategies in patients undergoing knee arthroscopy were included. Twenty-five studies (n = 2408) were included.

Results
Pre-emptive nonopioid pain medications demonstrated a reduction in cumulative postoperative oral morphine equivalent (OME) consumption by 11.8 mg (95% CI − 18.3, − 5.4, $p \leq 0.0001$) and VAS pain scores by 1.5 (95% CI − 2.3, − 0.7, $p < 0.001$) at 24 h compared to placebo. Postoperative nonopioid pain medications significantly reduced cumulative postoperative OME consumption by 9.7 mg (95% CI − 14.4, − 5.1, $p < 0.001$) and VAS pain scores by 1.0 (95% CI − 1.354, − 0.633, $p < 0.001$) at 24 h compared to placebo. Saphenous nerve blocks significantly reduced cumulative postoperative OME consumption by 6.5 mg (95% CI − 10.3, − 2.6, $p = 0.01$) and VAS pain scores by 0.8 (− 1.4, − 0.3, $p = 0.03$) at 24 h compared to placebo. Both preoperative patient education and postoperative cryotherapy reduced postoperative opioid consumption.

Conclusion
Perioperative nonopioid pharmacotherapy, saphenous nerve blocks, and cryotherapy for patients undergoing knee arthroscopy significantly reduce opioid consumption and pain scores when compared to placebo at 24 h postoperatively. These interventions should be considered in efforts to reduce opioid consumption in patients undergoing knee arthroscopy. More research is needed to determine which interventions can reduce pain outside of the immediate postoperative period and the potential synergistic effects of combining interventions.

Level of evidence
II.

BACK

Multi-ligament reconstructions as a risk factor for adverse outcomes in arthroscopic surgery.

Kyhos, J., Johnson, D., Alvandi, B. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06252-6

Purpose
Multi-ligament knee injuries are a serious consequence of knee dislocation with a poorly evaluated post-operative complication profile due to low incidence. The aim of this study is to assess the risk of adverse post-operative events associated with operative management of multi-ligament knee injuries.

Methods
The American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database was used to identify patients undergoing surgical procedures for multi-ligament knee injuries from 2006 to 2016 using Current Procedural Terminology codes. We evaluated data on patient demographics and used a propensity score algorithm to adjust for baseline differences in these patients and developed univariate and multivariate logistic regression models to assess effects on minor and severe 30-day post-operative complications.

Results
We identified 444 patients in this database who underwent multi-ligament knee reconstructions between 2006 and 2016. After propensity matching, minor and major adverse post-operative events were more frequent in patients with multi-ligament knee injuries (1.4% vs 0.2%, $p < 0.001$ and 2.7% vs 1.1%, $p = 0.002$, respectively). Patients with multi-ligament knee injuries experienced a 55-fold increase risk of need for transfusion ($p < 0.001$) and a fivefold increased risk of pulmonary embolism ($p = 0.025$), with most occurring in bicruciate reconstructions (Schenck Classification KD-III and KD-IV injuries).

Conclusion
The surgical management of multi-ligament knee injuries confers significant increased risk of 30-day post-operative minor or severe adverse event over arthroscopic ACL reconstruction. These patients are most at risk for post-operative blood transfusion requirement, and pulmonary embolism, with patient's undergoing surgery for bicruciate ligament injuries at particularly high risk of complication.

Level of evidence
IV.

BACK

Surgeon practice patterns for pre-soaking ACL tendon grafts in vancomycin: a survey of the ACL study group.

Xiao, M., Sherman, S.L., Safran, M.R. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06265-1

Purpose
To survey members of The ACL study group to determine the current practice patterns surrounding the technique of pre-soaking ACL grafts in vancomycin.

Methods
A web-based questionnaire was distributed to members of the ACL Study Group. Questions included the use of vancomycin solution for graft soaking during ACL reconstruction, their protocol for soaking the graft, vancomycin concentration utilized, graft choices, and concerns with the technique.

Results
Sixty-six (57%) ACL surgeons completed the survey. Approximately one-third (37.9%) of respondents currently pre-soak their ACL grafts in vancomycin prior to implantation, with 60% of these surgeons being from Europe. Seventy-six percent have adopted this practice within the past 5 years. The majority of surgeons wrap the graft in a vancomycin-soaked gauze prior to implantation (56%), soak for a variable amount of time before implantation (56%), use a concentration of 5 mg/mL (68%), and soak hamstring grafts (92%). Concerns included the mechanical properties of the graft (35%), cost of vancomycin (23%), availability (12%), and antibiotic resistance (9%).

Conclusion
This survey demonstrates that 37.9% of ACL study group members currently utilize vancomycin to pre-soak ACL tendon grafts as a means to decrease post-operative infection risk, with the majority of surgeons having implemented this practice within the past 5 years. The biggest concern towards using vancomycin was the mechanical properties of the graft after soaking.

Level of evidence
IV.

BACK

Patients with a quadriceps tendon shorter than 60 mm require a patellar bone plug autograft in anterior cruciate ligament reconstruction.

Yamasaki, S., Hashimoto, Y., Han, C. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06261-5

Purpose
To assess the length and thickness of the quadriceps tendon (QT) and anterior cruciate ligament (ACL) to predict the required QT length for individual ACL reconstruction.

Methods
Thirty patients (9 females, 21 males; mean age 24.5 years; mean height 169.3 cm) who underwent ACL reconstruction using the QT with a bone plug autograft were enrolled. The length and thickness of the QT on preoperative magnetic resonance imaging (MRI) were compared with those measured under direct visualization. The ACL length was measured on preoperative MRI and three-dimensional computed tomography after ACL reconstruction. The QT length on MRI was compared with the required graft length, and the factors related to an adequate QT length were assessed.

Results
The mean QT length on MRI was 60.8 ± 1.3 mm and was significantly positively correlated with the QT length under direct visualization ($P < 0.01$). On MRI, the mean ACL length was 30.8 ± 1.2 mm and the mean QT thickness was 6.3 ± 0.2 mm. Although the mean QT was 0.1 mm longer than the mean required graft length, the QT on MRI was shorter than the required graft length in 37% of patients (11/30). Adequate QT length was related to a QT length of more than 60 mm, but not to age, sex, height, or ACL length.

Conclusion
Although preoperative MRI predicted the required QT length for ACL reconstruction, 37% of patients lacked an adequate QT length, and a QT shorter than 60 mm required the addition of patellar bone.

Level of evidence
III.

BACK

Comparable clinical and radiological outcomes between anatomical and high femoral tunnels in posterior cruciate ligament reconstruction.

Yoon, K.H., Kim, J.S., Park, J.Y., et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06266-0

Purpose
To compare clinical and radiological outcomes and failure rates between anatomical and high femoral tunnels in remnant-preserving single-bundle posterior cruciate ligament (PCL) reconstruction.

Methods
63 patients who underwent remnant-preserving single-bundle PCL reconstruction between 2011 and 2018 with a minimum 2-year follow-up were retrospectively reviewed. Patients were divided into two groups according to the femoral tunnel position: group A (33 patients with anatomical femoral tunnel) and group H (30 patients with high femoral tunnels). The femoral tunnel was positioned at the center (group A) or upper margin (group H) of the remnant anterolateral bundle. The position of the femoral tunnel was evaluated using the grid method on three-dimensional computed tomography. Clinical and radiological outcomes and failure rates were compared between the groups at the 2-year follow-up.

Results
The position of the femoral tunnel was significantly high in group H than in group A (87.4% ± 4.2% versus 76.1% ± 3.7%, $p < 0.001$). Clinical outcomes were not significantly different between the two groups in terms of the clinical scores (International Knee Documentation Committee subjective, Lysholm, and Tegner activity scores), range of motion, and posterior drawer test. Radiological outcomes also showed no intergroup differences in the side-to-side differences of posterior tibial translation and osteoarthritis progression. Side-to-side difference on the Telos stress radiograph was 5.2 ± 2.9 mm in group A and 5.2 ± 2.7 mm in group H (n.s.). There were four failures in group A (12.1%) and one in group H (3.3%). The differences between the groups were not statistically significant.

Conclusion
The clinical and radiological outcomes and failure rates of the high femoral tunnels were comparable with those of the anatomical femoral tunnels at the 2-year follow-up after remnant-preserving single-bundle PCL reconstruction. The findings of this study suggest that high femoral tunnels can be considered an alternative in remnant-preserving single-bundle PCL reconstruction.

Level of evidence
III.

BACK

The deep lateral femoral notch sign: a reliable diagnostic tool in identifying a concomitant anterior cruciate and anterolateral ligament injury.

Dimitriou, D., Reimond, M., Foesel, A., et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06278-w

Purpose
The aim of the present study was to investigate the validity and reliability of the deep lateral femoral notch sign (DLFNS) in identifying a concomitant anterior cruciate ligament (ACL)/anterolateral ligament (ALL) rupture and predicting the clinical outcomes following an anatomical single-bundle ACL reconstruction. It was hypothesized that patients with a concomitant ACL/ALL rupture would have an increased DLFNS compared to patients without a concomitant ACL/ALL rupture.

Methods
The lateral preoperative radiographs and MRI images of 100 patients with an ACL rupture and 100 control subjects were evaluated for the presence of a DLFNS and ACL/ALL rupture, respectively. The patients were evaluated clinically preoperatively and at a minimum 1 year following the ACL reconstruction. A receiver operator curve (ROC) analysis was performed to define the optimal cut-off value of the DLFNS for identifying a concomitant ACL/ALL injury. The relative risk (RR) was also calculated to determine whether the presence of the DLFNS was a risk factor for residual instability or ACL graft rupture following an ACL reconstruction.

Results
The prevalence of DLFNS was 52% in the ACL-ruptured patients and 15% in the control group. At a minimum 1-year follow-up, 35% (6/17) of the patients with DLFNS > 1.8 mm complained of persistent instability, and an MRI evaluation demonstrated a graft re-rupture rate of 12% (2/17). In patients with a DLFNS < 1.8 mm, 8% (7/83) reported a residual instability, and the graft rupture rate was 2.4% (2/83). A DLFNS > 1.8 mm demonstrated a sensitivity of 89%, a specificity of 95%, a negative predictive value of 98%, and a positive predictive value of 89% in identifying a concomitant ACL/ALL rupture. Patients with a DLFNS > 1.8 mm had 4.2 times increased risk for residual instability and graft rupture compared to patients with a DLFNS ≤ 1.8 mm.

Conclusions
A DLFNS > 1.8 mm could be a clinically relevant diagnostic tool for identifying a concomitant ACL/ALL rupture with high sensitivity and PPV. Patients with a DLFNS > 1.8 mm should be carefully evaluated for clinical and radiological signs of a concomitant ACL/ALL rupture and treated when needed with a combined intra-articular ACL reconstruction and extra-articular tenodesis to avoid a residual rotational instability and ACL graft rupture.

Level of evidence
III.

BACK

Clinical outcomes of concurrent surgery with weight bearing after modified lasso-loop stitch arthroscopic ankle stabilization.

Takao, M., Inokuchi, R., Jujo, Y., et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06264-2

Purpose
To determine the effects of unilateral and bilateral ankle stabilization surgery with or without additional concurrent procedures for other pathologies on return to activity in patients who were allowed unrestricted weight bearing postoperatively.

Methods
Ninety-three athletes underwent 120 ankle stabilization surgeries including 27 that underwent bilateral simultaneous surgery using the all-inside arthroscopy-modified lasso-loop technique and were divided into two groups: arthroscopic ligament repair alone without concurrent procedures (group A) and with simultaneous procedures for other pathologies (group B). Group A was further subdivided into unilateral (group A1) and simultaneous bilateral ankle surgery (group A2), and group B into ankle stabilization surgery with simultaneous procedures not requiring weight bearing postoperatively (Group B1) and with concurrent procedures allowing weight bearing (Group B2). Return to activity postoperatively was assessed by recording the time to walk without any support, jog, and return to full athletic activities. Clinical outcomes were assessed preoperatively and 12 months postoperatively using a subjective clinical score.

Results
The average time between surgery and unsupported walk, jog, and return to full athletic activities was 1.6 ± 2.5, 16.9 ± 3.7, and 42.4 ± 19.3 days in group A, 17.2 ± 19.6, 34.5 ± 20.8, and 60.9 ± 22.8 days in group B, 1.7 ± 2.9, 16.1 ± 2.4, and 41.6 ± 18.2 days in group A1, 1.3 ± 0.6, 18.9 ± 5.5, and 44.6 ± 22.5 days in group A2, 25.3 ± 20.2, 43.3 ± 21.1, and 70.7 ± 23.1 days in group B1, and 4.8 ± 11.7, 20.7 ± 11.7, and 45.0 ± 13.7 days in group B2, respectively. These results indicate that the patients in group B2 showed a statistically significant faster time to return to activity than did those restricted from weight bearing. Differences in ankle stabilization alone between patients in groups A1 and A2 as well as groups B2 and A were not statistically significant. Clinical outcomes were similar for patients in groups B2 and A1 versus group A2.

Conclusion
Time to return to activity and clinical outcomes after ankle stabilization surgery using the modified lasso-loop technique were negatively affected if simultaneous bilateral surgery or simultaneous concurrent procedures were added or if weight bearing was unrestricted. However, a delay in return to athletic activity was observed when ankle stabilization surgery was performed using the modified lasso-loop technique with concurrent procedures that require non-weight bearing postoperatively.

Level of evidence
Level III.

BACK

Low rate of adverse events in a randomized controlled trial addressing the surgical treatment of femoroacetabular impingement (FAI) syndrome.

Ohlin, A., Simunovic, N., Duong, A., et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06236-6

Purpose
The femoroacetabular impingement randomised controlled trial (FIRST) is a multi-center randomized controlled trial (RCT), comparing arthroscopic osteochondroplasty with arthroscopic lavage in adults aged 18–50 years diagnosed with non-arthritic femoroacetabular impingement (FAI) syndrome. The purpose of the present study is to report the prevalence, distribution and severity of adverse events during and within 24-month follow-up period.

Methods
Of the 220 patients included, 6 were adjudicated as ineligible, for a total of 214 patients included in the final analysis. An independent Adjudication Committee evaluated operatively treated and non-operatively treated adverse events that were related to the hip. Adverse events were also reported directly by each participating clinical site. Continuous variables were reported as mean and standard deviation, categorical variables were reported as counts and percentages.

Results
There were a total of 52 (24.2%, 52/214) adverse events in 46 (21.5%) patients (mean age 34.2 ± 7.9 years, 58.7% male) during the 24-month follow-up. There were 12.6% (27/214) operatively treated adverse events for: hip pain, re-injury of labrum and heterotopic ossification. There were 11.7% (25/214) non-operatively treated adverse events for predominantly: hip pain, hip tendinopathy and hip popping/snapping. Approximately, 87% of adverse events resolved within the 24-month follow-up time.

Conclusion
Given the inherent challenges with conducting RCTs, the results of this adverse event study from the FIRST trial demonstrate that it is safe to perform an RCT addressing FAI syndrome.

Level of evidence
Level III.

BACK

American Journal of Sports Medicine (AJSM), Volume 49, Issue 6

Risk Factors for Septic Arthritis After Anterior Cruciate Ligament Reconstruction: A Nationwide Analysis of 26,014 ACL Reconstructions

Jesper Kraus Schmitz, MD, PhD*, Viktor Lindgren, MD, PhD, Gunnar Edman, PhD, Per-Mats Janarv, MD, PhD, Magnus Forssblad, MD, PhD, Anders Stålman, MD, PhD

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Background: Septic arthritis (SA) after anterior cruciate ligament reconstruction (ACLR) is a rare yet severe complication. The samples in previous studies have been small and without nationwide coverage, making analysis uncertain with a risk of bias. Conclusions to recommend preventive measures are therefore difficult to draw, and it has not been possible to perform a comprehensive risk factor analysis.

Purpose: To study the incidence of SA after ACLR in a large, nationwide population and to study the risk factors for SA after ACLR.

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

Methods: All ACLRs, primary and revision, in the Swedish Knee Ligament Registry between 2006 and 2013 were linked with data from the Swedish National Board of Health and Welfare. The incidence of SA events was determined using entries from the day of surgery until 90 days postoperatively based on diagnosis codes and the prescription of antibiotics. All events of SA were verified via a review of medical records. Risk factors were analyzed based on data from the registries. Descriptive statistics were used to describe the findings, while logistic regression analysis was used for the risk analysis.

Results: The cohort consisted of 26,014 primary and revision ACLRs. During the study period, 298 events of SA (1.1%) were identified. The high-volume units (≥500 ACLRs during the study period) had a distribution of SA between 2 and 47 (0.2%-2.9%). Independent risk factors of SA were male sex (OR, 1.65; 95% CI, 1.28-2.13), operating time ≥70 minutes (OR, 1.83; 95% CI, 1.42-2.36), hamstring tendon autograft (OR, 2.23; 95% CI, 1.21-4.08), and clindamycin as perioperative antibiotic prophylaxis (OR, 1.94; 95% CI, 1.10-3.41).

Conclusion: The incidence of SA after ACLR in this nationwide cohort was 1.1%. Male sex, hamstring tendon autografts, and a longer operating time were all independent risk factors for SA. The use of clindamycin as perioperative antibiotic prophylaxis was a risk factor compared with the use of cloxacillin. Some high-volume units had a very low infection rate (0.2%).

BACK

Validation of a Risk Calculator to Personalize Graft Choice and Reduce Rupture Rates for Anterior Cruciate Ligament Reconstruction

Hana Marmura, BSc, PhD(c), Alan M.J. Getgood, MD, FRCS (Tr&Orth), Kurt P. Spindler, MD, Michael W. Kattan, PhD, Isaac Briskin, MSc, Dianne M. Bryant, MSc, PhD††

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Background: Anterior cruciate ligament reconstructions (ACLRs) fail at an alarmingly high rate in young active individuals. The Multicenter Orthopaedic Outcomes Network (MOON) knee group has developed an autograft risk calculator that uses patient characteristics and lifestyle to predict the probability of graft rupture if the surgeon uses a hamstring tendon (HT) or a bone–patellar tendon–bone (BPTB) graft to reconstruct the ligament. If validated, this risk calculator can be used during the shared decision-making process to make optimal ACLR autograft choices and reduce rupture rates. The STABILITY 1 randomized clinical trial offers a large, rigorously collected data set of similar young active patients who received HT autograft with or without lateral extra-articular tenodesis (LET) for ACLR.

Purpose/Hypothesis: The purpose was to validate the ACLR graft rupture risk calculator in a large external data set and to investigate the utility of BPTB and LET for ACLR. We hypothesized that the risk calculator would maintain adequate discriminative ability and calibration in the external STABILITY 1 data set when compared with the initial MOON development data set.

Study Design: Cohort study (diagnosis); Level of evidence, 1.

Methods: The model predictors for the risk calculator include age, sex, body mass index, sport played at the time of injury, Marx Activity Score, preoperative knee laxity, and graft type. The STABILITY 1 trial data set was used for external validation. Discriminative ability, calibration, and diagnostic test validity of the model were assessed. Finally, predictor strength in the initial and validation samples was compared.

Results: The model showed acceptable discriminative ability (area under the curve = 0.73), calibration (Brier score = 0.07), and specificity (85.3%) to detect patients who will experience a graft rupture. Age, high-grade preoperative knee laxity, and graft type were significant predictors of graft rupture in young active patients. BPTB and the addition of LET to HT were protective against graft rupture versus HT autograft alone.

Conclusion: The MOON risk calculator is a valid predictor of ACLR graft rupture and is appropriate for clinical practice. This study provides evidence supporting the idea that isolated HT autografts should be avoided for young active patients undergoing ACLR.

BACK

Lateral Extra-articular Tenodesis Contributes Little to Change In Vivo Kinematics After Anterior Cruciate Ligament Reconstruction: A Randomized Controlled Trial

Daisuke Chiba, MD, PhD, Tom Gale, MS, Kyohei Nishida, MD, PhD, Felipe Suntaxi, BS, Bryson P. Lesniak, MD, Freddie H. Fu, MD, William Anderst, PhD‖, Volker Musahl, MD

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Background: Lateral extra-articular tenodesis (LET) in combination with anterior cruciate ligament (ACL) reconstruction (ACLR) has been proposed to improve residual rotatory knee instability in patients having ACL deficiency.

Purpose/Hypothesis: The purpose was to compare the effects of isolated ACLR (iACLR) versus LET in combination with ACLR (ACLR+LET) on in vivo kinematics during downhill running. It was hypothesized that ACLR+LET would reduce the internal rotation of the reconstructed knee in comparison with iACLR.

Study Design: Controlled laboratory study.

Methods: A total of 18 patients with ACL deficiency were included. All participants were randomly assigned to receive ACLR+ LET or iACLR during surgery. Six months and 12 months after surgery, knee joint motion during downhill running was measured using dynamic biplane radiography and a validated registration process that matched patient-specific 3-dimensional bone models to synchronized biplane radiographs. Anterior tibial translation (ATT; positive value means “anterior translation”) and tibial rotation (TR) relative to the femur were calculated for both knees. The side-to-side differences (SSDs) in kinematics were also calculated (operated knee–contralateral healthy knee). The SSD value was compared between ACLR+LET and iACLR groups using a Mann-Whitney U test.

Results: At 6 months after surgery, the SSD of ATT in patients who had undergone ACLR+LET (–1.9 ± 2.0 mm) was significantly greater than that in patients who had undergone iACLR (0.9 ± 2.3 mm) at 0% of the gait cycle (foot strike) (P = .031). There was no difference in ATT 12 months after surgery. Regarding TR, there were no differences between ACLR+LET and iACLR at either 6 months (P value range, .161-.605) or 12 months (P value range, .083-.279) after surgery.

Conclusion: LET in combination with ACLR significantly reduced ATT at the instant of foot strike during downhill running at 6 months after surgery. However, this effect was not significant at 12 months after surgery. The addition of LET to ACLR had no effect on TR at both 6 and 12 months after surgery.

Clinical Relevance: LET in combination with ACLR may stabilize sagittal knee motion during downhill running in the early postoperation phase, but according to this study, it has no effect on 12-month in vivo kinematics.

BACK

Ramp Lesion Subtypes: Prevalence, Imaging, and Arthroscopic Findings in 2156 Anterior Cruciate Ligament Reconstructions

Mathieu Thaunat, MD*, Pramod Ingale, MD, Alexandre Penet, MD, Samih Kacem, MD, Ibrahim Haidar, MD, Paul-Henri Bauwens, MD, Jean-Marie Fayard, MD

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Background: Ramp lesions are defined as a particular type of injury within the posterior horn of the medial meniscus and its meniscocapsular attachments. Five subtypes have been described: type 1, meniscocapsular lesion; type 2, partial superior lesion; type 3, partial inferior lesion or hidden type; type 4, complete tear in the red zone; and type 5, complete double tear.

Purpose: (1) To determine the prevalence of different subtypes of ramp lesions in patients undergoing arthroscopic anterior cruciate ligament reconstruction (ACLR). (2) To describe the characteristics of ramp lesions based on imaging and diagnostic arthroscopy.

Study Design: Cross-sectional study; Level of evidence, 3.

Methods: All patients who underwent arthroscopic ACLRs between November 2015 and November 2018 by 2 senior surgeons at 1 institution were evaluated retrospectively (1) to describe the subtypes of ramp lesions diagnosed intraoperatively using transnotch arthroscopic exploration of the posteromedial compartment and (2) to look for any factors significantly associated with these subtypes. The following parameters were studied: demographics; history and clinical findings including time between injury and surgery, side-to-side laxity, and pivot shift; lesions missed on magnetic resonance imaging (MRI) scans and medial proximal tibial bone contusion visible on MRI scans; and arthroscopic confirmation of ramp lesion (ie, prevalence), associated lateral meniscal tear, or medial chondral tear.

Results: Out of 2156 primary or revision arthroscopic reconstructions, 334 ramp lesions were confirmed, giving a prevalence of 15.5%. The subtype distribution was as follows: type 1, 47.9%; type 2, 4.8%; type 3, 11.4%; type 4, 28.7%; type 5, 7.2%. Multivariate analysis showed that gross pivot shift was significantly associated with complete ramp tears (odds ratio, 4.8; 95% CI, 1.7-17.2). Hidden lesions (type 3, inferior partial tear in the red zone) were the most likely to be missed on preoperative MRI (45.9%).

Conclusion: In a population undergoing ACLR, the prevalence of ramp lesions was 15.5%. Among the subtypes of ramp lesion, the most common was a meniscocapsular junction tear (type 1). Partial inferior tears (type 3) were the most likely to be missed on preoperative MRI scans. Gross pivot shift was significantly associated with complete ramp tears (types 1, 4, and 5).

BACK

Prevalence and Detection of Meniscal Ramp Lesions in Pediatric Anterior Cruciate Ligament–Deficient Knees

Isabelle Bernardini, MD*, Daniel N'Dele, MD, Marie Faruch Bilfeld, MD, PhD, Camille Thevenin-Lemoine, MD, Julie Vial, MD, Etienne Cavaignac, MD, PhD, Franck Accadbled, MD, PhD

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Background: Anterior cruciate ligament (ACL) tears represent 13% of knee injuries in children. Medial meniscal tears are commonly associated with ACL ruptures. Ramp lesions correspond to posterior meniscocapsular tears of the medial meniscus. Depending on the study, the prevalence of ramp lesions is inconsistent.

Purpose: To describe the prevalence of ramp lesions in children and adolescents and to investigate the sensitivity of magnetic resonance imaging (MRI) for diagnosing such lesions.

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

Methods: We analyzed videos from arthroscopic ACL reconstruction (ACLR) in children. During these procedures, we systematically looked for potential ramp lesions. To do so, an arthroscope was passed through the intercondylar notch to visualize the posteromedial compartment. A needle was introduced at the site of a posteromedial portal to unfold the meniscocapsular junction to reveal any hidden meniscal tear. Surgical procedures were performed by 2 senior surgeons. Videos were blindly analyzed by a third surgeon. Preoperative MRIs were screened by 2 blinded, independent senior radiologists to look specifically for ramp lesions.

Results: Videos of 50 consecutive arthroscopic ACLRs concerning 32 boys and 18 girls were analyzed. Mean age at surgery was 14.2 years (range, 8.5-17.6 years). A total of 14 ramp lesions (28%) in 8 boys and 6 girls were identified. In addition, there were 22 tears of the meniscal body in 20 patients (40%). Arthroscopic and MRI findings did not correlate. Among 14 arthroscopically diagnosed ramp lesions, only 8 were detected on the MRI. Conversely, 12 patients had a ramp lesion detected on the MRI, which could not be confirmed intraoperatively. The sensitivity of MRI was 57% and the positive predictive value was 40%.

Conclusion: A meniscal ramp lesion was present in 14 of 50 children (28%) undergoing ACLR. MRI has a low sensitivity for diagnosis of ramp lesions in children. Careful exploration of the posteromedial compartment is strongly recommended. Overlooking such lesions during ACLR may contribute to ongoing instability and higher re-rupture rates in these young patients.

BACK

Additional Inferior Extensor Retinaculum Augmentation After All-Inside Arthroscopic Anterior Talofibular Ligament Repair for Chronic Ankle Instability Is Not Necessary

Sung Hyun Lee, MD*, Hyung Gyu Cho, MD, Je Heon Yang, MD

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Background: Although several arthroscopic surgical techniques for the treatment of chronic ankle instability (CAI) have been introduced recently, the effect of inferior extensor retinaculum (IER) augmentation remains unclear.

Purpose: To compare the clinical outcomes after arthroscopic anterior talofibular ligament (ATFL) repair according to whether additional IER augmentation was performed or not.

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

Methods: We performed a retrospective review of consecutive patients who underwent arthroscopic ATFL repair surgery for CAI between 2016 and 2018. The mean age of the patients was 35.2 years (range, 19-51 years), and the mean follow-up period was 32.6 months (range, 24-48 months). Patients were divided into 2 groups according to the surgical technique used for CAI: arthroscopic ATFL repair (group A; n = 37) and arthroscopic ATFL repair with additional IER augmentation (group R; n = 45). The pain visual analog scale, American Orthopaedic Foot & Ankle Society score, Foot and Ankle Outcome Score, and the Karlsson Ankle Function Score were measured as subjective outcomes, and posturographic analysis was performed using a Tetrax device as an objective outcome. Radiologic outcome evaluations were performed preoperatively and at 2 years postoperatively using stress radiographs and axial view magnetic resonance imaging (MRI).

Results: Out of 101 patients, 19 (18.5%) were excluded per the exclusion criteria, and 82 were evaluated. We identified 6 retears (7.3%) based on postoperative MRI evaluation. All patients who had ATFL retear on MRI (8.1% [3/37] in group A and 6.7% [3/45] in group R) demonstrated recurrent CAI with functional discomfort and anterior displacement >3 mm as compared with the intact contralateral ankle. All clinical scores and posturography results were improved after surgery in both groups ($P < .001$). However, there were no significant differences in the clinical results and radiologic findings between the groups.

Conclusion: The clinical and radiologic outcomes of patients with CAI improved after all-inside arthroscopic ATFL repair. However, additional IER augmentation after arthroscopic ATFL repair did not guarantee better clinical outcomes.

BACK

Arthroscopic Correction of Femoroacetabular Impingement for Concomitant Inguinal Disruption in Athletes With Dual Pathology

Patrick Carton, MD, FRCS (Tr&Orth), FFSEM*, David Filan, MSc

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Background: Inguinal disruption and femoroacetabular impingement (FAI) are well-recognized sources of groin pain in athletes; however, the relationship between inguinal disruption and FAI remains unclear. In cases of dual pathology, where both entities coexist, there is no definitive consensus regarding which pathology should be prioritized for treatment in the first instance.

Purpose: (1) To examine the 2-year effectiveness and clinical outcome in athletes presenting with dual pathology in which the FAI component alone was treated with arthroscopic deformity correction. (2) To compare 2-year patient-reported outcome measures between athletes undergoing only hip arthroscopy (HA) and athletes undergoing groin repair and HA.

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

Methods: All patients undergoing HA for the treatment of FAI with concomitant clinical signs of inguinal disruption at initial consultation were between 2010 and 2016 were included in this study. Inclusion criteria were male sex, age <40 years, and involvement in competitive sporting activity. Athletes with previous HA on the symptomatic side, Tönnis grade >1, or lateral center-edge angle <25° were excluded. Revision HA or subsequent groin surgery was documented. Outcome evaluation consisted of validated patient-reported outcome measures (modified Harris Hip Score; University of California, Los Angeles Activity Scale; 36-Item Short Form Health Survey; Western Ontario and McMaster Universities Osteoarthritis Index) completed preoperatively and a minimum 2 years postoperatively. The minimal clinically important difference was assessed by using a distribution-based technique (SD, 0.5) and an anchor-based technique (percentage of possible improvement). Level of satisfaction and return to play were assessed.

Results: A total of 113 cases of dual pathology were included in 91 patients with a mean ± SD age of 26.3 ± 5.1 years. The index surgical procedure was HA for 104 cases (92%) and groin repair for 9 (8%). For patients undergoing HA as the index procedure, 98.1% (102/104 cases) were successfully followed up to establish survivorship. In 89.2% (91/102 cases), no additional groin surgery was required. In 11 cases (10.8%), additional groin surgery was required for persisting inguinal-related groin pain. At 2 years after the operation, there was no difference for any patient-reported outcome measure ($P > .099$), improvement from baseline ($P > .070$), or proportion of cases achieving the minimal clinically important difference ($P > .120$) between the HA-only group and the group undergoing HA and groin repair at any stage. There was also no difference between groups in terms of return-to-play rate ($P = .509$) or levels of satisfaction (pain, $P = .204$; performance, $P = .345$).

Conclusion: In patients with dual pathology, treatment of the FAI component alone using arthroscopic hip surgery results in a successful outcome without need for groin repair in 89.2% of cases. No statistical difference in clinical outcome 2 years after surgery was observed between athletes undergoing 1 procedure (HA alone) and those undergoing 2 procedures (HA and groin repair at any stage).

BACK

Arthroscopic Circumferential Acetabular Labral Reconstruction for Irreparable Labra in the Revision Setting: Patient-Reported Outcome Scores and Rate of Achieving the Minimal Clinically Important Difference at a Minimum 2-Year Follow-up

Benjamin G. Domb, MD*, Cynthia Kyin, BA, Cammille C. Go, BS, Jacob Shapira, MD, Philip J. Rosinsky, MD, Ajay C. Lall, MD, David R. Maldonado, MD

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Background: There is a paucity in the literature reporting patient-reported outcome (PRO) scores and the minimal clinically important difference (MCID) after revision hip arthroscopic surgery with circumferential labral reconstruction.

Purpose: To report minimum 2-year PRO scores and the rate of achieving the MCID in patients who underwent revision hip arthroscopic surgery with circumferential labral reconstruction in the setting of irreparable labral tears.

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

Methods: Data were retrospectively reviewed for all patients who underwent revision hip arthroscopic surgery between February 2016 and November 2017. Patients were included if they had undergone circumferential labral reconstruction and had preoperative and postoperative scores for the modified Harris Hip Score (mHHS), Non-Arthritic Hip Score (NAHS), Hip Outcome Score Sport-Specific Subscale (HOS-SSS), International Hip Outcome Tool (iHOT-12), 12-Item Short Form Health Survey physical and mental components (SF-12 P and SF-12 M, respectively), Veterans RAND 12-Item Health Survey physical and mental components (VR-12 P and VR-12 M, respectively), and visual analog scale (VAS) for pain. Exclusion criteria were Tönnis grade >1, Legg-Calve-Perthes disease, slipped capital femoral epiphysis, fractures, hip dysplasia, or revision labral treatment different from circumferential labral reconstruction. The MCID was calculated. Secondary surgical procedures were documented.

Results: A total of 26 hips (26 patients; 61.5% female) were included. The mean age and body mass index were 33.2 ± 10.4 years and 25.5 ± 4.9, respectively. Significant improvements were reported for the mHHS (17.0 ± 19.5; P = .0002), NAHS (17.9 ± 16.7; P < .0001), HOS-SSS (21.7 ± 23.1; P = .0005), VAS (–2.2 ± 3.0; P = .006), iHOT-12 (25.8 ± 32.5; P = .0007), SF-12 P (8.5 ± 11.2; P = .001), and VR-12 P (8.9 ± 11.6; P = .001). Rates of meeting the MCID for the mHHS, NAHS, HOS-SSS, iHOT-12, and VAS were 76.9%, 80.0%, 65.0%, 62.5%, and 69.2%, respectively. No case of re-revision arthroscopic surgery was documented, but 1 case of conversion to total hip arthroplasty was documented at 38.6 months.

Conclusion: In the setting of revision hip arthroscopic surgery and irreparable labral tears, circumferential labral reconstruction resulted in significant improvements in all PRO and VAS scores at a minimum 2-year follow-up with a high rate of achieving the MCID.

BACK

Miscellaneous

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BACK