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May 2021

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Journal of arthroscopy
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Volume 29, Issue 5

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Volume 49, Issue 5

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Volume 103, Issue 9

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Upper extremity

Arthroscopy, Volume 37, Issue 7, p 1381-1391

Limited Predictive Value of the Instability Severity Index Score: Evaluation of 217 Consecutive Cases of Recurrent Anterior Shoulder Instability

Dekker, T. J., Peebles, L. A., Bernhardson, A. S., Golijanin, P., Di Giacomo, G., Hackett, T. R., & Provencher, C. M. T.

https://doi.org/10.1016/j.arthro.2020.12.185

Purpose
To review the existing variables and their ability to predict recurrence of shoulder instability as it relates to the Instability Severity Index Score (ISIS), as well as evaluate any other pertinent imaging and patient history variables that may impact risk of recurrent anterior instability after arthroscopic Bankart repair.

Methods
All consecutive patients with recurrent anterior shoulder instability and who had arthroscopic instability repair were identified. Exclusion criteria were prior surgery on the shoulder, posterior or multidirectional instability, instability caused by seizure disorder, or a rotator cuff tear. All ISIS variables were recorded (age <20 years, sport type and level, hyperlaxity, Hill-Sachs on anteroposterior external rotation radiograph, loss of glenoid contour on anteroposterior radiograph), as well as additional variables: (1) number of instability events; (2) total time of instability; (3) glenoid bone loss (GBL) percent; and (4) Hill-Sachs measures (H/L/W/D/Volume). Postoperative outcomes were assessed based on the Western Ontario Shoulder Instability Index (WOSI), Single Assessment Numeric Evaluation (SANE) scores, and American Shoulder and Elbow Surgeons (ASES) scores, and recurrent anterior instability. Regression analysis was used to determine preoperative variables that predicted outcomes and failures.

Results
There were 217 consecutive patients (209 male patients [96.5%], 8 female patients [3.5%]) who met the inclusion criteria and were all treated with a primary arthroscopic shoulder stabilization during a 3.5-year period (2007–2011), with a mean follow-up time of 42 months (range, 26–58). The mean age at first instability event was 23.9 years (range, 16–48 years) and the mean cumulative ISIS score for the overall group was 3.6 (range, 1–6). Outcomes were improved from mean preoperative (WOSI = 1,050/2,100; ASES = 61.0; SANE = 52.5) to postoperative (WOSI = 305/2,100; ASES = 93.5; SANE = 95.5). A total of 11.5% (25/217) of patients had evidence of recurrent instability (subluxation or dislocation). Additionally, all 25 patients who failed postoperatively also had consistently inferior ASES, SANE, and WOSI outcome scores when compared with successfully treated patients. Factors associated with failure were GBL greater than 14.5% ($P < .001$), total time of instability symptoms greater than 3 months ($P = .03$), Hill-Sachs volume greater than 1.3 cm3 ($P = .02$), contact sports participation ($P = .05$), and age 20 years or younger ($P < .01$). There was no correlation in outcomes with Hill-Sachs on presence of glenoid contour loss on radiograph ($P = .07$), participation sports, or ISIS (mean = 3.4 success vs 3.9 failure, $P > .05$).

Conclusions
At a mean follow-up of 42 months was an 11.5% failure rate after arthroscopic Bankart stabilization surgery. This study shows no correlation between treatment outcome and the ISIS measure, given a mean score of 3.4 for the overall cohort with little difference identified in those who failed. However, several important parameters previously unidentified were detected including, GBL greater than 14.5%, Hill-Sachs volume greater than 1.3 cm3, and duration of

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instability symptoms (>3 months). The ISIS may need to be redesigned to incorporate variables that more accurately portray the actual risk of failure after arthroscopic stabilization, including quantification of both glenoid and humeral head bone loss.

Level of Evidence
III (Retrospective Case Series).

BACK

Comparison of Hook Plate Fixation Versus Arthroscopic Coracoclavicular Fixation Using Multiple Soft Anchor Knots for the Treatment of Acute High-Grade Acromioclavicular Joint Dislocations

Yon-Sik Yoo, MD, Ph.D, Eun Kyung Khil, MD, Wooyoung Im, MD, Jeung Yeol Jeong, MD

https://doi.org/10.1016/j.arthro.2020.12.189

Purpose
To compare the clinical and radiologic outcomes of arthroscopically assisted coracoclavicular (CC) fixation using multiple soft anchor knots versus hook plate fixation in patients with acute high-grade Rockwood type III and V acromioclavicular (AC) joint dislocations.

Methods
This retrospective study included 22 patients with acute Rockwood type III and V AC joint dislocations who underwent arthroscopic fixation or hook plate fixation surgery between February 2016 and March 2018. Patients were categorized into 2 groups: arthroscopically assisted CC fixation using multiple soft anchor knots group (AR, n = 12) and hook plate fixation group (HO, n = 10). We measured the CC distances (CCDs) and CCD ratio at 6 months, 1 year, and last follow-up postoperatively to compare the radiologic results between the groups. Clinical outcomes were assessed at 1 year postoperatively and at the last follow-up using the Visual Analog Scale, American Shoulder and Elbow Surgeons (ASES) scores, and Shoulder Pain and Disability Index (SPADI) scores, and the Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire. Magnetic resonance imaging after hook plate removal was used to evaluate the healing ligaments and tendon–bone interface.

Results
The patients in the AR group had better ASES, SPADI, and Quick DASH scores than the patients in the HO group at 1 year postoperatively and at last follow-up. The CCD and CCD ratio were significantly better in the AR group than in the HO group at the last follow-up period (P = .007/0.029). Magnetic resonance imaging findings showed grade I in 60% of patients in the AR group and grade III in 60% of patients in the HO group. AC joint arthritic change was observed in 40% of the HO group.

Conclusions
The CC fixation method using multiple soft anchor knots showed satisfactory results and had superior CC ligament healing ability and maintenance of CCD than hook fixation.

Level of Evidence
Level III, retrospective therapeutic comparative investigation.

BACK

Glenoid Pathology, Skeletal Immaturity, and Multiple Preoperative Instability Events Are Risk Factors for Recurrent Anterior Shoulder Instability After Arthroscopic Stabilization in Adolescent Athletes

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https://doi.org/10.1016/j.arthro.2020.12.211

Purpose
To identify risk factors for recurrent shoulder instability after arthroscopic stabilization in adolescent athletes.

Methods
A retrospective case-control study was undertaken of all patients younger than 18 years undergoing arthroscopic shoulder stabilization for anterior instability between 2009 and 2016. Two patient cohorts were identified: (1) patients with recurrent instability (frank dislocations or subluxations) after arthroscopic stabilization and (2) an age- and sex-matched cohort of patients with no recurrent instability at a minimum of 2 years' follow-up from index surgery. Patient demographic, injury, radiographic, and surgical variables were recorded. Variables with $P < .10$ on univariate analysis were entered into a binary logistic multivariate regression analysis.

Results
We identified 35 patients (20.5%) in whom arthroscopic stabilization failed at a mean of 1.2 ± 1.0 years after their index surgical procedure. A separate age- and sex-matched cohort of 35 patients with no evidence of recurrent instability was identified (mean follow-up, 5.4 ± 2.0 years; minimum follow-up, 2 years). Univariate analysis identified increased glenoid bone loss ($P = .039$), decreased glenoid retroversion ($P = .024$), and more than 1 instability event prior to surgery ($P = .017$) as significant risk factors for recurrent instability. Multivariate regression analysis revealed that glenoid retroversion less than 6°, skeletal immaturity, and more than 1 prior instability event significantly and independently predicted future recurrence. The risk of recurrence after arthroscopic stabilization was increased by 3 times in patients with 2 risk factors and by 4 times in patients with all 3 risk factors.

Conclusions
Anterior glenoid bone loss, glenoid version, skeletal immaturity, and multiple preoperative instability events are risk factors for failed arthroscopic stabilization in adolescent athletes with anterior instability.

Level of Evidence
Level III, case-control study

BACK

No Difference in Outcome Between Articular-Sided and Bursal-Sided Tears: Comparative Study With Minimum 2-Year Follow-Up of Arthroscopic Repairs in 104 Patients in a Single-Surgeon Series

Xunqi Cheow, Andy Yew, Benjamin Fu Hong Ang, Denny Tjiauw Tjoen Lie

https://doi.org/10.1016/j.arthro.2020.12.226

Purpose
To evaluate and compare the functional outcomes after arthroscopic repair of bursal-sided versus articular-sided partial-thickness rotator cuff tears.

Methods
We conducted a retrospective analysis of patients who had undergone arthroscopic tear completion and subsequent repair of symptomatic partial-thickness rotator cuff tears in a single institution from 2010 to 2015. Range of motion (ROM) (forward flexion and abduction), the pain score as measured on the Numeric Pain Rating Scale, and outcome scores (Constant-Murley score, University of California, Los Angeles shoulder score, and Oxford Shoulder Score) were calculated preoperatively and at 1 year and 2 years postoperatively. The delta difference was calculated for each outcome parameter at the respective follow-up points as the difference from the preoperative baseline score.

Results
A total of 104 patients were included. All tears involved the supraspinatus tendon and did not exceed 2 cm. Of the patients, 65 had an articular-sided tear (AST) whereas 39 had a bursal-sided tear (BST). The mean age of the patients was 53.4 years in the AST group and 55.8 years in the BST group. The AST and BST groups did not differ preoperatively in terms of age, sex, and the measured outcome parameters. Postoperatively, the patients in both groups achieved statistically significant improvement in pain relief and functional outcomes at 2 years. No statistically significant difference was observed between the 2 groups in terms of the delta-difference outcomes in ROM in forward flexion (P = .781) or abduction (P = .348), pain score (P = .187), Constant-Murley score (P = .186), University of California, Los Angeles shoulder score (P = .911), and Oxford Shoulder Score (P = .186) at 2 years.

Conclusions
Partial-thickness rotator cuff tears treated with arthroscopic tear completion and subsequent repair achieved good outcomes in terms of ROM, functional outcomes, and pain relief at 2 years. There was no difference in outcomes regardless of whether the location of the tear was articular sided or bursal sided.

Level of Evidence
Level III, retrospective comparative study.

BACK

Mid- and Long-Term Outcome After Arthroscopically Assisted Transosseous Triangular Fibrocartilage Complex Refixation—Good to Excellent Results in Spite of Some Loss of Stability of the Distal Radioulnar Joint

Gerhild Thalhammer, Thomas Haider, Martin Lauffer, Heinrich-Geert Tünnerhoff

https://doi.org/10.1016/j.arthro.2021.01.056

Purpose
To evaluate mid- and long-term outcomes after arthroscopically-assisted transosseous reattachment of the triangular fibrocartilage complex (TFCC) and to analyze the association of distal radioulnar joint (DRUJ) stability with the clinical outcome.

Methods
Patients treated with an arthroscopically-assisted transosseous reattachment of the deep layer of the TFCC between 2000 and 2009 and a minimum follow-up of 12 months at mid-term and 4 years at long-term follow-up were retrospectively reviewed. Mayo Modified Wrist Score (MMWS); Disabilities of the Arm, Shoulder and Hand (DASH) score; pain visual analogue scale (VAS); grip strength and stability of the DRUJ were assessed at 2 follow-up clinical examinations. At the last follow-up, the Patient-Rated Wrist Evaluation score was additionally recorded.

Results
Thirty patients with a mean age of 29 (±13) years were included. Most of the patients were female (70%, n = 21). The mid-term evaluation took place at a median of 30 months (range, 12-83 months). The assessed scores showed statistically significant clinical improvement (MMWS, $P < .001$; DASH score $P < .001$; VAS $P < .001$). Stability assessment showed a stable DRUJ in 23 (76.7%) patients. At a median of 106 months (range 52-215 months), the long-term clinical assessment was performed. The evaluated scores demonstrated persisting significant improvement (MMWS $P < .001$; DASH score $P < .001$; VAS $P < .001$). Stability assessment showed a stable DRUJ in 19 patients (63.3%). DRUJ instability did not correlate with clinical outcome. No permanent surgery-related complications occurred.

Conclusion
Arthroscopically-assisted transosseous reattachment of the deep fibers of radioulnar ligaments leads to excellent and good clinical results in mid- and long-term follow-up. In 95.5% of the analyzed patients, the measured improvement in the DASH score exceeded the in literature reported minimal clinically important difference of 13.5. Loss of DRUJ stability during follow-up was not associated with deterioration of clinical parameters and patient satisfaction.

Level of Evidence
Level IV, retrospective case series.

BACK

Arthroscopic Transosseous Repair of Foveal Tears of the Triangular Fibrocartilage Complex: A Systematic Review of Clinical Outcomes

Hyoung-Seok Jung, Seong Hwan Kim, Chan Woo Jung, Sung Jong Woo, Jong Pil Kim, Jae-Sung Lee

https://doi.org/10.1016/j.arthro.2020.12.209

Purpose
To determine whether arthroscopic transosseous foveal repair of the triangular fibrocartilage complex (TFCC) results in significant and clinically relevant improvement in clinical outcomes including pain and function with low complication and reoperation rates.

Methods
We reviewed studies investigating the clinical outcomes of arthroscopic transosseous foveal repair of the TFCC through MEDLINE, Embase, and the Cochrane Library. Studies on TFCC repair performed with an open or capsular technique and combined with other procedures, such as ulnar shortening osteotomy and a wafer procedure, were excluded. Methodologic quality was assessed using the Methodological Index for Non-randomized Studies score. Clinical outcomes were assessed using range of motion, grip strength, and patient-reported outcomes. Clinically relevant improvement was determined using the minimal clinically important difference (MCID).

Results
A total of 443 unique studies were identified, of which 7 (131 patients) met the inclusion criteria. The mean age ranged from 27 to 37 years, and the mean follow-up period ranged from 23.5 to 31.1 months. The grip strength (as a percentage) increased after foveal repair of the TFCC in all studies (mean difference range, 11.8% to 22.3%). All studies also reported an improvement in the visual analog scale score (mean difference range, –9.8 to –1.88); Modified Mayo Wrist Score (mean difference range, 10.5 to 27); and Disabilities of the Arm, Shoulder and Hand score (mean difference range, –51.8 to –24.48). Considering clinically relevant improvements based on the MCID, 4 of 5 studies reporting the visual analog scale score showed improvements in this score (MCID, 2) and all studies reporting the Disabilities of the Arm, Shoulder and Hand score showed improvements in this score (MCID, 10). Most complications recovered without any treatment, and 3 patients (2.29%) needed a reoperation.

Conclusions
Arthroscopic transosseous foveal repair of the TFCC resulted in improvements in grip strength and functional outcomes with low complication and reoperation rates. However, the evidence for which technique produces better clinical outcomes remains limited.

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

BACK

Journal of Shoulder and Elbow Surgery (JSES), Volume 30, issue 5, issue 5, pages 951 - 960

Biceps tenodesis versus tenotomy: a systematic review and meta-analysis of level I randomized controlled trials.

Belk, J.W., Kraeutler, M.J., Houck, D.A., et al

DOI: https://doi.org/10.1016/j.jse.2020.11.012

Background
Biceps tenodesis and tenotomy are 2 surgical treatment options for relief of long head of the biceps tendon (LHBT) pathology and superior labrum anterior-to-posterior (SLAP) tears. The purpose of this systematic review was to compare the clinical outcomes and complications of biceps tenodesis and tenotomy for the treatment of LHBT or SLAP pathology during shoulder arthroscopy.

Methods
We performed a systematic review by searching PubMed, the Cochrane Library, and Embase to identify level I randomized controlled trials that compared the clinical outcomes of biceps tenodesis vs. tenotomy. The search phrase used was as follows: biceps tenodesis tenotomy randomized. Patients were assessed based on the American Shoulder and Elbow Surgeons score, visual analog scale score for pain, and Constant-Murley score, as well as postoperative range of motion, strength, and cosmetic deformity.

Results
Five studies (all level I) met the inclusion criteria, including 236 patients undergoing biceps tenodesis (mean age, 60.3 years) and 232 patients undergoing biceps tenotomy (mean age, 59.7 years). The mean follow-up period was 23.0 months. Overall, 6.8% of tenodesis patients experienced cosmetic deformity at latest follow-up compared with 23.3% of tenotomy patients ($P < .001$). No differences in Constant-Murley, visual analog scale, or American Shoulder and Elbow Surgeons scores were found between groups in any study, and of all the studies evaluating strength and range of motion at latest follow-up, only 1 found a significant difference between groups, in which tenodesis patients demonstrated significantly increased forearm supination strength ($P = .02$). One study found tenodesis patients to experience significantly more biceps cramping at 6-month follow-up compared with tenotomy patients ($P = .043$), although no differences in complication rates at latest follow-up were found in any study.

Conclusion
Patients undergoing treatment for LHBT or SLAP pathology with either biceps tenodesis or tenotomy can be expected to experience similar improvements in patient-reported and functional outcomes. There is an increased rate of cosmetic deformity in patients undergoing biceps tenotomy compared with tenodesis.

Level of evidence
Level I, Systematic Review and Meta-analysis.

BACK

A meta-analysis of level I evidence comparing tenotomy vs tenodesis in the management of long head of biceps pathology.

Zhu, X.M., Leroux, T, Ben-David E, et al.

DOI: https://doi.org/10.1016/j.jse.2021.02.002

Background
The ideal surgical treatment of long head of biceps pathology is unclear. This review evaluates Level I studies comparing tenotomy and tenodesis for the management of long head of biceps pathology.

Methods
Medline, EMBASE, and the Cochrane Library databases were searched from database inception though April 17, 2020. Clinical outcomes including Constant-Murley Shoulder Outcome Score, American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES) shoulder score, pain on visual analog scale, postoperative strength, and Popeye deformity were evaluated. Dichotomous outcomes were pooled into relative risk ratios whereas continuous outcomes were pooled into weighted mean differences using random effects meta-analysis.

Results
A total of 5 studies (227 tenotomy and 227 tenodesis patients) met the final inclusion criteria. Postoperative improvement across all outcomes was observed regardless of surgical treatment. Pooled analysis demonstrated no statistically significant difference for Constant-Murley Shoulder Outcome Score, ASES, pain, or flexion strength. Tenodesis was superior to tenotomy in reducing the risk of Popeye deformity (relative risk ratio 3.07, confidence interval 1.87, 5.02; $P < .001$).

Conclusion
Tenotomy and tenodesis of the long head of the biceps results in comparable postoperative clinical and functional outcomes. Tenodesis is superior to tenotomy in preventing Popeye deformity postoperatively.

Level of Evidence
Level I, Meta-Analysis

BACK

The Popeye sign: a doctor's and not a patient's problem.

van Deurzen, D.F.P., Garssen, F.L., Wessel, R.N. et al.

DOI: https://doi.org/10.1016/j.jse.2020.10.040

Background
The Popeye sign is a frequently reported finding following long head of the biceps (LHB) surgery and may be more often detected by doctors than by patients. This study investigates agreement between patients and doctors regarding the presence of a Popeye sign following LHB surgery.

Method
This interobserver study investigates agreement between patients and consulting physicians with regard to assessment of a Popeye sign in patients following LHB surgery. Furthermore, this was compared with assessments by non–consulting physicians (observers) using digital photographs of the operated arm, taken both preoperatively and postoperatively. Data about gender, age, and body mass index (BMI) were collected to investigate their role in doctor's reporting of a Popeye sign. Patient's dissatisfaction with a Popeye sign in the operated arm was evaluated as well.

Results
Ninety-seven patients (mean age 61 ± 6.0 years, 62% male) underwent LHB surgery. A Popeye sign was reported by 2 patients (2%) as opposed to 32 cases (40%) by consulting physicians, of which only 1 case was in agreement. Krippendorff's alpha (Kalpha) for agreement between observers for preoperative photographs was 0.074 (95% CI −0.277, 0.382) and 0.495 (95% CI 0.317, 0.659) for postoperative cases. Kalpha between observers and consulting physicians for pre- and postoperative cases were 0.033 (95% CI −970, 0.642) and 0.499 (95% CI 0.265, 0.699), respectively. Phi coefficient analysis showed a moderate, statistically significant correlation between male sex and Popeye sign identification. Rank-biserial calculation revealed negligible correlation between BMI and age with regard to detecting a Popeye sign by both consulting physicians and observers. Dissatisfaction about swelling in the upper arm was reported in 1 case, though in a location that did not correspond to the location of a Popeye sign.

Conclusion
The Popeye sign is more often identified by doctors than by patients after undergoing LHB surgery. BMI and age are not related to the detection of a Popeye sign, but sex is moderately correlated. Together with the low percentage of dissatisfaction of patients with this swelling, this signifies that a Popeye sign seems to be a doctor's rather than a patient's problem.

Level of evidence
Level III, Interobserver Agreement Design; Diagnostic Study

BACK

Liposomal bupivacaine infiltration in the surgical site for analgesia after rotator cuff repair: a randomized, double-blinded, placebo-controlled trial.

Verdecchia, N.M., Rodosky, M.W., Kentor, M., et al.

DOI: https://doi.org/10.1016/j.jse.2020.10.035

Introduction
Arthroscopic rotator cuff repair is among the most painful of orthopedic surgeries. Liposomal bupivacaine is Food and Drug Administration approved for administration into surgical sites to provide postsurgical analgesia and has been used to address postoperative pain after many types of surgery, including total shoulder arthroplasty. However, its efficacy for pain control after rotator cuff repair is unclear.

Methods
In this randomized, double-blind, placebo-controlled trial, we compared liposomal bupivacaine with an equivalent volume of saline injected into the subacromial space and arthroscopy portal sites in patients undergoing rotator cuff repair under the interscalene block with sedation. The primary outcome measure was numeric rating pain score at the time of block resolution, as reported during the follow-up phone call on postoperative day 1. Secondary outcomes included mean pain scores at rest as well as oral morphine equivalent requirements on postoperative days 1, 2, and 3. This study provides Level 1 evidence.

Results
There were no statistically significant differences in the primary outcome of numeric rating pain scores on resolution of the interscalene nerve block, nor in those reported on postoperative day 1 or 2. There was a minor but statistically significant difference in mean resting pain scores on day 3, though opioid consumption and patient satisfaction score did not differ between groups. In those instructed to perform passive range-of-motion exercises, there was no difference in reported mean pain scores among the groups.

Discussion
In this study of patients undergoing arthroscopic rotator cuff repair, we found no statistically significant difference in mean pain scores on interscalene block resolution, a result consistent with a number of studies investigating liposomal bupivacaine for total shoulder arthroplasty. A modest reduction in pain was evident only on day 3, and there was no impact on perioperative opioid requirements, opioid-related side effects, or pain with motion. Liposomal bupivacaine, when injected into the subacromial space and the tissues around the arthroscopy port sites, provided minimal improvement in pain control in this patient population.

Level of evidence
Level I, Randomized Controlled Trial

BACK

Stiffness: friend or foe? A cohort study evaluating the effect of early postoperative stiffness on the outcomes of patients who underwent superior labral repair.

Murphy, G.T., Lam, P., Murrel, G.A.C.

DOI: https://doi.org/10.1016/j.jse.2020.07.046

Background
Postoperative stiffness is a commonly reported complication after type II superior labrum anterior-posterior (SLAP) repair. It is unclear whether patients with postoperative stiffness, classified as external rotation to the side of ≤20°, ultimately will have greater functional outcomes at ≥2 years after surgery. We hypothesized that postoperative stiffness would result in improved functional outcomes at ≥2 years after surgery.

Methods
Sixty-five consecutive arthroscopic SLAP repair cases performed by a single surgeon were retrospectively reviewed using prospectively collected patient-ranked outcomes and examiner-determined assessments preoperatively and at 1 week, 6 weeks, 24 weeks, and a minimum of 2 years after surgery. Patients were allocated to the stiff group and the non-stiff group based on their external rotation at 6 weeks after repair.

Results
Of the patients, 16 (27%) had ≤20° of external rotation at 6 weeks postoperatively. These patients, comprising the stiff group, had more pain and more difficulty with overhead activities early on than patients in the non-stiff group (very severe vs. severe, $P < .05$), but by 2 years, they had less difficulty and less pain with overhead activities, less patient-reported stiffness, and less severe pain at night than isolated SLAP repair patients with >20° of external rotation at 6 weeks ($P < .05$).

Conclusion
This study suggests that in patients who underwent SLAP repair, early postoperative stiffness (at 6 weeks as assessed by ≤20° of external rotation), while problematic early, is associated with improved functional outcomes in the longer term, with patients in the stiff group reporting less pain and difficulty with overhead activities at ≥2 years after surgery.

Level of evidence
Level III, Retrospective Cohort Design.

BACK

Superior capsular reconstruction using a porcine dermal xenograft for irreparable rotator cuff tears: outcomes at minimum two-year follow-up.

Ferrando, A., Kingston, R., Delaney, R.A.

DOI: https://doi.org/10.1016/j.jse.2020.08.020

Purpose
To evaluate midterm outcomes of arthroscopic superior capsular reconstruction (SCR) using a decellularized porcine dermal xenograft in patients with massive, irreparable rotator cuff tears and to determine the influence of concomitant, repairable subscapularis tears.

Methods
This is a retrospective study of 56 patients with a minimum 2-year follow-up. Preoperative and postoperative range of motion, American Shoulder and Elbow Surgeons score, Subjective Shoulder Value, and visual analog score for pain were measured. Postoperative data were collected at 3, 6, 12, 24, and 36 months.

Results
Of the 56 patients who underwent arthroscopic SCR, there were 39 men and 17 women. The mean age at operation was 65 ± 9 years, and the mean follow-up was 34 ± 8 months. The mean preoperative American Shoulder and Elbow Surgeons improved from 41 ± 19 to 78 ± 18 at 24 weeks, to 86± 16 at 12 months, and to 90±9 at 24 months, P < .0001. Similarly, the mean preoperative Subjective Shoulder Value improved from 39 ± 17 to 74 ± 18 at 24 weeks, to 80 ± 18 at 12 months, and to 80 ± 11 at 24 months, P < .0001. The mean preoperative visual analog score improved from 6.5 ± 2.1 to 1.4 ± 2.2 at 24 weeks, to 0.7± 1.1 at 12 months, and to 0.2 ± 0.4 at 24 months, P < .0001. There were no differences in outcome scores between patients with intact vs. repaired subscapularis. Similarly, no statistically significant differences were found in forward flexion or external rotation after SCR between patients with an intact vs. repaired subscapularis. Failure of the SCR graft was observed on magnetic resonance imaging in 14 patients, 4 of whom opted for revision to reverse shoulder arthroplasty. Eleven patients were truly pseudoparalytic before surgery; in 5 cases, pseudoparalysis was reversed after SCR.

Conclusions
SCR can alleviate pain and disability from irreparable rotator cuff tears and provide significant improvements in shoulder function; however, the xenograft technique resulted in inconsistent reversal of true pseudoparalysis. No difference was found between patients who required concomitant subscapularis repair vs. those who did not.

Level of evidence
Level IV,Case SeriesTreatment Study.

BACK

Grip and shoulder strength correlation with validated outcome instruments in patients with rotator cuff tears.

Manske, R.C., Jones, D.W., Dir, C.E., et al.

DOI: https://doi.org/10.1016/j.jse.2020.07.041

Hypothesis/Background
The ability to better define preoperatively the extent of rotator cuff (RC) dysfunction is desired. The study's purpose was to prospectively examine the relationships between absolute and percentage loss (affected compared to unaffected) of grip and shoulder strength, and RC dysfunction.

Methods
Forty-seven consecutive patients with proven RC tears participated in this study. Prior to surgery, bilateral strengths of grip, shoulder abduction, and shoulder external rotation (ER) were measured with a handheld dynamometer, and subjective outcome measures were gathered. RC tear size was determined via arthroscopy. Patient-reported outcomes were gathered on the day of the examination or via e-mail following initial evaluation. Descriptive statistics, difference analysis, and correlation coefficients (reported as either direct or negative) were used to analyze data. Grip, abduction and ER strengths, and percentage loss of grip, abduction, and ER strengths (percentage loss affected vs. unaffected), and tear size were analyzed in relation to all of the scores on selected subjective outcome measurement tools. The P value was set at .05.

Results
Fair direct correlations were found between grip strength and the Veterans RAND 12-Item Health Survey (VR-12) mental health scores, ER strength and Simple Shoulder Test (SST), abduction strength, and both the American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES) function score and SST score. Abduction and ER strengths were also found to possess a fair direct correlation. Fair negative correlations were found between the ASES function score and each of the following: percentage loss of abduction strength, percentage loss of ER strength, and tear size in centimeters. Another fair negative correlation was found between the Single Assessment Numerical Evaluation (SANE) score and tear size in centimeters.

Discussion
Our findings suggest that as shoulder strength decreases, ipsilateral shoulder RC dysfunction increases. Grip strength was not related to shoulder RC dysfunction.

Conclusion
Grip strength was not found to correlate with RC tears. Those with decreased abduction and ER strengths and low ASES scores should be considered more likely to have an RC tear.

Level of Evidence
Level III, Diagnostic Study.

BACK

Utility of a 3-dimensionally printed color-coded bone model to visualize impinging osteophytes for arthroscopic débridement arthroplasty in elbow osteoarthritis.

Shigi, A., Oka, K., Tanaka, H., et al.

DOI: https://doi.org/10.1016/j.jse.2020.12.002

Background
The identification and precise removal of bony impingement lesions during arthroscopic débridement arthroplasty for elbow osteoarthritis require a high level of experience and surgical skill. We have developed a new technique to identify impinging osteophytes on a computer display by simulating elbow motion using the multiple positions of 3-dimensional (3D) elbow models created from computed tomography data. Moreover, an actual color-coded 3D model indicating the impinging osteophytes was created with a 3D printer and was used as an intraoperative reference tool. This study aimed to verify the efficacy of these new technologies in arthroscopic débridement for elbow osteoarthritis.

Methods
We retrospectively studied 16 patients treated with arthroscopic débridement for elbow osteoarthritis after a preoperative computer simulation. Patients who underwent surgery with only the preoperative simulation were assigned to group 1 (n = 8), whereas those on whom we operated using a color-coded 3D bone model created from the preoperative simulation were assigned to group 2 (n = 8). Elbow extension and flexion range of motion (ROM), the Mayo Elbow Performance Score (MEPS), and the severity of osteoarthritis were compared between the groups.

Results
Although preoperative elbow flexion and MEPS values were not significantly different between the groups, preoperative extension was significantly more restricted in group 2 than in group 1 (P = .0131). Group 2 tended to include more severe cases according to the Hastings-Rettig classification (P = .0693). ROM and MEPS values were improved in all cases. No significant differences in postoperative ROM or MEPS values were observed between the groups. There were no significant differences in the improvement in ROM or MEPS values between the 2 groups.

Conclusions
The use of preoperative simulation and a color-coded bone model could help to achieve as good postoperative ROM and MEPS values for advanced elbow osteoarthritis as those for early and intermediate stages.

Level of evidence
Level III, Retrospective Cohort

BACK

Single Assessment Numeric Evaluation for instability as an alternative to the Rowe score.

Lädermann, A., Denard, P.J., Collin, P., et al.

DOI: https://doi.org/10.1016/j.jse.2020.08.013

Background
Several functional outcome scores have been proposed for the evaluation of shoulder instability. Most are multiple-item questionnaires, which can be time-consuming and difficult for patients to understand, as well as leading to lack of compliance. The Single Assessment Numeric Evaluation (SANE) score is a single question that has recently gained widespread acceptance based on its simplicity and correlation with more complex scoring systems. The purpose of this study was to assess the correlation of a new modified version of the SANE score, the SANE-instability score, with the Rowe score after treatment for shoulder instability.

Methods
We prospectively evaluated a consecutive series of 253 patients (268 shoulders) treated surgically or nonoperatively for shoulder instability between November 2017 and November 2019, for whom the Rowe and SANE-instability scores were collected before treatment and/or after treatment. The SANE-instability score was assessed with the following question: “What is the overall percent value of your shoulder if a completely stable shoulder represents 100%?” Correlations were tested using the Pearson coefficient (r) and interpreted as very high (r = 0.90-1.00), high (r = 0.70-0.89), moderate (r = 0.50-0.69), low (r = 0.30-0.49), or negligible (r = 0.00-0.29). Subgroup analyses were also performed to observe correlation variations according to follow-up length (before treatment and at 6, 12, 26, 52, and 104 weeks after treatment), patient age (<20, 20-29, 30-39, or ≥40 years), and type of treatment (nonoperative or surgical).

Results
The overall correlation between the SANE-instability and Rowe scores was high (r = 0.85, P < .001). Subgroup analyses revealed that the correlation between the 2 scores was high before treatment (r = 0.74); moderate at 6 and 12 weeks after treatment (r = 0.66 and r = 0.57, respectively); and then high at 26, 52, and 104 weeks after treatment (r = 0.75, r = 0.75, and r = 0.78, respectively) (P < .001). The correlation was high across all types of treatment (r = 0.76-0.85), high for patients aged ≥ 20 years (r = 0.80-0.86), and very high for patients aged < 20 years (r = 0.93) (P < .001).

Conclusion
This study demonstrated a significant correlation between the SANE-instability and Rowe scores before and after treatment, as well as across all patient age groups and treatments. Owing to its high simplicity, the SANE-instability score could be used as an alternative to the Rowe score for patient follow-up at various time points.

Level of evidence
Basic Science Study; Validation of Outcome Instrument

BACK

Resiliency influences postoperative outcomes following rotator cuff repair.

Porter, A., Hill, M.A., Harm, R., et al.

DOI: https://doi.org/10.1016/j.jse.2020.08.024

Background
The purpose of this retrospective review was to assess the effects of resiliency on postoperative outcome scores and complications following rotator cuff repair (RCR).

Methods
In 2014, 49 consecutive patients underwent arthroscopic RCR for either a partial- or full-thickness tear performed by a single surgeon at a multi-location, single center. In these patients, the following scores were monitored: American Shoulder and Elbow Surgeons (ASES), Simple Shoulder Test (SST), and Life Orientation Test–Revised (LOT-R). Data collected at 4 years postoperatively were statistically analyzed by 1-way analysis of variance tests, Pearson correlations, and multivariate tests of between-subjects effects (multivariate analysis of covariance).

Results
There was a statistically significant difference between cohorts and their scores of resiliency and optimism measured by the LOT-R (function portion of ASES score [ASESf], P = .048; pain portion of ASES score [ASESp], P = .003; and SST score, P = .009) as illustrated by a 1-way analysis of variance. A multivariate analysis of covariance found that LOT-R scores exhibited a significant impact on outcome scores (ASESf score, P = .043; ASESp score, P = .002; and SST score, P = .007). Correlational analysis indicated that LOT-R scores directly correlated with higher ASESp (P = .003), ASESf (P = .029), and SST (P = .018) scores. Regression line analysis provided a positive coefficient of determination value for all outcome scores.

Conclusion
The premise of this study was to look at mental resilience as a potential indicator of long-term outcome scores following RCR. The results of statistical analysis indicated that outcome scores are significantly different based on the degree of optimism; high levels of optimism impact and correlate to higher outcome scores. This study provides a basis for future studies of psychological resilience in the field of orthopedic surgery.

Level of evidence
Basic Science Study; Validation of Outcome Instrument.

BACK

Venous thromboembolism after arthroscopic rotator cuff repair in a patient with a negative presurgical SARS-CoV-2 test who developed symptomatic COVID-19 three days after surgery.

Chauhan, A., Villacis, D., Boente, R., et al.

DOI: https://doi.org/10.1016/j.jse.2021.02.003

The rate of venous thromboembolism (VTE) after elective shoulder arthroscopy cases is rare, and there also has not been substantial evidence to support the use of routine postoperative anticoagulation.1,6,8,9 However, with the recent pandemic of the SARS-CoV-2 virus that causes COVID-19 infections, there has been significant concern over the high rate of VTE observed in infected patients.3,5,7 The virus seems to stimulate a strong microvascular endothelial cell response that leads to thrombosis and clot formation.7 As we have resumed normal elective surgeries, we have nationally implemented routine preprocedural SARS-CoV-2 screening in patients. However, as our testing has improved, it is still far from perfect. Anecdotally in our practice, we have had numerous asymptomatic patients who test positive for the virus in their routine preprocedure screening that are either latent infections or false positives. However, the real concern occurs when patients who test negative, have surgery, but are actually infected and become symptomatic soon thereafter.

In this case report, we discuss the rare occurrence of a postoperative upper extremity deep venous thrombosis (DVT) and pulmonary embolus (PE) that formed acutely after an elective, outpatient arthroscopic rotator cuff repair in an otherwise healthy, young patient. The patient tested negative for the SARS-CoV-2 virus on her preoperative screening, indicating no active COVID-19 infection. However, the patient became symptomatic 3 days after surgery and was found to have a positive exposure the day before surgery, which led to her infection. We believe the risk factors of surgery combined with her unknown COVID-19 infection created a significant prothrombotic state that led her to have this rare VTE event

BACK

American Journal of Sports Medicine (AJSM), Volume 49, Issue 5

Short-Term Bone Fusion With Arthroscopic Double-Button Latarjet Versus Open-Screw Latarjet

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Background: Recently, arthroscopic double-button Latarjet (AL) has provided an alternative to conventional open Latarjet (OL) in the treatment of anterior shoulder instability with glenoid bone loss. Therefore, theoretically, the faster fusion is obtained, the sooner return to sports under safe conditions can occur. The emerging flexible fixation of the bone block has clearly offered a new approach to achieve bone fusion. However, the period required to achieve this goal remains controversial.

Purpose/Hypothesis: The purpose was to compare computed tomography (CT) scan results of AL and OL in the early postoperative period. It was hypothesized that the bone block fusion with AL would require a longer time than that with OL.

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

Methods: In a retrospective 1-year study, the authors compared 17 primary double-button AL to 22 primary 2-screw OL procedures indicated for anterior shoulder instability in patients with an Index Severity Instability Score >3 points. These patients were reviewed with a CT scan at 1 day, 3 months, and 6 months postoperatively. The characteristics for the 2 groups were comparable. CT scans aimed to analyze graft position, bone contact area with the scapula, and fusion at 3 and 6 months. Clinical assessment was based on the Walch-Duplay and Rowe scores.

Results: The mean preoperative Index Severity Instability Score was 5.3 ± 1.9 points, with a mean anterior glenoid bone loss of 9.1% ± 4.6%. At 3 months, the rates of fusion were 41% and 100% for the AL and OL groups, respectively ($P < .001$). This rate increased to 70% in the AL group at 6 months ($P = .006$). In the axial and sagittal planes, there was no difference in graft position between the AL group and the OL group. The bone block was longer and there was a more extensive bone contact area in the OL group (AL, 131 mm2 vs OL, 223 mm2; $P < .001$). At 6 months of follow-up, no significant difference in clinical scores was noted between the groups: Walch-Duplay score, 93.0 ± 10.9 points versus 91.8 ± 12.5 points ($P = .867$); and Rowe score, 99.0 ± 2.2 points versus 95.0 ± 8.4 points ($P = .307$) for the AL and OL groups, respectively.

Conclusion: AL required more time to achieve bone block fusion than OL. This finding should be taken into account when considering this procedure for patients in a hurry to return to sports involving the shoulder.

BACK

Arthroscopic Soft Tissue Stabilization With Selective Augmentations for Traumatic Anterior Shoulder Instability in Competitive Collision Athletes

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Background: Many surgeons prefer bony stabilization including Bristow or Latarjet procedures for shoulder instability in collision athletes, even though several potential complications have been reported. There has been a limited number of studies on the midterm outcomes of arthroscopic soft tissue stabilization for anterior shoulder instability in competitive collision athletes.

Purpose: To assess the outcomes of arthroscopic soft tissue stabilization in combination with selective augmentation procedures for collision athletes with traumatic anterior shoulder instability

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

Methods: We retrospectively assessed rugby or American football players (<40 years old) who underwent arthroscopic Bankart or bony Bankart repair with selective augmentations (rotator interval closure and/or Hill-Sachs remplissage) for traumatic anterior shoulder instability between January 2012 and March 2017. Shoulders that required other bony procedures were excluded. Recurrence, complications, return to sport, and functional scores (Rowe score and Subjective Shoulder Value sports score) were investigated.

Results: This study included 113 shoulders in 100 patients with a mean age of 20 years (range, 15-36 years) at surgery. Rotator interval closure was performed on 36 shoulders in addition to Bankart repair, and rotator interval closure and Hill-Sachs remplissage were performed on 77 shoulders. The mean follow-up period was 44 months (range, 24-72 months). Of the 113 shoulders, 4 (3.5%) experienced postoperative dislocation, but there were no complications. A total of 93 athletes (93%) attained complete or near complete preinjury sports activity levels. The mean Rowe score significantly improved from 36 (range, 10-75) at presurgery to 96 (range, 35-100; P = .003) at postsurgery. The mean Subjective Shoulder Value sports score significantly improved after surgery, from a mean preoperative score of 22 (range, 0-50) to a postoperative score of 92 (range, 64-100; P = .002).

Conclusion: Our treatment strategy, where arthroscopic soft tissue stabilization was combined with selected augmentations, provided good clinical outcomes for competitive collision athletes in terms of low rates of recurrence and complication, a high rate of return to sports, and good shoulder function.

BACK

Lower Extremity

Arthroscopy, Volume 37, Issue 5, P1467-1473.E2

Hip Arthroscopy for Femoroacetabular Impingement Syndrome in Adolescents Provides Clinically Significant Outcome Benefit at Minimum 5-Year Follow-Up

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https://doi.org/10.1016/j.arthro.2020.12.188

Purpose
To report the rates of achieving clinically significant outcomes as defined by the minimal clinically important difference (MCID), patient acceptable symptomatic state (PASS), or substantial clinical benefit (SCB) in adolescent patients and the rates of clinical failure 5 years after undergoing hip arthroscopy for femoroacetabular impingement syndrome (FAIS).

Methods
Data from consecutive adolescent patients (defined by the American Academy of Pediatrics as age 11 to 21 years) who underwent primary hip arthroscopy with routine capsular closure for the treatment of FAIS between January 2012 and January 2015 by a single, fellowship-trained surgeon was collected. Baseline data, clinical outcomes including Hip Outcome Score (HOS)–Activities of Daily Living, HOS–Sports Subscale, modified Harris hip score, international Hip Outcome Tool, and clinical failure rates were recorded at 5 years after operative. Clinical failure was defined by revision hip arthroscopy or conversion to total hip arthroplasty. Clinically significant outcomes was defined as achieving MCID, PASS, or SCB on at least 1 hip-specific outcome measure.

Results
Of the 139 eligible patients, a total of 85 (60.4%) patients (85 hips) were included in the final analysis, with an age and body mass index average of 17.6 ± 2.5 years (range 13-21) and 22.3 ± 3.1 kg/m2, respectively. The majority of the patients were female (80.6%) and participated in sports (76.2%). There was statistically significant difference between preoperative and postoperative score averages across every reported outcome ($P < .001$). At 5 years, 88.4%, 67.6%, and 64.9% reached at least 1 threshold for achieving MCID, PASS, and SCB, respectively, whereas 89.2% achieved at least one of the meaningful outcome thresholds. Last, 2 patients (2.4%) failed clinically, with both undergoing revision (2.4%) because of continued pain. There were no conversions to total hip arthroplasty.

Conclusion
This study demonstrated that a large majority (89.2%) of adolescent patients undergoing primary arthroscopic treatment for symptomatic FAIS achieved meaningful clinically significant outcomes. Furthermore, only 2.4% of patients failed clinically, requiring revision hip arthroscopy because of continued pain.

Level of Evidence
IV, Retrospective Case Series.

BACK

Defining the Maximum Outcome Improvement of the Modified Harris Hip Score, the Nonarthritic Hip Score, the Visual Analog Scale For Pain, and the International Hip Outcome Tool-12 in the Arthroscopic Management for Femoroacetabular Impingement Syndrome and Labral Tear

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https://doi.org/10.1016/j.arthro.2021.01.002

Purpose
To determine the respective percent thresholds for achieving the maximal outcome improvement (MOI) for the modified Harris Hip Score (mHHS), the Nonarthritic Hip Score (NAHS), the visual analog scale (VAS) for pain, and the International Hip Outcome Tool-12 (iHOT-12) that were associated with satisfaction following hip arthroscopy for femoroacetabular impingement syndrome and labral tear, and to identify preoperative predictors of reaching the mHHS, NAHS, VAS, and the iHOT-12 thresholds for achieving the MOI.

Methods
An anchor question was provided to patients who underwent hip arthroscopy between April 2008 and April 2019. Patients were included if they answered the anchor question and had minimum 1-year follow-up. Patients were excluded if they had a previous ipsilateral hip surgery, a Tönnis grade >1, hip dysplasia, or a previous hip condition. Receiver operating characteristic analysis was used to determine the thresholds for the percentage of the MOI predictive of satisfaction. Multivariate logistic regression was used to determine predictors of achieving the MOI threshold.

Results
In total, 407 hips (375 patients) were included, with 279 female patients (68.6%). The average age, body mass index, and follow-up time were 38.8 ± 13.7 years, 26.6 ± 5.8, and 51.8 ± 33.2 months, respectively. Satisfaction with the current state of their hip was reported in 77.9% (317) of the cases. It was determined that 54.8%, 52.5%, 55.5%, and 55.8% of MOI were the thresholds for maximal predictability of satisfaction for mHHS, NAHS, VAS, and iHOT-12, respectively. Predictors of achieving MOI were not identified.

Conclusions
Following hip arthroscopy in the context of femoroacetabular impingement syndrome and labral tear, the thresholds for achieving the MOI for the mHHS, NAHS, VAS for pain, and iHOT-12 were 54.8%, 52.5%, 55.5%, and 55.8% respectively. No preoperative predictors of achieving the MOI were identified.

Level of Evidence
IV, case-series.

BACK

Development and Internal Validation of Supervised Machine Learning Algorithms for Predicting Clinically Significant Functional Improvement in a Mixed Population of Primary Hip Arthroscopy

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https://doi.org/10.1016/j.arthro.2021.01.005

Purpose
To (1) develop and validate a machine learning algorithm to predict clinically significant functional improvements after hip arthroscopy for femoroacetabular impingement syndrome and to (2) develop a digital application capable of providing patients with individual risk profiles to determine their propensity to gain clinically significant improvements in function.

Methods
A retrospective review of consecutive hip arthroscopy patients who underwent cam/pincer correction, labral preservation, and capsular closure between January 2012 and 2017 from 1 large academic and 3 community hospitals operated on by a single high-volume hip arthroscopist was performed. The primary outcome was the minimal clinically important difference (MCID) for the Hip Outcome Score (HOS)–Activities of Daily Living (ADL) at 2 years postoperatively, which was calculated using a distribution-based method. A total of 21 demographic, radiographic, and patient-reported outcome measures were considered as potential covariates. An 80:20 random split was used to create training and testing sets from the patient cohort. Five supervised machine learning algorithms were developed using 3 iterations of 10-fold cross-validation on the training set and assessed by discrimination, calibration, Brier score, and decision curve analysis on an independent testing set of patients.

Results
A total of 818 patients with a median (interquartile range) age of 32.0 (22.0-42.0) and 69.2% female were included, of whom 74.3% achieved the MCID for the HOS-ADL. The best-performing algorithm was the stochastic gradient boosting model (c-statistic = 0.84, calibration intercept = 0.20, calibration slope = 0.83, and Brier score = 0.13). Of the initial 21 candidate variables, the 8 most important features for predicting the MCID for the HOS-ADL included in model training were body mass index, age, preoperative HOS-ADL score, preoperative pain level, sex, Tönnis grade, symptom duration, and drug allergies. The algorithm was subsequently transformed into a digital application using local explanations to provide customized risk assessment: https://orthoapps.shinyapps.io/HPRG_ADL/.

Conclusions
The stochastic boosting gradient model conferred excellent predictive ability for propensity to gain clinically significant improvements in function after hip arthroscopy. An open-access digital application was created, which may augment shared decision-making and allow for preoperative risk stratification. External validation of this model is warranted to confirm the performance of these algorithms, as the generalizability is currently unknown.

Level of Evidence
IV, Case series.

BACK

Low Back Pain Improves After Surgery for Lesser Trochanteric–Ischial Impingement

Munif Hatem, Hal David Martin

https://doi.org/10.1016/j.arthro.2021.01.006

Purpose
To assess the effects of surgery for lesser trochanteric–ischial impingement (LTI) on low back pain.

Methods
The records of patients with LTI who underwent endoscopic partial resection of the lesser trochanter (LT) between May of 2017 and February of 2019 were reviewed. Inclusion criteria were the presence of low back pain in association with hip pain, diagnosis of LTI, and partial resection of the LT to treat LTI. Exclusion criteria were less than 12 months of postoperative follow-up and hip or spine surgery after the LTI surgery. Patients were assessed before surgery and at the most recent follow-up with the modified Harris Hip Score and Oswestry Disability Index for lumbar spine.

Results
Thirty patients (31 hips) met the inclusion criteria. Four patients were lost to follow-up. Two patients with borderline dysplasia and grade 1 and 2 osteoarthritis underwent total hip arthroplasty after the partial resection of the LT. The results are presented considering the remaining 24 patients (25 hips). The average age at surgery was 51 years (range 32-65 years). The mean follow-up after the surgery for LTI was 19 months (range 12-35 months). The mean ± SD ODI improved from 48% ± 15 before the LTI surgery to 21% ± 22 ($P < .001$) at the most recent follow-up. Improvement in the Oswestry Disability Index above the minimal clinical important difference was observed in 16 patients (67%) following the LTI surgery. The mean ± SD modified Harris Hip Score improved from 55.8 ± 14 before LTI surgery to 81.3 ± 14.3 ($P < .001$).

Conclusions
Decrease in low back pain above the minimal clinically important difference is observed in 2 of 3 patients after partial resection of the LT.

Level of Evidence
Level IV, therapeutic case series

BACK

Clinically Significant Outcomes Following the Treatment of Focal Cartilage Defects of the Knee With Microfracture Augmentation Using Cartilage Allograft Extracellular Matrix: A Multicenter Prospective Study

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https://doi.org/10.1016/j.arthro.2021.01.043

Purpose
To determine the short-term outcomes following microfracture augmented with cartilage allograft extracellular matrix for the treatment of symptomatic focal cartilage defects of the adult knee.

Methods
Forty-eight patients enrolled by 8 surgeons from 8 separate institutions were included in this study. Patients underwent microfracture augmented by cartilage allograft extracellular matrix (BioCartilage; Arthrex, Naples, FL) and were followed at designated time points (3, 6, 12, and 24 months) to assess patient-reported outcomes (PROs), clinically significant outcomes (CSOs), and failure and complication rates. Magnetic resonance imaging (MRI) was offered at 2 years postoperatively regardless of symptomatology, and Magnetic Resonance Observation of Cartilage Repair Tissue (MOCART) 2.0 score was documented.

Results
PRO compliance was 81.3% at 6 months, 72.9% at 12 months, and 47.9% at 2 years. All joint-specific and function-related PROs significantly improved compared to baseline at 3, 6, 12, 18, and 24 months of follow-up ($P < .01$), apart from Marx activity scale, which demonstrated a significant decline in postoperative scores at 2 years ($P = .034$). The percentage of patients achieving CSOs (as defined for microfracture) at 2 years was 90% for minimal clinically important difference and 85% for patient acceptable symptomatic state. Patient factors including age, sex, body mass index, symptoms duration, smoking, presence of a meniscal tear, lesion size, and location were not associated with CSO achievement at 2 years. One patient (2.1%) failed treatment 9.5 months postoperatively due to graft delamination and required a reoperation consisting of arthroscopic debridement. One complication (2.1%) consisting of complaints of clicking, grinding, and crepitus 15 months following the index procedure was reported. Two-year postoperative MRI demonstrated a mean 40.5 ± 22.9 MOCART 2.0 score.

Conclusions
In this preliminary study, we found cartilage allograft extracellular matrix to be associated with improvement in functional outcomes, high rates of CSO achievement, and low failure and complication rates at 2-year follow-up.

Level of Evidence
Level III, prospective multicenter cohort study.

BACK

Outcomes at 20 Years After Meniscectomy in Patients Aged 50 to 70 Years

Aprato, A., Sordo, L., Costantino, A., Sabatini, L., Barberis, L., Testa, D., & Massè, A.

https://doi.org/10.1016/j.arthro.2020.11.053

Purpose
To report the outcomes of arthroscopic meniscectomy (AM) at 20 years of follow-up through timing/rate of conversion to total knee replacement (TKR) and Knee Injury and Osteoarthritis Outcome Score (KOOS), focusing on detection of specific predictor variables for these outcomes, in patients 50 to 70 years old.

Methods
We performed a retrospective study of 289 patients, ages at surgery 50 to 70 years, with diagnosis of degenerative meniscal tear who underwent arthroscopic meniscectomy. We collected the following baseline data: age, sex, injured meniscus (medial, lateral, or both), knee alignment, osteoarthritis (OA), associated lesion identified during arthroscopy, and associated procedure performed during arthroscopy. At 20 years of follow-up, we collected rate and timing of TKR conversion, and we evaluated clinical outcomes with KOOS.

Results
Female sex ($P < .01$), older age ($P < .01$), lateral meniscectomy ($P = .02$), malalignment ($P = .03$), and advanced chondral lesion ($P < .01$) were found to be significantly related to subsequent TKR. No significant correlation was found between amount of resection and subsequent TKR ($P = .26$). Negative predictor factors to obtain equal or superior to age- and sex-adjusted KOOS scores were age 60 to 70 years at time of AM ($P = .03$) and lateral meniscectomy ($P = .02$).

Conclusions
We report a 15.7% conversion rate at 20 years from AM to TKR and a mean time between surgeries of 7 years. Subsequent TKR in the 20 years after AM for degenerative meniscus tears were significantly associated with preoperative OA and chondral lesion (Kellgren Lawrence 2; Outerbridge >2), lateral meniscectomy, age at surgery, female sex, and malalignment. Furthermore, age >60 years, lateral meniscectomy, and concurrent anterior cruciate ligament reconstruction were negative predictors for poor clinical outcomes at 20 years. Therefore, if patients present with negative predictor factors, the AM should not be proposed as second-line treatment, and nonoperative management should be continued until TKR is unavoidable.

Level of Evidence
IV, case series.

BACK

Preoperative Opioid Use Is Associated With Persistent Use, Readmission and Postoperative Complications After Arthroscopic Knee Surgery

Ryan Ridenour, Christopher Kowalski, Aditya Yadavalli, Djibril Ba, Guodong Liu, Douglas Leslie, Jesse Bible, Michael Aynardi, Matthew Garner, Aman Dhawan

https://doi.org/10.1016/j.arthro.2020.12.187

Purpose
To evaluate factors associated with prolonged opioid use after arthroscopic knee surgery and to identify associations between preoperative usage and postoperative complications.

Methods
The MarketScan commercial database was searched to identify patients who underwent arthroscopic knee surgery from 2005 to 2014 (based on Current Procedure Terminology code). Preoperative comorbidities including Diagnostic and Statistical Manual of Mental Disorders mental health disorders, chronic pain, chronic regional pain syndrome, obesity, tobacco use, non-narcotic medications and diabetes were queried and documented. Patients who filled opioid prescriptions 1 to 3 months before surgery were identified. Patients who filled opioid prescriptions after surgery were identified. Adjusted odds ratios and 95% confidence intervals were calculated using multivariable logistic regression analysis to determine factors associated with prolonged postoperative opioid use.

Results
In total, 1,012,486 patients who underwent arthroscopic knee surgery were identified, and we determined which of these patients were on preoperative opioids. Preoperative opioid usage was associated with a statistically significant increased risk of usage out to 1 year. There was a statistically significant association between postoperative usage and preoperative variables (mental health diagnosis, smokers, chronic pain, chronic regional pain syndrome, and use of non-narcotic medications). There was a statistically significant association between preoperative opioid use and 90-day readmission and postoperative complications.

Conclusion
In this study, we found that patients taking opioids 1 to 3 months before arthroscopic knee surgery have increased risk of postoperative use. Additionally, chronic opioid use, chronic pain, or use of non-narcotic medications has the highest risk of postoperative opioid use. Finally, preoperative use was associated with an increased risk of 90-day readmission.

Evidence
Prognostic Level IV Evidence.

BACK

Predictors of Pediatric Anterior Cruciate Ligament Injury: The Influence of Steep Lateral Posterior Tibial Slope and Its Relationship to the Lateral Meniscus

Thomas C. Edwards, Ali Z. Naqvi, Nina Dela Cruz, Chinmay M. Gupte,

https://doi.org/10.1016/j.arthro.2020.12.235

Purpose
To examine the relationship between posterior tibial slope and lateral meniscal bone angle (LMBA) on anterior cruciate ligament (ACL) tear risk in a pediatric population.

Methods
In this case-control study, non-contact ACL-injured pediatric patients with no significant lateral meniscal lesions were matched by age and sex in a 1:1 ratio to a group of radiologically normal controls. Knee magnetic resonance imaging (MRI) studies were analyzed by 3 independent, blinded observers measuring the medial posterior tibial slope (MTS), lateral posterior tibial slope (LTS), and LMBA. Sagittal slope asymmetry was calculated as the absolute difference in degrees between slopes, and the relationship between LMBA and LTS was calculated as a ratio. Binary logistic regressions identified independent predictors of ACL injury. Receiver operator characteristics were performed to determine predictive accuracy.

Results
20 study patients were compared with 20 sex- and age-matched controls (age 14.8 ± 2.42, mean ± standard deviation). LTS was significantly higher in the ACL-injured group (11.30° ± 3.52° versus 7.00° ± 2.63°, P = .0001), as were the absolute slope difference (7.10 ± 2.92° versus 3.14 ± 3.25°, P = .0002) and LTS:LMBA ratio (0.46 ± 0.17 versus 0.26 ± 0.12, P = .0001). No significant differences were observed for MTS or LMBA. Independent predictors were LTS (odds ratio [OR] 1.58, 95% confidence interval [CI] 1.18 to 2.13, P = .002), LTS:LMBA ratio (OR 3.13, 95% CI 1.48 to 6.62, P = .003), and absolute slope difference (OR 1.65, 95% CI 1.17 to 2.32, P = .005). LTS:LMBA ratio was the strongest predictor variable (area under the curve 0.86).

Conclusion
This study suggests that LTS, absolute slope difference, and LTS:LMBA ratio are significant pediatric ACL-injury risk factors. All 3 demonstrate good predictive accuracy; however, the relationship between steep LTS and shallow LMBA was the strongest predictor.

Level of Evidence
III, case-control study

BACK

Lesion Size May Predict Return to Play in Young Elite Athletes Undergoing Microfracture for Osteochondral Lesions of the Talus

Kyung Tai Lee, Si Young Song, Jegal Hyuk, Sung Jae Kim

https://doi.org/10.1016/j.arthro.2020.12.206

Purpose
To evaluate the clinical and sports-related outcomes of arthroscopic microfracture (MFx) for osteochondral lesion of the talus (OLT) in elite athletes.

Methods
The athletes who underwent arthroscopic MFx for OLTs at our institution between January 2011 and September 2015 with minimum 2 years of follow-up were reviewed. The Foot and Ankle Outcome Score, American Orthopaedic Foot & Ankle Society, and visual analog scale pain score, time and rate of “return-to-competition” (RTC, return to an official match for at least 1 minute after treatment), and rate of “return-to-play” (RTP, participation in at least 2 entire seasons after treatment) were used to evaluate the outcomes. We compared athletes who were able to RTP with those who were not.

Results
In total, 41 patients (mean age 19.34 ± 3.76 years) were included. The mean follow-up was 54.9 ± 13.72 months. In total, 36 patients had medial lesions, and 5 patients had lateral lesions. All subscales of preoperative Foot and Ankle Outcome Score were significantly improved at the final follow-up. The mean preoperative American Orthopaedic Foot & Ankle Society score of 74.46 ± 8.10 improved to 91.62 ± 2.99 ($P < .001$) at the final follow-up. The mean preoperative visual analog scale pain score of 5.44 ± 1.57 improved to 2.66 ± 1.04 ($P < .001$). All patients achieved RTC (100%) at mean time of 5.45 ± 3.18 months, and 74.4% of patients were able to RTP. The RTP-group showed significantly smaller lesions compared to the No-RTP group (71.52 ± 43.29 vs 107.00 ± 45.28 mm2, $P = .009$). The cut-off OLT size for predicting RTP was 84.0 mm2, with a sensitivity of 90.0% and specificity of 75.9%.

Conclusions
All athletes were able to RTC at average of 5.45 months after MFx for OLTs with minimal subchondral involvement, and 74.4% were able to RTP. The only prognostic variable for RTP was lesion size, and its predictive cut-off was 84.0 mm2.

Level of evidence
IV, Case series

BACK

Significantly Lower Infection Risk for Anterior Cruciate Ligament Grafts Presoaked in Vancomycin Compared With Unsoaked Grafts: A Systematic Review and Meta-analysis

Michelle Xiao, Seth L. Sherman, Marc R. Safran, Geoffrey D. Abrams

https://doi.org/10.1016/j.arthro.2020.12.212

Purpose
To compare postoperative infection rates following ACL reconstruction performed with grafts presoaked in vancomycin versus those without vancomycin.

Methods
A systematic review was performed using PRISMA guidelines. PubMed, SCOPUS, and Cochrane Central Register of Controlled Trials were searched for therapeutic level I to III studies that compared outcomes of presoaking ACL grafts with vancomycin versus without vancomycin in human patients. Included graft types were tendon autografts or allografts, and included studies documented infection with a minimum follow-up of 30 days. Postoperative infection rates and knee-specific patient-reported outcome scores were extracted from each study and compared between groups. Study methodological quality was analyzed using the Methodological Index for Non-Randomized Studies (MINORS) and Modified Coleman Methodology Score (MCMS). Infection rates and retear rates were pooled and weighted for meta-analysis using a random-effects model. All P values were reported with an α level of 0.05 set as significant.

Results
The initial search yielded 144 articles (44 duplicates, 100 screened, 29 full-text review). Ten articles (21,368 subjects [7,507 vancomycin and 13,861 no vancomycin], 67% males, mean ± standard deviation age 29.5 ± 1.5 years) were included and analyzed. Eight of the 10 studies included only autografts, with 94.5% of grafts being hamstring autografts. Soaking grafts in vancomycin resulted in significantly fewer infections (0.013% versus 0.77%; odds ratio 0.07; 95% confidence interval 0.03, 0.18; $P < .001$). Only 2 studies included patient-reported outcomes, and both demonstrated no difference in International Knee Documentation Committee scores 1 year after surgery for patients with grafts presoaked in vancomycin versus without vancomycin.

Conclusions
Soaking ACL tendon grafts with vancomycin before implantation is associated with a nearly 15 times decrease in odds of infection compared with grafts not soaked in vancomycin. Few studies investigated patient-reported outcomes and retear rates after soaking ACL grafts in vancomycin.

Level of Evidence
III, systematic review of level III studies

BACK

Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA), Volume 29, issue 5, pages 1353 - 1361

Psychological readiness is related to return to sport following hip arthroscopy and can be assessed by the Hip-Return to Sport after Injury scale (Hip-RSI).

Wörner, T., Thorborg, K., Webster, K.E. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06157-4

Purpose
Psychological readiness may play an important role in the return to sport (RTS) process following hip arthroscopy (HA), but there are limited tools for the measurement of this construct. The aim of this study was to modify the Swedish version of the Anterior Cruciate Ligament-Return to Sport after Injury (ACL-RSI) scale for use in HA patients and evaluate its psychometric properties.

Methods
Content validity of a modified version of the Swedish ACL-RSI (Hip-RSI) was evaluated through 127 HA patient responses and relevance ratings by an expert panel (35 patients, 9 surgeons, 11 physiotherapists). Items with low relevance were omitted. Construct validity was assessed by the association of Hip-RSI scores to hip-related sporting function (HAGOS sport) and quality of life (iHOT12). Hip-RSI scores were compared between patients who had not returned, or returned to sport participation, previous sport, and sport performance.

Results
Item reduction resulted in a 6-item Hip-RSI scale with adequate content validity for the target population. Construct validity of the full and the item-reduced scale was demonstrated by correlation to HAGOS sport and iHOT12 (*r* 0.631–0.752). A gradient increase in Hip-RSI scores was found for patients returning to sport participation, previous sport, and sport performance.

Conclusion
The short version of the Swedish Hip-RSI is a valid tool for the assessment of psychological readiness to RTS and can be recommended to be used in HA patients. Higher psychological readiness to RTS, assessed by the Hip-RSI, is found with increasing levels of return to sports following HA.

Level of evidence
III.

BACK

Femoroacetabular impingement surgery leads to early pain relief but minimal functional gains past 6 months: experience from the FIRST trial.

Almasri, M., Simunovic, N., Heels-Ansdell, D. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06401-x

Purpose
To understand the early outcomes after hip arthroscopy and better define the trajectory of improvement in a prospective cohort of patients who have undergone hip arthroscopic osteochondroplasty for femoroacetabular impingement (FAI) syndrome.

Methods
Data were analyzed from the Femoroacetabular Impingement RandomiSed controlled Trial (FIRST) on the 108 study patients who underwent osteochondroplasty, with or without labral repair. Study outcomes included patient-reported pain (using a 100-point Visual Analogue Scale (VAS)), hip function (using the Hip Outcome Score (HOS) and International Hip Outcome Tool (iHOT-12)), and health-related quality of life (using the EuroQol 5 Dimensions (EQ-5D)) measured at baseline, 2 weeks, 3 months, 6 months, and 12 months post-operatively.

Results
There was a decrease in mean post-operative pain VAS scores from baseline. The first 2 weeks post-operative yielded the greatest reduction in pain with a mean (SD) VAS score of 37.8 (23.4), with score stabilization between 6 months (26.9 (26.9)) and 12 months (25.3 (27.6)). Mean HOS (activities of daily living) scores improved from baseline (59.7 (16.2)) starting at 6 weeks post-operative (64.1 (19.1)). The HOS (Sports) showed no improvement from baseline (41.2 (20.4)) until 3 months (49.1 (27.9)), and continued to improve at 6 months (64.1 (28.7)) and 12 months (68.6 (30.5)). The iHOT-12 scores showed functional improvement from baseline (31.3 (18.8)), as early as 6 weeks (44.9 (22.4)) up to and including 12 months (67.1 (29.7)). EQ-5D index scores showed modest steady improvement from 6 weeks to 12 months post-operative, while the EQ-5D VAS component similarly showed modest and steady improvements from 3 months onward.

Conclusion
Results from this study highlight that hip arthroscopic osteochondroplasty with or without labral repair for FAI leads to early pain relief. While all scores improved from baseline, functional gains appear to plateau from 6 months onwards. These data can be used to inform decision-making about timelines for rehabilitation and return to sport, a knowledge gap in the current FAI literature.

Level of evidence
II.

BACK

Successful return to sport in patients with symptomatic borderline dysplasia following hip arthroscopy and T-shaped capsular plication.

D'Ambrosi, R., Hantes, M.E., Mariani, I. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06147-6

Purpose
This study aims to evaluate the return to sport and correlations of patients with symptomatic borderline hip dysplasia (BHD) after hip arthroscopy and T-shaped capsular plication at a minimum follow-up of 24 months.

Methods
Twenty-five patients who underwent hip arthroscopy and T-shaped capsular plication for symptomatic BHD were included in the study. All the patients were evaluated clinically prior to surgery (T_0) and at two consecutive follow-ups (T_1:15 ± 1.2 months and T_2: 53.9 ± 23.2 months) using the visual analogue scale (VAS) pain score, whereas sports activity was assessed by the Hip Outcome Score Sport Specific Subscale (HOS-SSS), the University of California, Los Angeles (UCLA) activity scale, the Tegner score and the physical component (PCS) of the Short Form-12 (SF-12). Furthermore, the presence of correlations and the possible differences between subgroups were evaluated and analysed.

Results
A significant difference was found for HOS-SSS, VAS, Tegner, UCLA and PCS with the Friedman test for repeated measures through time points ($p < 0.0001$). Moreover, all the scores reported significant improvement compared to the previous time point ($p < 0.0001$) except the HOS-SSS between T_1 and T_2 (n.s.). Body Mass Index (BMI) was negatively correlated with HOS-SSS at T_0 (rho = − 0.526 $p = 0.006$) and T_1 (rho = − 0.425; $p = 0.034$), with Tegner at each follow-up (T_0: rho = − 0470 $p = 0.017$; T_1: rho = − 0.450; $p = 0.024$; T_2: rho = − 0.448; $p = 0.024$), with UCLA at T_1 (rho = − 0.396 $p = 0.049$), with pre-operative PCS (rho = − 0.413 $p = 0.0401$), and positively correlated with pre-operative VAS (rho = 0.436 $p = 0.0291$).

Conclusions
Hip arthroscopy and T-shaped capsular plication in young patients with symptomatic BHD demonstrates a significant increase in return to sport and physical activity and low risk of complications. T-shaped capsular plication procedure may be considered in young and active patients for whom non-operative treatment failed and who have a significant limitation in sports activity; in these patterns of patients, the ideal treatment should reliably allow fast recovery in combination with very low invasiveness which will prevent osteoarthritis. The results of this study provide more accurate information regarding return to sport in patients with BHD after hip arthroscopy and T-shaped capsular plication.

Level of evidence
Level IV.

BACK

The forgotten joint score-12 is a valid and responsive outcome tool for measuring success following hip arthroscopy for femoroacetabular impingement syndrome.

Robinson, P.G., Rankin, C.S., Murray, I.R. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06138-7

Purpose
The forgotten joint score-12 (FJS-12) is an outcome questionnaire designed to evaluate joint awareness. The responsiveness and validity of the English language version of the FJS-12 in patients undergoing hip arthroscopy for femoroacetabular impingement (FAI) is not known.

Methods
Consecutive patients undergoing hip arthroscopy for a diagnosis of FAI were prospectively followed up over a 1 year period. Patients completed preoperative and postoperative FJS-12, EuroQol 5 Dimension (EQ-5D-5L), and the 12-item international hip outcome tool (iHOT-12). We evaluated construct validity with Spearman correlation coefficients for the FJS-12, and responsiveness by way of effect size and ceiling effects.

Results
Forty-six patients underwent hip arthroscopy, of which 42 (91%) completed post-operative PROMs at 1 year follow-up. Construct validity was strong with the iHOT-12 ($r = 0.87$) and also the EQ-5D-5L ($r = 0.83$). The median postoperative FJS score was 50.2 (IQR 64). The mean change in score for the FJS-12 was 31 points (SD 31) ($p < 0.001$), with an effect size (Cohen's d) of 1.16. Preoperatively, three patients scored the lowest possible value resulting in a floor effect of 7.1%. Similarly, only three patients (7.1%) scored the best possible score post-operatively.

Conclusion
This is the first evaluation of the joint awareness concept in the English language version of the FJS-12 following hip arthroscopy for FAI. The FJS-12 is a valid and responsive tool for the assessment of this cohort of patients.

Level of evidence
II.

BACK

Increased hip arthroscopy operative duration is an independent risk factor for overnight hospital admission.

Bovonratwet, P., Boddapati, V., Nwachukwu, B.U. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06170-7

Purpose
The purpose of this study was to determine the association between operative duration and short-term complications as well as overnight hospital admission following hip arthroscopy.

Methods
Hip arthroscopy cases from 2006 to 2016 were retrieved from the National Surgical Quality Improvement Program registry, which prospectively collects 30-day postoperative complications. Patients were stratified into the following groups based on procedure length: group 1 (< 60 min), group 2 (60–120 min), and group 3 (> 120 min). Preoperative characteristics were compared across the cohorts. Multivariate regressions were used to compare complication rates and overnight hospital admission between the three groups. Independent risk factors for overnight hospital admission were characterized.

Results
A total of 2129 hip arthroscopy cases were identified. Average operative duration was 99.3 ± 55.7 min. As operative time increased, patients were more likely to be younger, male, and had lower American Society of Anesthesiologists (ASA) class ($p < 0.001$). Body mass index and comorbidity profiles were similar across the patient cohorts, with the exception of hypertension being more prevalent in the shorter operative time cohort ($p < 0.001$). Patients in group 3 were more likely to stay overnight in the hospital (26.0%) compared to patients in groups 1 (7.7%) and 2 (10.9%), $p < 0.001$). All postoperative complication rates were otherwise similar between the cohorts. Independent risk factors for overnight hospital admission included increasing operative time (most notably > 120 min relative to < 60 min, relative risk [RR] = 3.53, 95% CI 2.50–5.00, $p < 0.001$) and increasing ASA classification (most notably ASA III or IV relative to ASA I, RR = 1.64, 95% CI 1.18–2.27; $p = 0.013$).

Conclusions
Increasing operative duration was not associated with increased postoperative complications following hip arthroscopy. However, patients were more than three times likely to stay in the hospital overnight if their surgery was longer than 120 min, relative to cases that were less than 60 min.

Level of evidence
III.

BACK

Arthroscopic classification of intra-articular hip pathology demonstrates at best moderate interrater reliability.

Emmons, B.R., Christoforetti, J.J., Matsuda, D.K. *et al.*

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06215-x

Purpose
The purpose of this study was to report several novel classification systems for intra-articular lesions observed during hip arthroscopy, and to quantify the interrater reliability of both these novel systems and existing classifications of intra-articular lesions when tested by a group of high-volume hip arthroscopists.

Methods
Five hip arthroscopists deliberated over shortcomings in current classification systems and developed several novel grading systems with particular effort made to capture factors important to the treatment and outcomes of hip arthroscopy for labral injury. A video learning module describing the classifications was then developed from the video archive of surgeries performed by the senior author and reviewed by study participants. Following review of the module, a pilot study was completed using five randomly selected videos, after which participating surgeons met once more to discuss points of disagreement and to seek clarification. The final video collection for testing reliability was composed of 29 videos selected with the intent of capturing all sublevels of each classification scheme. Study participants recorded their assessments using each classification scheme, and interrater reliability was calculated by a study participant not involved in grading.

Results
The average kappa coefficients for the classification schemes ranged from 0.38 to 0.54, with the interrater reliability of all classification schemes except labral degeneration qualifying as moderate. The percent of cases with absolute agreement ranged from 17.2% to 51.7% across the classification systems.

Conclusions
Even among a group of high-volume hip arthroscopists who engaged in several discussions about the proposed classification schemes, grades were found to have at best moderate interrater reliability. Moderate interrater reliability is demonstrated for novel grading systems for describing labral tear complexity, labral bruising, labral size, and extent of synovitis, and fair reliability is demonstrated for labral degeneration. Further development and refinement of multifactorial grading systems for describing labral injury are indicated. Evaluating the multifactorial nature of intra-articular lesions in the hip is an important part of intraoperative decision-making and defining reliable classifications for intra-articular lesions is a critical first step towards developing generalizable criteria for guiding treatment type.

Level of evidence
Level III.

BACK

The dimensions of the hip labrum can be reliably measured using magnetic resonance and computed tomography which can be used to develop a standardized definition of the hypoplastic labrum.

Walker, M., Maini, L., Kay, J. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06330-9

Purpose
The purpose of this study was to examine the existing literature to determine the dimensions of the acetabular labrum, with a focus on hypotrophic labra, including the modalities and accuracy of measurement, factors associated with smaller labra, and any impacts on surgical management.

Methods
Four databases (PubMed, Ovid [MEDLINE], Cochrane Database, and EMBASE) were searched from database inception to January 2020. Two reviewers screened the literature independently and in duplicate. Methodological quality of included papers was assessed using the Methodological Index for Non-Randomized Studies (MINORS) criteria. Where possible, data on labral size were combined using a random effects model.

Results
Twenty-one studies (5 level II, 9 level III, 7 level IV) were identified. This resulted in 6,159 patients (6,436 hips) with a mean age of 34.3 years (range 8.4–85). The patients were 67.3% female with an average follow-up of 57.3 months. There was no consistent definition of labral size quoted throughout the literature. The mean width on MRI/MRA was 7.3 mm (95% CI 6.9–7.8 mm), on computed tomography arthrography was 8.7 mm (95% CI 8.0–9.3), and during arthroscopy was 5.0 mm (95% CI 4.9–5.2). Inter-observer reliability was good to excellent in all modalities. Labral hypotrophy may be associated with increased acetabular coverage. Hypertrophic labra were highly associated with acetabular dysplasia ($r = -0.706$, -0.596, -0.504, respectively; $P < 0.001$).

Conclusion
Labral width can reliably be measured utilizing imaging techniques including magnetic resonance and computed tomography. The pooled mean labral width was 6.2 mm, and height 4.6 mm. The establishment of a gold-standard of measurement on arthroscopy and advanced imaging would aid in clinical decision-making regarding treatment options for patients presenting with a painful hip, particularly those with hypoplastic labra, and provide radiological guidelines for standardized labrum size classifications.

Level of evidence
Level IV.

BACK

Hip arthroscopy with initial access to the peripheral compartment provides significant improvement in FAI patients.

Dantas, P., Gonçalves, S., Mascarenhas, V. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06380-z

Purpose
This study was designed to evaluate the clinical and radiographic results of arthroscopic treatment of femoroacetabular impingement (FAI) using the technique of initial access to the peripheral compartment. It is based on a single surgeon large case series with a minimum of 2 years follow-up.

Methods
Prospective longitudinal study with consecutive patients. Inclusion criteria were the presence of FAI syndrome that had failed non-operative treatment and had a hip arthroscopy with initial access to the peripheral compartment. Exclusion criteria were previous hip surgery, patients younger than 16 or older than 60 years, Tönnis grade ≥ 2 osteoarthritis, hip dysplasia based on radiographic evidence of LCEA less than 25° and workers compensation cases. One hundred and sixty hips met the inclusion criteria, 84 were female and 70 were male patients (six bilateral cases), with a median age of 36 years (range 16–59).

Results
The median alpha angle correction was 22.6º (range 5.9–46.7) ($p < 0.01$) and the average LCEA correction when acetabuloplasty was undertaken was 6.5º (range − 1.4–20.8) ($p < 0.01$). The mean NAHS at baseline was 56.1 (range 16–96) and improved to 83.2 at the last follow up (range 44–100) for the patients that had no additional procedure ($p < 0.01$). The mean average improvement was 27.7º points (range − 16–73). No iatrogenic labral perforation and no full-thickness chondral damage were recorded during the arthroscopic procedures.

Conclusions
Favourable outcomes are reported for the arthroscopic treatment of FAI with initial access to the peripheral compartment. The technique is protective against iatrogenic chondral and labral damage, more conservative to the joint capsule, but the mean traction time was relatively long when suture anchors were used. The results are comparable to the classic initial central compartment approach.

Level of evidence
Level IV.

BACK

Lower body mass index and age are predictive of improved pain and health utility scores following arthroscopic management of femoroacetabular impingement.

Kay, J., Simunovic, N., Heels-Ansdell, D. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06395-6

Purpose
To identify patient factors associated with improved pain scores, functional hip scores, health-related quality of life, and re-operation rates after arthroscopic management of femoroacetabular impingement (FAI).

Methods
Using the comprehensive dataset from the multinational Femoroacetabular Impingement Randomized Controlled Trial (FIRST), a total of 13 prognostic factors that were chosen a priori were identified that would be expected to predict post-surgical outcomes. The primary outcome was pain assessed using a Visual Analogue Scale (VAS) and secondary outcomes included hip function (Hip Outcome Score [HOS] and International Hip Outcome Tool [iHOT-12]), health-related quality of life (Short Form-12 [SF-12] and Euro-Qol 5 Dimensions [EQ-5D]), and re-operation rate. A multivariable linear regression was used to analyse the change questionnaire scores from baseline to 12 months post-surgery including all 13 prognostic factors as independent variables. A total of 27 re-operation events were analysed at 24 months using a multivariable logistic regression including only the treatment group variable.

Results
Of the 154 patients that had VAS scores completed at 12 months, a lower BMI (adjusted mean difference [aMD], 4.48 for a 5-unit decrease in BMI; 95% confidence interval [CI] 0.33–8.63; $p = 0.035$) was significantly associated with less pain. There was a significant negative association between increasing age and 1-year EQ-5D scores (aMD, − 0.04 for every 10-year increase in age; 95% CI − 0.07 to − 0.006; $p = 0.020$). The degree of impingement, severity of osteoarthritis, type of procedure, and adjudicated quality of surgery were not significantly associated with improvement across all outcomes at 12 months. Furthermore, there was no significant association between the treatment variable and the incidence of re-operation at 24 months.

Conclusion
This study identified that lower BMI and age are predictive of improved pain and health utility scores, respectively, following arthroscopic management of FAI at 12 months post-surgery. These results may be a helpful adjunct in clinical decisions for this patient population when determining candidacy for surgical intervention.

Level of evidence
I.

BACK

Obesity is associated with less favorable outcomes following hip arthroscopic surgery: a systematic review and meta-analysis.

Kuroda, Y., Hashimoto, S., Saito, M. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-021-06435-9

Purpose
The aim of this study was to systematically review the existing literature comparing the postoperative outcomes after following hip arthroscopy in obese and non-obese patients.

Methods
Studies comparing the outcomes following hip arthroscopy of obese and non-obese patients were systematically identified via a computer-assisted literature search of Pubmed (Medline), EMBASE, and Cochrane Library using the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines. Studies comparing the outcome of hip arthroscopy in different body mass index (BMI) groups were included. Data including patient-reported outcome measures (PROMs), revision arthroscopy rate, conversion rate to total hip arthroplasty (THA), and complications were collected. The methodological index for non-randomized studies (MINORS) and Newcastle–Ottawa Scale (NOS) were used to assess the quality of each study quality. The effect of heterogeneity was quantified by calculating the I^2 value.

Results
A total of eight studies were finally included in the qualitative analysis, and three studies of high quality involving 373 hips were included in the quantitative assessment. All the studies defined obesity as a BMI of ≥ 30 kg/m^2. The modified Harris Hip Score and the Non-Arthritic Hip Score were 5.1 (95% CI 1.1–9.1) and 9.0 (95% CI 5.0–13.1) points lower, respectively, in the obese group than in the non-obese group. The pooled odds ratios were 1.2 (95% CI 0.5–2.7) for revision arthroscopy, 2.4 (95% CI 1.3–4.6) for conversion to THA, and 3.2 (95% CI 1.2–8.6 for complications in favor of the non-obese group. The heterogeneity was low in all outcome assessments (I^2 0–18%).

Conclusion
Obese patients had significantly lower PROMs than non-obese patients following hip arthroscopic surgery, and the THA conversion and complication rates were 2.4 times and 3.2 times higher, respectively. Understanding the effect of obesity on hip arthroscopy will allow appropriate surgical indications for surgery to be further refined and help obese patients to understand their individual risk profile.

Level of evidence
Systematic review of Level III–IV studies, Level IV.

BACK

High patient satisfaction and good long-term functional outcome after endoscopic calcaneoplasty in patients with retrocalcaneal bursitis.

Opdam, K.T.M., Zwiers, R., Vroemen, J. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06167-2

Purpose
The primary objective of this study was to determine the degree of patient satisfaction at a minimum of 5 years of follow-up after endoscopic calcaneoplasty. The secondary objectives were to assess functional outcome measures, pain scores, analysis of bone removal, reformation of exostosis at follow-up and correlation of the size of the exostosis and recurrent or persisting complaints.

Methods
This study evaluated patients who underwent endoscopic calcaneoplasty, between January 1st 2000 and December 31st 2010, for the diagnosis of retrocalcaneal bursitis. The evaluation consisted of PROMs (patient-reported outcome measures), a questionnaire and a visit to the outpatient clinic for physical examination and a standard lateral weight-bearing radiograph of the ankle. Patient satisfaction, functional outcomes and pain scores were measured by use of a numeric rating scale (NRS). Size of the posterosuperior calcaneal exostosis was measured on a standard lateral weight-bearing radiograph using parallel pitch lines (PPL) and the Fowler–Philip angle (PFA).

Results
The response rate was 28 out of 55 (51%) and the median time to follow-up was 101(IQR 88.5–131.8) months. The median satisfaction score for treatment results was 8.5 out of 10 (IQR 6–10). FAOS symptoms 84.5 (IQR 58.0–96.4), FAOS pain 90.3 (IQR 45.1–100.0), FAOS ADL 94.9 (IQR 58.1–100.0), FAOS sport 90.0 (IQR 36.3–100.0) and FAOS QOL 71.9 (IQR 37.5–93.8) and median AOFAS was 100 (IQR 89–100). The median PLL difference between before operation and 2 weeks after the operation was − 4 mm (IQR-6 and -1) and the median PLL difference between 2 weeks after the operation and at follow-up was 1 mm (0–2). The median PFA was 65 (63–69) at baseline, 66.5 (60.8–70.3) 2 weeks after the operation and 64 (60.8–65.3) at follow-up.

Conclusion
Despite the limited response rate, this study shows high patient satisfaction and good long-term functional outcome in patients affected by retrocalcaneal bursitis who underwent endoscopic calcaneoplasty.

Level of evidence
Level IV.

BACK

Preoperative risk factors in hip arthroscopy.

Seijas, R., Barastegui, D., López-de-Celis, C. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-021-06484-0

Purpose
Arthroscopic surgery is a usual technique to repair hip femoroacetabular impingement. Correlation exists among surgical indication, postoperative evolution, the final result, and the necessity of prosthesis in the near future. The assessment of specific parameters allowing us to evaluate the prognosis becomes vital to improve the results. The objective of this study is to check the variables found in patients with femoroacetabular impingement (FAI) treated with hip arthroscopy, and determine which of these variables would serve as key indicators in predicting the need for subsequent arthroplasty.

Methods
Data from FAI surgical indications (age, weight, height, BMI, gender, side, radiographic Tönnis degree, cartilage lesion degree by Acetabular Labrum Articular Disruption (ALAD) degree, VAS value, HOS, mHHS and WOMAC) were collected from cases which should have had a minimum monitoring period of 2 years from 2007 to 2017. The results of the group which needed prosthesis were compared to the results of the ones who did not.

Results
Among 452 patients who were monitored for an average of 5.8 years, 82 (18.1%) required conversion to prosthesis. The variables that indicated relatively high risk were fourth-degree acetabular labrum articular disruption (ALAD) chondral injury, preoperative radiographic Grade 2 Tönnis classification, age of over 55 years, WOMAC over 45 points, and HOS-ADL under 50 points. There were no significant differences between side, gender, VAS level, nor HOS.

Conclusions
The presence of chondral injuries such as acetabular labrum articular disruption (ALAD) 4, radiographic Grade 2 Tönnis classification, higher age, higher BMI, and worse WOMAC, along with mHHS and HOS-ADL preoperative results, are factors which lead to a poor prognosis following FAI hip arthroscopic surgery, increasing the risk of prosthetic conversion in the short or medium term.

Level of evidence
Level IV.

BACK

The anterior talofibular ligament–posterior talofibular ligament angle decreased after ankle lateral stabilization surgery.

Li, HY., Guo, A., Yang, F. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06174-3

Purpose
The angle between the anterior talofibular ligament (ATFL) and the posterior talofibular ligament (PTFL) is increased in patients with chronic ATFL injury. This study aimed to compare the AFTL–PTFL angle before versus after ankle lateral stabilization surgery, and to evaluate whether the ATFL–PTFL angle correlates with the ligament injury severity.

Methods
This retrospective study included 48 patients with mechanical ankle instability treated between 2016 and 2018. After arthroscopic evaluation, all patients underwent ankle lateral stabilization surgery comprising ligament repair (n = 28) or reconstruction (n = 20). The ATFL–PTFL angle was measured in the axial plane on pre- and postoperative MRI. Comparisons were made of the pre- versus postoperative ATFL–PTFL angles, and the ATFL–PTFL angle of the repair versus reconstruction groups. Receiver operating characteristic (ROC) curve analysis was used to assess the diagnostic performance of the ATFL–PTFL angle in selecting the surgical technique.

Results
The postoperative ATFL–PTFL angle was significantly decreased compared with preoperatively. The ATFL–PTFL angle was significantly smaller in the repair group than the reconstruction group preoperatively and postoperatively. The area under the ROC curve was 0.741 ($P < 0.01$). The optimal cutoff point for the selection of ligament reconstruction was an ATFL–PTFL angle of 89.4° (sensitivity 0.85, specificity 0.61).

Conclusion
The ATFL–PTFL angle decreases after ankle lateral stabilization surgery. The ATFL–PTFL angle is related to the severity of the ATFL injury. Ankle lateral ligament reconstruction should be considered when the ATFL–PTFL angle is > 89.4°.

Level of Evidence
Level III.

BACK

Acute, isolated and unstable syndesmotic injuries are frequently associated with intra-articular pathologies.

Rellensmann, K., Behzadi, C., Usseglio, J. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06141-y

Purpose
Although simultaneous arthroscopy for the surgical treatment of acute isolated, unstable syndesmotic injuries has been recommended, little knowledge is present about the actual frequency of intra-articular pathologies for this injury. The aim of this study was to investigate the frequency and severity of intra-articular pathologies detected during arthroscopy and their subsequent treatment in acute isolated, unstable syndesmotic injuries.

Methods
A retrospective chart review of patients treated by arthroscopic-assisted stabilization for acute isolated, syndesmotic instability was performed. The primary outcome parameter was the frequency of intra-articular pathologies. Secondary outcome parameters were the type of syndesmotic lesion (ligamentous/bony), severity of chondral lesions, MRI findings, treatment details, complications and the identification of factors associated with intra-articular pathologies.

Results
Twenty-seven patients, 19% female, with a mean age of 37 ± 12 years met the inclusion criteria. 70% suffered isolated ligamentous injuries, the remaining suffered avulsion fractures of the syndesmosis. Chondral lesions occurred in 48% (ICRS grade II: 33%; ICRS grade IV 15%) and intra-articular loose bodies in 11% of patients. Overall, arthroscopy revealed intra-articular pathologies necessitating further treatment in 19% of patients. Neither the type of syndesmotic injury (bony vs. ligamentous; ns) nor the degree of ligamentous instability (West Point IIB vs. III; ns) had a significant influence on the occurrence of chondral lesions. One complication (SSI) occurred. Pre-operative MRI revealed a sensitivity/specificity of 100/79% for chondral lesions and 50/93% for loose bodies.

Conclusion
Intra-articular pathologies in acute isolated, unstable syndesmotic injuries occur in up to 50% of patients, 19% necessitated additional treatment. Simultaneous arthroscopy, independent of the pre-operative MRI findings, appears reasonable in highly active patients.

Level of evidence
Level III.

BACK

The signal intensity of preoperative magnetic resonance imaging has predictive value for determining the arthroscopic reparability of the anterior talofibular ligament.

Ahn, J., Choi, J.G. & Jeong, B.O.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06208-w

Purpose
Arthroscopic all-inside anterior talofibular ligament (ATFL) repair is a common surgical technique for chronic ankle instability (CAI), and the condition of the ATFL remnants is associated with its reparability. ATFL reparability can affect the clinical course, but the relationship between magnetic resonance imaging (MRI) findings and the intraoperative ATFL reparability is still unclear. The purpose of this study was to investigate the relationship between ATFL signal intensities according to MRI and intraoperative ATFL reparability.

Methods
This study included 55 cases of CAI (n = 37) and osteochondral lesion of the talus (n = 18) that underwent MRI followed by subsequent arthroscopy. MRI signal intensity was measured preoperatively to calculate the signal to noise ratio (SNR). During arthroscopy, the presence of an ATFL tear was checked and the ATFL tension was classified as taut, mild laxity, or laxity; ATFL quality was classified as excellent (normal), moderate (abnormal but reparable), or poor (irreparable). It was then analyzed whether there was a relationship between the intraoperative findings and the SNR.

Results
The mean SNR was 23.4 ± 21.6. The SNR was significantly different according to the presence of an ATFL tear and ATFL tension and quality (all P = 0.001). The SNR was better correlated with ATFL quality (r = 0.708) than the presence of a tear (r = 0.545) or degree of tension (r = 0.653). The diagnostic SNR cutoff point to distinguish a normal ATFL from an abnormal but reparable ATFL was 11.2, and that to distinguish between an irreparable and reparable ATFL, was 32.3.

Conclusion
The SNR, representing MRI signal intensities, is highly correlated with the intraoperative measures of the ATFL. Therefore, the SNR had predictive value for determining the arthroscopic reparability of the ATFL.

Level of evidence
Level III.

BACK

Bone marrow stimulation for talar osteochondral lesions at long-term follow-up shows a high sports participation though a decrease in clinical outcomes over time.

Lambers, K.T.A., Dahmen, J., Altink, J.N. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06250-8

Purpose
Although bone marrow stimulation (BMS) as a treatment for osteochondral lesions of the talus (OCLT) shows high rates of sport resumption at short-term follow-up, it is unclear whether the sports activity is still possible at longer follow-up. The purpose of this study was, therefore, to evaluate sports activity after arthroscopic BMS at long-term follow-up.

Methods
Sixty patients included in a previously published randomized-controlled trial were analyzed in the present study. All patients had undergone arthroscopic debridement and BMS for OCLT. Return to sports, level, and type were assessed in the first year post-operative and at final follow-up. Secondary outcome measures were assessed by standardized questionnaires with use of numeric rating scales for pain and satisfaction and the Foot and Ankle Outcome Score (FAOS).

Results
The mean follow-up was 6.4 years (SD ± 1.1 years). The mean level of activity measured with the AAS was 6.2 pre-injury and 3.4 post-injury. It increased to 5.2 at 1 year after surgery and was 5.8 at final follow-up. At final follow-up, 54 patients (90%) participated in 16 different sports. Thirty-three patients (53%) indicated they returned to play sport at their pre-injury level. Twenty patients (33%) were not able to obtain their pre-injury level of sport because of ankle problems and eight other patients (13%) because of other reasons. Mean NRS for pain during rest was 2.7 pre-operative, 1.1 at 1 year, and 1.0 at final follow-up. Mean NRS during activity changed from 7.9 to 3.7 to 4.4, respectively. The FAOS scores improved at 1 year follow-up, but all subscores significantly decreased at final follow-up.

Conclusion
At long-term follow-up (mean 6.4 years) after BMS for OCLT, 90% of patients still participate in sports activities, of whom 53% at pre-injury level. The AAS of the patients participating in sports remains similar pre-injury and post-operatively at final follow-up. A decrease over time in clinical outcomes was, however, seen when the follow-up scores at 1 year post-operatively were compared with the final follow-up.

Level of evidence
Level II.

BACK

Clinical outcomes after arthroscopic microfracture for osteochondral lesions of the talus are better in patients with decreased postoperative subchondral bone marrow edema.

Ahn, J., Choi, J.G. & Jeong, B.O.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06303-y

Purpose
Magnetic resonance imaging (MRI) findings of subchondral bone marrow edema (SBME) in osteochondral lesions of the talus (OLT) after arthroscopic microfracture are associated with poor clinical outcomes. However, the relationship between SBME volume change and clinical outcomes has not been analyzed. It was hypothesized that clinical outcomes correlated with SBME volume change and extent of cartilage regeneration in patients with OLT.

Methods
64 patients who underwent arthroscopic microfracture for OLT were followed up for more than 2 years. SBME volume change was measured by comparing preoperative and 2-year follow-up MRI. Clinical outcomes were assessed using the visual analogue scale (VAS) and the American orthopedic foot and ankle society ankle-hindfoot scale (AOFAS) at the 2-year and final follow-up. To compare clinical outcomes, patients were categorized into two groups: decreased SBME (DSBME) group (cases without SBME on either MRI or with a decreased SBME volume between the MRIs) and increased SBME (ISBME) group (cases with new SBME on postoperative MRI or with an increased SBME volume between the MRIs). Additionally, the effects of age, sex, body mass index, symptom duration, OLT size, OLT location, containment/uncontainment, preoperative subchondral cysts, pre- and postoperative SBME volumes, and MRI observation of cartilage repair tissue score on clinical outcomes were analyzed.

Results
The DSBME group included 45 patients, whereas the ISBME group included 19. The mean age was 40.1 ± 17.2 years, and mean follow-up period was 35.7 ± 18.3 months. Preoperative SBME volume was significantly higher in the DSBME group, while the ISBME group had higher volumes at the final follow-up. In both groups, the VAS and AOFAS scores significantly improved at the final follow-up ($p < 0.001$, < 0.001). The VAS scores were significantly lower in the DSBME group at the 2-year and final follow-up ($p = 0.004$, 0.011), while the AOFAS scores were significantly higher ($p = 0.019$, 0.028). Other factors including cartilage regeneration did not affect clinical outcomes.

Conclusion
SBME volume change correlated with clinical outcomes after arthroscopic microfracture for OLT. Clinical outcomes were worse in patients with new postoperative SBME and increased postoperative SBME volume. In patients with an unsatisfactory clinical course that show decreased SBME via postoperative MRI, an extended follow-up in a conservative manner could be considered.

Level of evidence
Level III.

BACK

A four-step approach improves long-term functional outcomes in patients suffering from chronic ankle instability: a retrospective study with a follow-up of 7–16 years.

Ventura, A., Borgo, E., Terzaghi, C. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06368-9

Purpose
The aim of the present study was to assess the long-term outcomes of the treatment of chronic ankle instability (CAI) with a four-step protocol.

Methods
Fifty-four patients with isolated anterior talo-fibular ligament (ATFL) lesion suffering from CAI who underwent surgical treatment between 2000 and 2009 were assessed. All the patients underwent a four-step protocol including synovectomy, debridement of ATFL lesion borders, capsular shrinkage, and 21-day immobilization and nonweightbearing. Median age at surgery was 31.6 years (18–48). Patients were examined preoperatively and at follow-up. Clinical assessment included the American Orthopaedic Foot and Ankle Society (AOFAS) ankle and hindfoot scoring system, Karlsson–Peterson score, Tegner activity level, and objective examination comprehending range of motion (ROM) and manual laxity tests.

Results
AOFAS (preoperative, 64.8; postoperative, 92.4; $p < 0.001$) and Karlsson-Peterson score (preoperative, 62.5; postoperative, 88.8; $p < 0.001$) significantly improved after a median 11 years follow-up (7–16 years). Similarly median Tegner activity level significantly increased at follow-up compared to pre-operatory status (6.0 and 4.0 respectively, $p < 0.001$). Objective examination documented a statistically significant improvement in terms of ankle stability compared to pre-operative manual laxity tests, with negative anterior drawer test observed in 48 (88.9%) patients ($p < 0.001$). Sagittal ROM was full in 50 patients (92%). Nine patients had subsequent ankle sprains (15.6%), two patients required further surgery, while seven were treated conservatively. No major complications were reported.

Conclusion
Satisfying subjective and objective clinical outcomes in selected patients with isolated ATFL lesion suffering from CAI were reported with a treatment protocol including arthroscopic synovectomy, debridement of ATFL remnants, capsular shrinkage, and immobilization. These findings are of clinical relevance because they provide a suitable minimally invasive method for the treatment of mild to moderate ankle instability.

Level of evidence
Level IV

BACK

Litigation in arthroscopic surgery: a 20-year analysis of legal actions in France.

Pioger, C., Jacquet, C., Abitan, A. et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06182-3

Purpose
The main objective of this study was to identify the epidemiological characteristics of litigation following arthroscopic procedures, performed in private practice and public hospitals in France. The secondary objective was to establish a risk profile for medical malpractice lawsuits after arthroscopic surgery.

Methods
All court decisions related to arthroscopic surgery between 1994 and 2020 were collected and reviewed cases from the two main French legal databases (Legifrance and Doctrine). Data were retrospectively collected and included: gender, joint and defendant's specialty involved, reason behind the lawsuit, initial indication and the type of arthroscopic procedure performed. The final verdicts as well as the indemnity awarded to the plaintiff (if any) were recorded.

Results
One-hundred eighty cases met the inclusion criteria of the study and were analyzed: 58 cases were before administrative courts and 122 were before civil courts. An orthopaedic surgeon was involved alone or in solidum in 45.6% of cases (82/180), followed by anesthesiologists in 5.6% (10/180). The private surgery center or public hospital were implicated in 63.9% (115/180) of cases. The 2 most common joints involved in litigation following arthroscopic surgery were the knee (82.2%, n = 148) and the shoulder (11.1%, n = 20). The main reasons behind the lawsuit were related to postoperative infection in 78/180 cases and to a musculoskeletal complication in 45/180 cases (25%). A failure to inform was also reported in 34/180 cases (18.9%). Of the 180 cases, 122 cases (67.8%) resulted in a verdict for the plaintiff. The average indemnity award for the plaintiff was 77.984 euros [2.282–1.117.667]. A verdict for the plaintiff was significantly associated with postoperative infection or a wrong-side surgery, while technical error and musculoskeletal complications were more significantly likely to result in a verdict in favor of the defendant ($p = 0.003$).

Conclusion
This study evaluated and mapped lawsuits following after arthroscopic surgery in France over a period of more than 20 years. The main joint involved in lawsuits was knee. The main causes of lawsuits following arthroscopic surgery were related to postoperative infection, musculoskeletal complications and failure to inform.

Level of Evidence
Level IV.

BACK

American Journal of Sports Medicine (AJSM), Volume 49, Issue 5

Effect of Anterior Cruciate Ligament Rupture on Physical Activity, Sports Participation, Patient-Reported Health Outcomes, and Physical Function in Young Female Athletes

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Background: Return to sports (RTS) is frequently considered an indicator of successful recovery after anterior cruciate ligament reconstruction (ACLR). However, despite the well-recognized health benefits of physical activity (PA), little is known about objectively measured PA in the 1 to 2 years after ACLR. Given that young female athletes have a high prevalence of ACLR and lower RTS rates as compared with their male counterparts, an in-depth examination of PA in this subgroup is warranted.

Hypothesis: We hypothesized that female youth and young adults who have had ACLR in the previous 1 to 2 years would have less moderate or vigorous PA (MVPA) compared with healthy matched controls. We also hypothesized that the ACLR group would report lower levels of sports participation, patient-reported health outcomes, and physical function.

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

Methods: Participants included 51 female athletes with primary unilateral ACLR for a sports-related injury in the previous 1 to 2 years and 51 age- and sports-matched controls. Outcomes included objectively measured PA (GT3X accelerometers), previous and current sports participation and RTS, body mass index, Knee injury and Osteoarthritis Outcome Score (KOOS), triple single-leg hop, and one-leg rise. Mean within-pair differences with 95% CIs were used to assess differences between groups across all outcomes. Multivariable linear regression (clustered by pair) was used to examine whether the ACLR group had less MVPA than did the age- and sports-matched control group, adjusting for total wear time, age, time since injury, and body mass index.

Results: Median age was 17.8 years (range, 14.6-22.6 years). There was no significant difference between groups in MVPA. However, the injury group had fewer mean minutes per day of vigorous PA (–1.22; 95% CI, −2.40 to −0.04), poorer KOOS values on all subscales, and shorter triple single-leg hop distance. In the injury group, 28 (55%) returned to sports, including 14 (27.5%) who returned at preinjury performance level. Across both groups, over one-third changed their most important sport, shifting toward an individual-based sport.

Conclusion: At 1 to 2 years after ACLR, female athletes demonstrated no differences in combined MVPA and only a very small reduction in vigorous PA, yet they had higher levels of self-reported knee pain and symptoms, reduced knee function in sports, lower quality of life, and poorer objective knee function compared with matched controls.

BACK

Influence of Preoperative Tunnel Widening On the Outcomes of a Single Stage–Only Approach to Every Revision Anterior Cruciate Ligament Reconstruction: An Analysis of 409 Consecutive Patients From the SANTI Study Group

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https://doi.org/10.1177/0363546521996389

Background: Preoperative tunnel widening is a frequently reported indication for performing a 2-stage revision anterior cruciate ligament reconstruction (ACLR) instead of a single-stage procedure. However, the strength of the available evidence to support a 2-stage strategy is low.

Purpose/Hypothesis: The purpose was to evaluate the clinical outcomes of a single stage–only approach to revision ACLR. It was hypothesized that this approach would be associated with significant improvements from baseline in patient-reported outcome measures (PROMs) and knee stability and that there would be no significant differences in any postoperative outcomes between patients with and without preoperative tunnel widening.

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

Methods: A retrospective analysis was conducted of a large series of consecutive patients undergoing revision ACLR with a minimum follow-up of 2 years. Preoperative tunnel widening was assessed using digital radiographs. All patients underwent single-stage surgery with an outside-in technique, regardless of the degree of tunnel widening. Clinical outcomes were compared according to whether tunnel widening was present (either tunnel ≥12 mm) or not (both tunnels <12 mm).

Results: The study included 409 patients with a mean ± SD follow-up of 69.6 ± 29.0 months. After revision ACLR, there was a significant reduction in the side-to-side anteroposterior laxity difference, from 7.7 ± 2.2 mm preoperatively to 1.2 ± 1.1 mm at 2 years ($P < .001$). The mean International Knee Documentation Committee (IKDC) and all subscales of the Knee injury and Osteoarthritis Outcome Score (KOOS) exceeded the thresholds for the Patient Acceptable Symptom State defined for primary ACLR. An overall 358 patients had retrievable preoperative radiographs. According to the tunnel diameter measurements, 111 patients were allocated to group A (both tunnels <12 mm) and 247 patients to group B (either/both tunnels ≥12 mm). There were no significant differences between groups with respect to anteroposterior side-to-side laxity difference, graft rupture rates, non–graft rupture related reoperations, or contralateral anterior cruciate ligament injury rates. There was also no significant difference between groups that exceeded minimal detectable change thresholds for any of the PROMs recorded (ACL-RSI [Anterior Cruciate Ligament–Return to Sports After Injury], Lysholm, Tegner, IKDC, KOOS).

Conclusion: A single-stage approach to revision ACLR is associated with excellent clinical results when an outside-in drilling technique is utilized. The presence of preoperative tunnel widening does not significantly influence PROMs, knee stability, graft rupture rates, or non–graft rupture related reoperation rates.

BACK

Effect of Tibial Tunnel Placement Using the Lateral Meniscus as a Landmark on Clinical Outcomes of Anatomic Single-Bundle Anterior Cruciate Ligament Reconstruction

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https://doi.org/10.1177/0363546521999672

Background: It remains unclear if use of the lateral meniscus anterior horn (LMAH) as a landmark will produce consistent tunnel positions in the anteroposterior (AP) distance across the tibial plateau.

Purpose: To evaluate the AP location of anterior cruciate ligament (ACL) reconstruction tibial tunnels utilizing the LMAH as an intra-articular landmark and to examine how tunnel placement affects knee stability and clinical outcomes.

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

Methods: A retrospective review was conducted of 98 patients who underwent primary ACL reconstruction with quadrupled hamstring tendon autografts between March 2013 and June 2017. Patients with unilateral ACL injuries and a minimum follow-up of 2 years were included in the study. All guide pins for the tibial tunnel were placed using the posterior border of the LMAH as an intra-articular landmark. Guide pins were evaluated with the Bernard-Hertel grid in the femur and the Stäubli-Rauschning method in the tibia. Patients were divided by the radiographic location of the articular entry point of the guide pin with relation to the anterior 40% of the tibial plateau. Outcomes were evaluated by the Marx Activity Scale and International Knee Documentation Committee (IKDC) form. Anterior knee laxity was evaluated using a KT-1000 arthrometer and graded with the objective portion of the IKDC form. Rotational stability was evaluated using the pivot-shift test.

Results: A total of 60 patients were available for follow-up at a mean 28.6 months. The overall percentage of AP placement of the tibial tunnel was 39.3% ± 3.8% (mean ± SD; range, 31%-47%). Side-to-side difference of anterior knee laxity was significantly lower in the anterior group than the posterior group (1.2 ± 1.1 mm vs 2.5 ± 1.3 mm; $P < .001$; $r = 0.51$). The percentage of AP placement of the tibial tunnel demonstrated a positive medium correlation with side-to-side difference of anterior knee laxity as measured by a KT-1000 arthrometer ($r = 0.430$; $P < .001$). The anterior group reported significantly better distribution of IKDC grading as compared with the posterior group (26 grade A and 6 grade B vs 15 grade A and 13 grade B; $P = .043$; $V = 0.297$). The pivot-shift test results and outcome scores showed no significant differences between the groups.

Conclusion: Using the posterior border of the LMAH as an intraoperative landmark yields a wide range of tibial tunnel locations along the tibial plateau, with anterior placement of the tibial tunnel leading toward improved anterior knee stability.

BACK

Long-term National Trends of Arthroscopic Meniscal Repair and Debridement

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https://doi.org/10.1177/0363546521999419

Background: Optimal treatment of meniscal pathology continues to evolve in orthopaedic surgery, with a growing understanding of which patients benefit from which procedure and which patients might be best treated nonsurgically. In 2002, Moseley et al found no difference between arthroscopic procedures, including meniscal debridement and sham surgery, in patients with osteoarthritis of the knee. This called into question the role of routine arthroscopic debridement in these patients. Additionally, an increased interest in understanding and maintaining the function of the meniscus has more recently resulted in a greater focus on meniscal preservation procedures.

Study Design: Descriptive epidemiology study.

Purpose/Hypothesis: The purpose was to evaluate the trends of arthroscopic meniscal debridement and repair and the characteristics of the patients receiving these treatments, compare the differences in practice between newly trained orthopaedic sports medicine specialists and those of other specialties, and analyze if there are differences in practice by region. It was hypothesized that the American Board of Orthopaedic Surgery (ABOS) database would evaluate practice patterns of recent graduates as a surrogate for current treatment and training and, consequently, demonstrate a decreased rate of meniscal debridement.

Methods: Data from ABOS Part II examinees from 2001 to 2017 were obtained from the ABOS Case List. Current Procedure Terminology (CPT) codes related to arthroscopic meniscal treatment were selected. The examination year, age of the patient, practice region, and examinee subspecialty were analyzed. Patient age was stratified into 4 groups: <30, 30 to 50, 51 to 65, and >65 years. Examinee subspecialty was stratified into sports medicine and non–sports medicine. Statistical regression analysis was performed.

Results: Between 2001 and 2017, ABOS Part II examinees submitted 131,047 cases with CPT codes 29880 to 29883. Meniscal debridement volume decreased for all age groups during the study period, while repair increased. Sports medicine subspecialists were more likely than their counterparts to perform repair over debridement in patients aged younger than 30 years ($P = .0004$) and between 30 and 50 years ($P = .0005$).

Conclusion: This study provides insights into arthroscopic meniscal debridement and repair practice trends among ABOS Part II examinees. Meniscal debridement is decreasing and meniscal repair is increasing. Younger patient age and treatment by a sports medicine subspecialty examinee are associated with a higher likelihood of repair over debridement.

BACK

Arthroscopic Repair of the Hip Abductor Musculotendinous Unit: The Effect of Microfracture on Clinical Outcomes

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Background: Endoscopic surgical repair has become a common procedure for treating patients with hip abductor tendon tears. Considering that retear rates are high after the repair of gluteus medius and minimus tendons, exploring alternative strategies to enhance structural healing is important.

Purpose/Hypothesis: The purpose of this study was to evaluate the effect of adding microfracture to single-row repair (SR) on outcomes after the surgical repair of gluteus medius and minimus tendons and compare with SR and double-row repair (DR) without microfracture. We hypothesized that microfracture of the trochanteric footprint with SR would lead to superior clinical outcomes and lower clinically evident retear rates compared with SR and DR without the addition of microfracture.

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

Methods: A total of 50 patients who underwent primary arthroscopic repair of hip gluteus medius and minimus tendon tears were investigated. Patients were divided into 3 groups: DR, 16 patients; SR, 14 patients; and SR with microfracture (SRM), 20 patients. Patients were evaluated with a visual analog scale (VAS) for pain as well as the Hip Outcome Score–Activities of Daily Living (HOS-ADL), Hip Outcome Score–Sport Specific (HOS-SS), and modified Harris Hip Score (mHHS) both preoperatively and at a minimum 2-year follow-up (mean, 30 months).

Results: Among the SR, SRM, and DR groups, the greatest decrease in VAS scores and increase in mHHS, HOS-ADL, and HOS-SS scores were seen in the SRM group, and all the differences were significant ($P < .001$ to $P = .006$). The abductor tendon retear rates were 31.3%, 35.7%, and 15.0% in the DR, SR, and SRM groups, respectively. Retear rates were lower in the SRM group compared with the SR and DR groups ($P = .042$); however, there was no significant difference between the SR and DR groups ($P = .32$) in terms of retear rates.

Conclusion: Endoscopic SR with microfracture was a safe, practical, and effective technique and had the potential advantage of enhancing biological healing at the footprint. The addition of microfracturing the trochanteric footprint significantly lowered the retear rate and provided better functional outcomes than SR and DR without microfracture.

BACK

Can We Identify Why Athletes Fail to Return to Sport After Hip Arthroscopy for Femoroacetabular Impingement Syndrome? A Systematic Review and Meta-analysis

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Background: No previous systematic review has focused on the athletes who fail to return to sport after hip arthroscopy for femoroacetabular impingement syndrome (FAIS).

Purpose: To review the literature on the athletes who fail to return to sport after hip arthroscopy for FAIS to determine the rate of nonreturning athletes and explore the reasons for their inability to return to sport after arthroscopic FAI surgery.

Study Design: Systematic review and meta-analysis.

Methods: Three electronic databases were searched for eligible articles. Two reviewers independently screened the titles, abstracts, and full-text articles using prespecified criteria. Eligible articles were those that clearly stated the rate of athletes who did not return to sport after hip arthroscopy for FAIS. Data collected were the rate of patients who did not return to sport, the level of competition (high level, recreational, or mixed), the type of sport, comments on patients who did not return to sport, the rate of subsequent hip surgeries (total hip replacement or revision hip arthroscopy) in nonreturning athletes, and the reported reason for not returning to sport. A random-effects model was used for meta-analysis.

Results: Twenty studies were eligible for inclusion, and 1093 athletes were analyzed. The weighted rate of athletes who did not return to sport after hip arthroscopy for FAIS was 12.1% (95% CI, 7.7-17.4). Only 2 studies (2/20;10%) reported the age of the athletes who did not return, while sex was reported in 3 studies (3/20;15%). The estimated proportion of athletes who did not return to sport because of hip-related issues was significantly greater than the percentage of athletes who did not return for reasons unrelated to their hip (74.3% vs 22.3%; $P < .0001$). Persistent hip pain was the most commonly reported factor (52/110 patients; 47.2%) associated with failure to return to sport. Whether the nonreturning athletes underwent any subsequent hip procedure after hip arthroscopy for FAIS was reported in only 4 out of 20 studies (20%). There was evidence of publication bias and study heterogeneity.

Conclusion: The estimated rate of athletes who did not return to sport after hip arthroscopy for FAIS was 12%, with the majority of athletes being unable to return because of persistent hip pain. There is a severe lack of evidence on the athlete characteristics and clinical course of the nonreturning athletes, and the rate of subsequent hip procedures is unknown. The outcomes and reasons for athletes not returning to sport should be reported in detail to improve patient care.

BACK

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Patient Satisfaction Is Equivalent Using Telemedicine Versus Office-Based Follow-up After Arthroscopic Meniscal Surgery

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Background: Telemedicine has increasingly been considered as a viable alternative to traditional office-based health care, including postoperative follow-up visits. The purpose of the present study was to determine if patient satisfaction with overall care is equivalent for telemedicine follow-up (i.e., synchronous face-to-face video) and office-based follow-up after arthroscopic meniscectomy and repair.

Methods: Patients were prospectively enrolled from August 1, 2019, to March 1, 2020. Patients were included who were ≥18 years old, consented to isolated arthroscopic meniscal repair or meniscectomy, and were able to properly utilize telemedicine software on a computer, tablet, or smartphone with a built-in camera. Patient demographic data, including complication events and postoperative satisfaction data, were recorded and analyzed for significance.

Results: One hundred and fifty patients were enrolled in the study, of whom 122 (81.3%) were included in the final analysis. There were no significant differences between groups in terms of patient demographics or satisfaction scores. Patient satisfaction with overall care was equivalent based on the results of two 1-sided t-test analysis for equivalence (9.77 ± 0.60 in the office-based group versus 9.79 ± 0.53 in the telemedicine group; $p < 0.001$). When patients were asked to indicate their preferred follow-up type with the options listed as the type they received versus an alternative, 58 patients (84.1%) in the office-based group preferred their received type of follow-up, whereas 42 (79.2%) in the telemedicine group preferred their received follow-up ($p = 0.493$). There were no significant differences between groups in terms of complications ($p > 0.05$).

Conclusions: The present study showed that patient satisfaction with overall care is equivalent between telemedicine and office-based follow-up in the immediate postoperative period following an arthroscopic meniscal surgical procedure, and should be considered a reasonable alternative to the traditional in-office modality.

Level of Evidence: Therapeutic Level I. See Instructions for Authors for a complete description of levels of evidence.

BACK