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Upper extremity

Arthroscopy, Volume 34, Issue 3, p649-1000

Incidence and Return to Play After Biceps Tenodesis in Professional Baseball Players

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Arthroscopy, March 2018, Volume 34, Issue 3, Pages 747–751

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Purpose
To determine return to play (RTP) rates after biceps tenodesis (BT) in professional baseball players.

Methods
Major League Baseball has maintained a prospective database containing all major and minor league baseball players who have undergone shoulder surgery since 2010. All players who had undergone BT were included. Minimum follow-up was 24 months, and thus we included data from 2010 to 2013. Using this database we determined the incidence, demographics, prior surgery history, concomitant procedures, RTP rates, and time to RTP.

Results
Between 2010 and 2013, 17 professional baseball players underwent BT. Seventy-one percent of the 17 were pitchers, and 29% of the 17 were in the major league. Forty-seven percent of the 17 had a history of a prior shoulder surgery and 47% of the 17 underwent concomitant labral repair. For all players, RTP after BT was 35%, whereas RTP after BT without a concomitant reconstructive procedure was 44% in 10 ± 6 months, and 25% for those who underwent both BT and a concomitant reconstructive procedure (P = .620). All players who RTP were able to return to at least 20 games at their preoperative level of play. Return to professional play was 80% among position players and 17% among pitchers (P = .028). For those pitchers who RTP, performance was not statistically changed.

Conclusions
Professional baseball players who undergo BT have a 35% rate of return to their prior level of play. Whereas pitchers have only a 17% rate of RTP, position players have an 80% rate of RTP. Of those who returned, all returned to their prior level of play. The pitchers who returned had no significant change in performance statistics.

Level of Evidence
Level IV, therapeutic study, a case series.

BACK

Does Increased Body Mass Index Influence Outcomes After Rotator Cuff Repair?

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Arthroscopy, March 2018, Volume 34, Issue 3, Pages 754–761

https://doi.org/10.1016/j.arthro.2017.08.248

Purpose
To investigate the influence of pre-existing obesity (body mass index [BMI] ≥ 30) on outcomes after rotator cuff repair surgery.

Methods
We collected data on adult patients who underwent surgical repair for symptomatic full-thickness rotator cuff tears confirmed by imaging between 2012 and 2015. The required follow-up was 3 years. At baseline and 6, 12, 24, and 36 months, the American Shoulder and Elbow Surgeons score, Western Ontario Rotator Cuff index, and visual analog scale pain scores were collected. Complications were assessed by a chart review. Obesity was defined as BMI ≥ 30. Chi-square analysis and Student's t-test examined differences between categorical and continuous variables at baseline. Generalized estimating equations examined the effects of fixed factors on outcome variables longitudinally from baseline to 36 months.

Results
Thirty-nine percent of 213 subjects were obese (mean BMI = 29.2; range, 16-48; standard deviation, 5.8). There were no statistically significant differences between obese and nonobese subjects in other baseline characteristics. When controlling for covariates, obese subjects reported no differences in Western Ontario Rotator Cuff, American Shoulder and Elbow Surgeons, or visual analog scale pain scores when compared with nonobese subjects at baseline and over 3 years from surgery. Although obese patients were more likely to have inpatient surgery, there was no difference in the incidence of postoperative complications.

Conclusions
Contrary to our hypothesis, obese participants who underwent rotator cuff repair reported no difference in functional outcome or pain scores compared with nonobese participants over 3 years. In addition, obesity was not associated with postoperative complications in this study. However, as we hypothesized, obese participants were more likely than nonobese participants to have repair in the inpatient setting.

Level of Evidence
Level III, retrospective comparative study.

BACK

Clinical Outcomes of Arthroscopic 360° Capsular Release for Idiopathic Adhesive Capsulitis in the Lateral Decubitus Position

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Arthroscopy, March 2018, Volume 34, Issue 3, Pages 764–770

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Purpose
To report outcomes after arthroscopic 360° capsular release in the lateral decubitus position for idiopathic glenohumeral adhesive capsulitis without manipulation under anesthesia.

Methods
A retrospective case series of patients who underwent arthroscopic capsular release in the lateral decubitus position for idiopathic adhesive capsulitis with minimum 2-year follow-up was conducted. Patient demographics, preoperative range of motion (ROM), postoperative ROM, and the postoperative outcome scores, visual analog scale for pain, Single Assessment Numeric Evaluation, Simple Shoulder Test, and American Shoulder and Elbow Surgeons scores, were recorded. Complications and reoperations were recorded. Paired t-tests were used to compare preoperative and postoperative ROM, with $P < .05$.

Results
Overall, 43 patients were identified, of whom 10 were excluded because of post-traumatic etiology. Of the remaining 33 patients, 27 (81.8%) completed a minimum follow-up of 2 years. The mean age was 54.8 with a standard deviation of 7.4 years and 78% were female, with the duration of symptoms of 16.2 ± 21.0 (range, 3-125) months. Hypothyroidism was present in 7% and diabetes present in 30%. Active forward flexion improved from 115.0° ± 21.9° to 156.2° ± 16.1° at the final follow-up (mean difference, 41.2; 95% confidence interval [33.7, 48.7]; $P < .001$). Active external rotation with the arm adducted improved from 28.1° ± 16.3° preoperatively to 56.8° ± 15.7° at the final follow-up (mean difference, 27.7; 95% confidence interval [19.1, 36.3]; $P < .001$). Significant ROM improvements were seen even as early as 2 weeks postoperatively ($P < .001$). Two patients (7%) had manipulation under anesthesia postoperatively due to early recurrent stiffness 4 to 6 weeks after arthroscopic capsular release. There were no revision surgeries or complications.

Conclusions
Arthroscopic 360° capsular release in the lateral decubitus position for idiopathic adhesive capsulitis results in a significant early and lasting improvement in ROM, excellent functional outcomes, and low revision and complication rates.

Level of Evidence
Level IV, retrospective case series.

BACK

Arthroscopic Correction of the Critical Shoulder Angle Through Lateral Acromioplasty: A Safe Adjunct to Rotator Cuff Repair

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Arthroscopy, March 2018, Volume 34, Issue 3, Pages 771–780

https://doi.org/10.1016/j.arthro.2017.08.255

Purpose
To investigate whether arthroscopic lateral acromioplasty reliably decreases the critical shoulder angle (CSA) and whether it is associated with damage to the deltoid or other complications.

Methods
Patients undergoing arthroscopic rotator cuff repair (RCR) with lateral but without anterior acromioplasty for degenerative, full-thickness rotator cuff tears and a CSA of 34° or greater were retrospectively reviewed. Patients with traumatic or irreparable rotator cuff tears, osteoarthritis, or previous surgery were excluded. Clinical and radiographic outcomes were assessed at a minimum of 12 months' follow-up.

Results
We reviewed 49 consecutive patients (mean age, 56 years; age range, 39-76 years) at a mean of 30 months (range, 12-47 months). There were 7 RCR failures (14%). The mean CSA was reduced from 37.5° preoperatively (95% confidence interval [CI], 36.7°-38.3°) to 33.9° postoperatively (95% CI, 33.3°-34.6°; P < .001). There were no cases of dehiscence, increases in fatty infiltration, or significant atrophy of the deltoid. Scarring at the deltoid origin was noted in 18 patients (37%). The mean absolute and relative Constant scores increased from 59 points (95% CI, 54-64 points) to 74 points (95% CI, 70-78 points) and from 66% (95% CI, 61%-71%) to 83% (95% CI, 79%-87%) respectively, and the Subjective Shoulder Value increased from 45% (95% CI, 39%-50%) to 80% (95% CI, 74%-86%) (P < .001 for all 3 improvements). The postoperative CSA was significantly larger in failed than in healed repairs (P = .026). Patients with a healed RCR and a CSA corrected to 33° or less (n = 22) had 25% more abduction strength than patients with a healed cuff and a CSA corrected to 35° or greater (n = 14, P = .04).

Conclusions
Arthroscopic lateral acromioplasty performed in addition to arthroscopic RCR can reduce the CSA without significantly compromising the deltoid origin, deltoid muscle, or function. It is not associated with any additional complications of arthroscopic RCR. Insufficiently corrected, abnormally large CSAs are associated either with a higher retear rate or with inferior strength of abduction if the tears heal.

Level of Evidence
Level IV, case series, treatment study.

BACK

Return to Play Criteria Following Surgical Stabilization for Traumatic Anterior Shoulder Instability: A Systematic Review

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Arthroscopy, March 2018, Volume 34, Issue 3, Pages 903–913

https://doi.org/10.1016/j.arthro.2017.08.293

Purpose
To identify and describe in the existing literature any criteria used for return to play following surgical stabilization for traumatic, anterior shoulder instability.

Methods
We performed a systematic review evaluating surgical stabilization for primary traumatic anterior shoulder instability in skeletally mature patients with a minimum of 1-year follow-up using Level I to IV studies in PubMed and EMBASE from January 1994 to January 2017.

Results
Fifty-eight studies with at least 1 explicitly stated criterion for return to play were identified from a review of more than 5,100 published articles. Seven different categories of return to play criteria were identified, the most common of which were time from surgery (89.6%), strength (18.9%), and range of motion (13.8%). Pain, stability, proprioception, and postoperative radiographic evaluation were also used. As hypothesized, in 75.8% of the included studies (44/58), time was the only criterion explicitly used. The most commonly used time for return to play was 6 months.

Conclusions
This systematic review identifies 7 criteria that have been used in the available literature to determine when patients are ready to return to play; however, consistent with our hypothesis, 75% of studies used time from surgery as the sole listed criterion, with the most commonly used time point of 6 months postoperative. All of these criteria can be used in future research to develop a comprehensive checklist of functional criteria in hopes of reducing recurrent injury.

Level of Evidence
Level IV, systematic review.

BACK

Journal of Shoulder and Elbow Surgery (JSES), Volume 27, issue 3

Interstitial tears of the rotator cuff: difficulty in preoperative diagnosis

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Journal of Shoulder and Elbow Surgery, Volume 27, Issue 3, Published online: November 06, 2017

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Background
Few studies have investigated the characteristic findings of preoperative magnetic resonance imaging (MRI) and the clinical and radiologic outcomes of interstitial tear of the rotator cuff treated with arthroscopic repair after tear completion.

Methods
Forty-one patients (14 men and 27 women; mean age, 56.5 years) with arthroscopically confirmed interstitial tears underwent single-row repair after tear completion. The minimum follow-up period was 2 years.

Results
Twenty-eight patients (68.3%) were properly evaluated with MRI before surgery. Seven cases (17.1%) were misdiagnosed as bursal-sided tears and 5 cases (12.2%) were misdiagnosed as articular-sided tears on the basis of presurgical MRI findings. Arthroscopy revealed fibrillation and dimpling of the tendon surface in all cases and congestion within the defect in 36 cases (87.8%). At the final follow-up, the visual analog scale score for pain during motion decreased to 0.8 from a preoperative mean of 6.1 ($P < .001$). Moreover, at the final follow-up, the mean University of California–Los Angeles score and Constant score improved from 15.7 and 51.8 to 32.1 and 83.8, respectively ($P < .001$ for all). At 9 months after surgery, MRI revealed no cases of retear.

Conclusion
Interstitial tears are difficult to diagnose before surgery because MRI findings may lead to the misdiagnosis of interstitial tears as articular- or bursal-sided tears. If MRI-based diagnosis is indicative of articular- or bursal-sided tears but arthroscopy reveals fibrillation and dimpling of the tendon surface, interstitial tears should be suspected. The defective sites in interstitial tears are usually accompanied by congestion.

BACK

Operative versus nonoperative treatment for the management of full-thickness rotator cuff tears: a systematic review and meta-analysis

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Journal of Shoulder and Elbow Surgery, Volume 27, Issue 3, Published online: November 21, 2017

https://doi.org/10.1016/j.jse.2017.09.032

Background
Rotator cuff disease is the most common pathology of the shoulder, responsible for approximately 70% of clinic visits for shoulder pain. However, no consensus exists on the optimal treatment. The aim of this study was to analyze level I and II research comparing operative versus nonoperative management of full-thickness rotator cuff tears.

Methods
A literature search was performed, in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement, to identify level I and II studies comparing operative versus nonoperative treatment of rotator cuff tears. Two independent researchers reviewed a total of 1013 articles. Three studies qualified for inclusion. These included 269 patients with 1-year follow-up. The mean age ranged from 59 to 65 years. Clinical outcome measures included the Constant score and visual analog scale (VAS) score for pain. Meta-analysis, using both fixed- and random-effects models, was performed on pooled results to determine overall significance.

Results
Statistically significant differences favoring surgery were found in both Constant and VAS scores after 1 year, with mean differences of 5.64 (95% confidence interval, 2.06 to 9.21; P = .002) and −1.08 (95% confidence interval, −1.56 to −0.59; P < .0001), respectively.

Conclusion
There was a statistically significant improvement in outcomes for patients managed operatively compared with those managed nonoperatively. The differences in both Constant and VAS scores were small and did not meet the minimal difference considered clinically significant. Larger studies with longer follow-up are required to determine whether clinical differences between these treatments become evident over time.

BACK

Patients with a long-standing cuff tear in one shoulder have high rates of contralateral cuff tears: a study of patients with arthroscopically verified cuff tears 22 years ago

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Journal of Shoulder and Elbow Surgery, Volume 27, Issue 3, Published online: December 14, 2017

https://doi.org/10.1016/j.jse.2017.10.007

Background
The prevalence of contralateral full-thickness cuff tears (FTTs) and cuff tear arthropathy (CTA) is presumed to be higher in patients with long-standing cuff tears than in those with newly diagnosed tears, but data are currently lacking.

Methods
Sixty-one patients with 38 partial and 23 full-thickness tears of 1 shoulder at arthroscopy were examined with bilateral radiographs, ultrasound, and the Constant-Murley score at a mean of 22 years (range, 21-25 years) after arthroscopy.

Results
The overall rate of full-thickness tears in the contralateral shoulder was 50.8%. In patients with a full-thickness tear and CTA (Hamada grade ≥2) in the index shoulder at follow-up, 18 of 20 (90%) had a contralateral full-thickness tear and 4 of 20 (20%) had CTA. In patients with a partial tear in the index shoulder at follow-up, 3 of 22 (13.6%) had a contralateral full-thickness tear and none had CTA. CTA changes were more common in patients with FTT and a previous acromioplasty ($P < .001$). The correlation between shoulders was 0.72 for the number of tendons with FTT ($P < .001$), 0.31 for the Hamada grade ($P = .016$), and 0.65 for the absolute Constant-Murley score ($P < .001$). The number of tendons with a full-thickness tear at follow-up was a risk factor (odds ratio, 3.28; 95% confidence interval, 1.67-6.44; $P < .001$) for a contralateral full-thickness tear. Patients with a partial or full-thickness tear in the contralateral shoulder had pain in 39.2% of cases.

Conclusion
Patients with long-standing cuff tears have high rates of contralateral cuff tears. The severity of the condition is strongly correlated between the shoulders. Patients with full-thickness tears and a previous acromioplasty have a significantly higher frequency of CTA than patients with cuff tears who had not undergone a previous acromioplasty.

BACK

The Bone and Joint Journal, volume 100, issue 3

Risk factors for recurrent instability or revision surgery following arthroscopic Bankart repair

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Bone Joint J 2018;100-B:324–30.

https://doi.org/10.1302/0301-620X.100B3.BJJ-2017-0557.R1

Aims The factors that predispose to recurrent instability and revision stabilization procedures after arthroscopic Bankart repair for anterior glenohumeral instability remain unclear. We sought to determine the rate and risk factors associated with ongoing instability in patients undergoing arthroscopic Bankart repair for instability of the shoulder.

Materials and Methods We used the Statewide Planning and Research Cooperative System (SPARCS) database to identify patients with a diagnosis of anterior instability of the shoulder undergoing arthroscopic Bankart repair between 2003 and 2011. Patients were followed for a minimum of three years. Baseline demographics and subsequent further surgery to the ipsilateral shoulder were analyzed. Multivariate analysis was used to identify independent risk factors for recurrent instability.

Results A total of 5719 patients were analyzed. Their mean age was 24.9 years (sd 9.3); 4013 (70.2%) were male. A total of 461 (8.1%) underwent a further procedure involving the ipsilateral shoulder at a mean of 31.5 months (sd 23.8) postoperatively; 117 (2.1%) had a closed reduction and 344 (6.0%) had further surgery. Revision arthroscopic Bankart repair was the most common subsequent surgical procedure (223; 65.4%). Independent risk factors for recurrent instability were: age < 19 years (odds ratio 1.86), Caucasian ethnicity (hazard ratio 1.42), bilateral instability of the shoulder (hazard ratio 2.17), and a history of closed reduction(s) prior to the initial repair (hazard ratio 2.45). Revision arthroscopic Bankart repair was associated with significantly higher rates of ongoing persistent instability than revision open stabilization (12.4% vs 5.1%, p = 0.041).

Conclusion The incidence of a further procedure being required in patients undergoing arthroscopic Bankart repair for anterior glenohumeral instability was 8.1%. Younger age, Caucasian race, bilateral instability, and closed reduction prior to the initial repair were independent risk factors for recurrent instability, while subsequent revision arthroscopic Bankart repair had significantly higher rates of persistent instability than subsequent open revision procedures.

BACK

Lower Extremity

Arthroscopy, Volume 34, Issue 3, p649-1000

Comparison of Arthroscopic and Conservative Treatments for Knee Osteoarthritis: A 5-Year Retrospective Comparative Study

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Arthroscopy, March 2018, Volume 34, Issue 3, Pages 652–659

https://doi.org/10.1016/j.arthro.2017.09.023

Purpose
To compare the effectiveness of arthroscopic and conservative treatments in patients with knee osteoarthritis (KOA) with 5 years of follow-up.

Methods
Patients diagnosed with Kellgren-Lawrence grade 2 to 4 KOA who underwent arthroscopic or conservative treatment from May 2005 to May 2012 were included. The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) total score was collected 1, 2, 3, 4, and 5 years after the initial treatment, and the number of patients who underwent total knee arthroplasty (TKA) at every time point was recorded.

Results
Three hundred eighty-two patients (168 in the conservative group and 214 in the arthroscopy group) were included. Five years after the initial treatment, 32 of the 214 patients who underwent arthroscopy (15.0%) compared with 30 of the 168 patients in the conservative treatment group (17.9%) ultimately underwent TKA, with no statistically significant difference between groups ($P = .20$). The WOMAC score was significantly lower in the arthroscopy group than in the conservative group at year 1 (24.33 ± 21.56 vs 36.43 ± 16.22, respectively) and year 2 (26.31 ± 17.84 vs 35.41 ± 19.21, respectively). There were no significant between-group differences at years 3, 4, and 5.

Conclusions
Compared with conservative treatment, arthroscopy provided no benefit in decreasing or delaying arthroplasty surgery. However, arthroscopy had a greater ability to relieve symptoms at 1 and 2 years. Our results suggest that arthroscopy can relieve symptoms up to 2 years without elevating the risk of arthroplasty.

Level of Evidence
Level III, retrospective comparative study.

BACK

Primary Versus Revision Anterior Cruciate Ligament Reconstruction: Patient Demographics, Radiographic Findings, and Associated Lesions

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Arthroscopy, March 2018, Volume 34, Issue 3, Pages 695–703

https://doi.org/10.1016/j.arthro.2017.08.305

Purpose
The purpose of this study was to evaluate the differences in intra-articular pathology, demographic characteristics, and radiographic characteristics of the knee associated with primary anterior cruciate ligament reconstruction (ACLR) versus revision ACLR at the time of initial presentation with either a native anterior cruciate ligament tear or an anterior cruciate ligament graft tear. Secondarily, we aimed to investigate risk factors for concomitant medial and lateral meniscal tears and cartilage injuries at the time of ACLR.

Methods
This was a retrospective review of patients who underwent primary or revision ACLR by a single surgeon. The exclusion criteria were as follows: skeletally immature patients; patients with an intra-articular fracture; patients with an ipsilateral knee infection; or patients who underwent an osteotomy, cartilage restoration procedure, or meniscal transplantation either previously or concomitantly with the ACLR. Detailed patient demographic data, radiographic long-standing alignment, tibial slope, and intraoperative findings including articular cartilage injury grade and meniscus integrity were documented at surgery.

Results
There were 487 patients included in this study (363 with primary ACLR and 124 with revision ACLR). There were no significant differences in age ($P = .119$), sex ($P = .917$), body mass index ($P = .468$), allograft versus autograft reconstruction ($P = .916$), or prevalence of meniscal tears ($P = .142$) between the primary and revision groups. Patients who underwent revision ACLR had a significantly increased medial tibial slope ($P = .048$) and a higher prevalence of chondral defects on both the medial ($P < .001$) and lateral ($P = .003$) femoral condyles when compared with primary ACLR patients. Logistic regression showed that a decreased tibial slope was correlated with femoral medial-sided chondral injuries and that varus or valgus coronal-plane malalignment was correlated with lateral meniscal tears in both groups.

Conclusions
The findings of this study show that patients undergoing a revision ACLR have significantly more chondral lesions, as well as higher-grade chondral lesions, at the time of presentation. Furthermore, coronal malalignment and a decreased tibial slope may contribute to injury patterns of the lateral meniscus and medial compartment cartilage, respectively.

Level of Evidence
Level III, retrospective case-control study.

BACK

Clinical Outcomes of Single Anteromedial Bundle Biologic Augmentation Technique for Anterior Cruciate Ligament Reconstruction With Consideration of Tibial Remnant Size

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Arthroscopy, March 2018, Volume 34, Issue 3, Pages 714–722

https://doi.org/10.1016/j.arthro.2017.08.309

Purpose
The primary aim of this study was to evaluate the functional outcomes, knee stability, complications, and reoperations associated with anatomic anterior cruciate ligament (ACL) reconstruction using the single anteromedial bundle biological augmentation (SAMBBA) technique in a consecutive series of 128 patients with a minimum follow-up of 24 months. A secondary aim was to compare larger preserved ACL remnants with smaller preserved remnants.

Methods
Patients who underwent primary anatomic ACL reconstruction using the SAMBBA technique from July 2013 to October 2014 were analyzed. Exclusion criteria were (1) age <16 years, (2) revision cases, (3) multiple ligament injuries, (4) chondral lesions greater than grade 2 according to the Outerbridge classification, (5) additional injuries to the collateral ligaments greater than grade 2, or (6) a history of a contralateral ACL injury. Clinical assessment including evaluation of side-to-side difference and functional outcome measures with the International Knee Documentation Committee (IKDC) subjective score and the Tegner Activity Scale were used to evaluate outcomes before surgery and at the last follow-up. Any subsequent surgical procedures were systematically recorded during the study period. The patients were also divided in 2 groups according to their ACL remnant size, ≥50% or <50%, and compared.

Results
Of the 135 patients who underwent primary SAMBBA technique, 128 patients returned to final follow-up, with a mean follow-up of 31.7 months (range, 24-44.3). At last follow-up, the IKDC score significantly improved from 54.1 ± 15.1 to 92.5 ± 11.4 ($P < .001$); the Tegner activity score (6.4 ± 1.2) was similar ($P = .3$) to the preinjury score (6.5 ± 1.2). Side-to-side laxity significantly improved from 6.7 ± 1.2 mm to 0.7 ± 1 mm ($P < .001$). Twenty-four subsequent surgeries (18.7%) were performed including 10 meniscal procedures, 7 ACL revisions, 5 arthroscopies for cyclops lesions, one microfracture, and one manipulation under anaesthesia. The side-to-side laxity ($P = .30$) and rates of reoperation ($P = .65$), graft failure ($P = .45$), and cyclops lesions ($P = .67$) were not significantly different between ≥50% or <50% ACL remnant groups.

Conclusions
The results of this study demonstrate that primary anatomic ACL reconstruction using the SAMBBA technique significantly improved clinical and functional outcomes between baseline and follow-up at a minimum of 24 months. A low rate of complications was observed with this technique. No significant differences between large and moderate size ACL remnants were detected for all outcome measures.

Level of Evidence
Level IV case series with subgroup analysis.

BACK

Patient-Reported Outcomes of Capsular Repair Versus Capsulotomy in Patients Undergoing Hip Arthroscopy: Minimum 5-Year Follow-up—A Matched Comparison Study

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Purpose
To elucidate whether capsular closure during hip arthroscopy affected patient outcomes over midterm follow-up.

Methods
Between 2008 and 2011, data were prospectively collected and retrospectively reviewed on patients who underwent hip arthroscopy. Patients were then matched for age, gender, worker's compensation, body mass index, and acetabular coverage. The inclusion criteria were capsular repair or unrepaired capsulotomy, lateral-center edge angle ≥18°, and minimum 5-year follow-up. The exclusion criteria were previous hip surgery or conditions and Tönnis grade >1. Patient-reported outcome scores (PROs) included modified Harris hip score (mHHS), nonarthritic hip score, hip outcome score sport-specific subscale, and visual analog score for pain, which were collected preoperatively, at 3 months, and annually thereafter. Minimal clinical important difference (MCID) and patient acceptable symptomatic state (PASS) for both groups were analyzed. Patient satisfaction was noted as well as any complications, secondary surgery, and conversion to arthroplasty.

Results
Minimum 5-year follow-up was available for 82.5% (287 of 348) hips that met the inclusion criteria and were eligible for matching. Ultimately, 65 patients who underwent capsular repair could be matched in a 1:1 ratio to 65 patients with release. Both groups had significant improvements in all mean PROs. The repair group had significant improvement of mean PROs, visual analog score, and patient satisfaction at both 2-year and minimum 5-year follow-up. The unrepaired group had a significant decrease in mHHS (P = .001) and patient satisfaction (P = .01) between 2- and 5-year follow-up. Despite decreasing mHHS in the repair group between 2- and 5-year follow-up, both groups met the MCID and PASS criteria with no significant difference between them. More patients in the release group required conversion to hip arthroplasty (18.5% vs 10.8%). Subgroup analysis considering various perioperative factors confirmed this trend. Rate of revision arthroscopy was the same in both groups (15.4%). Complication rate was low (4.6% vs 6.4%) in both groups.

Conclusions
Patients undergoing hip arthroscopy and who have minimal or no arthritis have significant short-term improvement, whether the capsule is closed or left unrepaired. However, at midterm follow-up, patients who had unrepaired capsules had deterioration in mHHS as well as a higher rate of conversion to arthroplasty, even when controlling for various perioperative variables. Despite this, patients in both groups met the MCID and PASS criteria. This study suggests that routine capsular closure may lead to more consistently durable outcome in patients undergoing hip arthroscopy, but also that individual patient pathology may dictate capsular management.

Level of Evidence
Level III, retrospective comparative study.

BACK

Arthroscopy After Traumatic Hip Dislocation: A Systematic Review of Intra-articular Findings, Correlation With Magnetic Resonance Imaging and Computed Tomography, Treatments, and Outcomes

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Purpose
To describe the literature concerning patient demographic characteristics and intra-articular injury seen at arthroscopy after traumatic hip dislocation, describe the reported computed tomography (CT) and magnetic resonance findings with arthroscopic correlation, and describe the reported arthroscopic treatments performed with complications and outcomes.

Methods
A systematic review was performed following Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines for assessment of arthroscopy after hip dislocation. Three databases were searched, and study screening and data abstraction were performed in duplicate.

Results
Thirty-one heterogeneous case series and case reports were included in the analysis from the initial search yielding 780 results, including reports of 151 patients who underwent arthroscopy after traumatic hip dislocation. A wide spectrum of intra-articular injury was reported, with a high prevalence of labral tears, intra-articular bodies, ligamentum teres injuries, and chondral damage. CT had a sensitivity of 87.3% for detecting intra-articular fragments; however, 43.3% of patients who had a preoperative CT scan with negative findings for intra-articular fragments did show fragments at arthroscopy. Magnetic resonance had a sensitivity of 95.0% for detecting labral tears. There were no major complications directly attributed to arthroscopic surgery. A total of 75 of 151 patients were followed up for a median of 2 years after surgery, with osteoarthritis reported in 4.0% and avascular necrosis in 2.7%.

Conclusions
In patients with traumatic hip dislocation, heterogeneously reported previously published cases show that arthroscopy reveals a broad spectrum of intra-articular damage amenable to arthroscopic intervention. CT is not sensitive in the detection of intra-articular bodies in all cases. Although no serious periprocedural adverse events were reported, only 49.7% of patients had reported follow-up data, and further prospective studies would be necessary to show the safety and efficacy of arthroscopy in comparison with conventional treatment algorithms of hip dislocation.

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

BACK

Should Acetabular Retroversion Be Treated Arthroscopically? A Systematic Review of Open Versus Arthroscopic Techniques

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Purpose
To compare patient-reported outcomes, progression of radiographic arthritis, revision rates, and complications for hips with acetabular retroversion treated by open versus arthroscopic methods.

Methods
The PubMed and EMBASE databases were searched in August 2016 for literature on the open and arthroscopic techniques using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) method. All studies published in the English language that focused on the surgical treatment of femoroacetabular impingement caused by retroversion were included. All arthroscopic procedures, such as acetabuloplasty and labral repair, and open procedures, including anteverting periacetabular osteotomy and surgical dislocation with osteoplasty, were included. Articles that did not describe how retroversion was defined were excluded, as were studies with less than 6 months' follow-up and fewer than 5 patients. Two authors screened the results and selected articles for this review based on the inclusion and exclusion criteria. All results were scored using the Methodological Index for Non-randomized Studies (MINORS) criteria.

Results
There were 386 results returned and 15 articles that met the inclusion criteria of this study. Among the studies, 11 reviewed arthroscopic techniques and 4 reviewed open surgical procedures. Both techniques yield good results based on patient-reported outcomes with minimal progression of osteoarthritis and low complication rates.

Conclusions
This review showed statistically and clinically significant improvements for the treatment of acetabular retroversion based on patient-reported outcomes, with low progression of radiographic arthritis, revision rates, and complications using both open and arthroscopic methods.

Level of Evidence
Level IV, systematic review of Level I to IV studies.

BACK

Are Outcomes After Meniscal Repair Age Dependent? A Systematic Review

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Purpose
To determine if the failure rate and functional outcome after arthroscopic meniscus suture repair are age dependent.

Methods
A systematic review was conducted using a computerized search of the electronic databases MEDLINE and ScienceDirect in adherence with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Extracted data from each included study were recorded on a standardized form. Studies were included if they (1) were English-language studies in peer-reviewed journals, (2) used a distinct age cut-off to evaluate outcome of meniscal surgery for those above and below the specified cut-off, and (3) used meniscal repairs using suture based technique with inside-out, outside-in, or all-inside techniques. Review papers, case reports, technique papers, non–English language publications, abstracts, and data on meniscal repairs using meniscal screws, arrows, or darts were excluded.

Results
15 of 305 identified articles met the inclusion/exclusion criteria. There were 1,141 menisci treated in 1,063 patients. Seven and 8 studies met the inclusion/exclusion criteria for analysis for the age thresholds of 25 years and 30 years, respectively, demonstrating no difference in failure rates relative to age threshold. Four of 6 studies that met analysis criteria found no difference in failure rates above or below an age threshold of 35 years. No significant difference in failure in patients younger than 40 than patients older than 40 was found for 4 of the 5 studies in that arm of the review.

Conclusions
Analysis of the composite data in this systematic review reveals that no significant difference exists when evaluating meniscal repair failure rate as a function of age above or below the given age thresholds.

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

BACK

Arthroscopic Versus Open Ankle Arthrodesis: A Systematic Review

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Purpose
To perform a systematic review comparing the clinical scores, union rate, complications, reoperations, hospital stay, and operation time between open ankle arthrodesis (OAA) and arthroscopic ankle arthrodesis (AAA).

Methods
We conducted a comprehensive search in the MEDLINE, Embase, and Cochrane Library databases. Only comparative studies were included in this meta-analysis. The literature search, data extraction, and quality assessment were conducted by 2 independent reviewers. The outcomes analyzed included clinical scores, union rate, complications, reoperations, hospital stay, operation time, and intraoperative blood loss.

Results
A total of 7 retrospective comparative studies were included in this systematic review. Clinical scores were noted in 3 studies. The American Orthopaedic Foot & Ankle Society ankle-hindfoot score and the Ankle Osteoarthritis Scale score were better in the AAA group than in the OAA group. The union rate was similar between the OAA (70%-100%) and AAA (76.2%-100%) groups. The complication rate was higher in the OAA group (6.7%-47.1%) than in the AAA group (0%-23.8%) in 6 studies. The reoperation rate was similar between the OAA (0%-26.5%) and AAA (0%-27.6%) groups. The hospital stay was shorter in the AAA group in 6 studies. Among the 5 studies that reported operation time, 4 reported no significant difference. Two studies showed that intraoperative blood loss was significantly less in the AAA group.

Conclusions
AAA was shown to offer the advantages of better clinical scores, fewer complications, a shorter hospital stay, and less blood loss compared with OAA. However, the union rate, reoperation rate, and operation time were similar overall between the 2 groups.

Level of Evidence
Level III, systematic review of Level III studies.

Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA), Volume 26, Issue 3

Arthroscopic meniscus repair for recurrent subluxation of the lateral meniscus

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https://link.springer.com/article/10.1007/s00167-017-4420-2/fulltext.html#Abs1

Purpose
This study was undertaken to diagnose and to document the clinical results and technical aspects of arthroscopic meniscus repair for recurrent subluxation with peripheral tears around the popliteal hiatus of the lateral meniscus.

Methods
Twenty-three patients (24 knees) with symptomatic recurrent subluxation of the lateral meniscus treated by arthroscopic meniscus repair were included. The inclusion criteria were: (1) patients with knee pain, locking or snapping symptoms despite 3 months of conservative treatment; (2) non-discoid lateral meniscus; (3) stable knee, and (4) tears involving the red–white or red–red zone. All tears were repaired by either the modified all-inside suture technique only or a combination of the modified all-inside and modified outside-in suture techniques. Clinical results were evaluated preoperatively and at final follow-up according to Tegner activity level, Lysholm knee, and Hospital for Special Surgery (HSS) scores.

Results
No reoperations were required after a median follow-up of 41 months (range 24–124). Although recurrence of a locking episode was documented in one knee and catching sensations were experienced in three knees, those patients did not require reoperation. At the last follow-up, the median Tegner activity level had improved significantly from 4 (range 2–6) to 7 (range 3–10, $p < 0.0001$), the median Lysholm knee score improved from 76 (range 25–90) preoperatively to 94 (range 76–100) at final follow-up ($p < 0.0001$), and the median preoperative HSS score improved from 86 to 95 at final follow-up ($p < 0.0001$).

Conclusion
The described arthroscopic meniscus suture technique is effective for treating symptomatic recurrent subluxation of the lateral meniscus without any complications or recurrence. Clinical suspicion and understanding of recurrent subluxation with lateral meniscus are important to diagnose the disease especially when definite meniscal tear signs are absent on magnetic resonance imaging.

Level of evidence
IV.

BACK

Good clinical and MRI outcome after arthroscopic autologous chondrocyte implantation for cartilage repair in the knee

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KKSTA, March 2018, Volume 26, Issue 3, pp 831–839

https://link.springer.com/article/10.1007/s00167-017-4491-0

Purpose
To analyze the clinical outcome and cartilage regeneration after all-arthroscopic Autologous Chondrocyte Implantation (ACI) using chondrospheres® (ACT3D) for the treatment of full-size articular cartilage lesions at the knee.

Methods
Thirty consecutive patients treated by all-arthroscopic ACI for full-size articular cartilage lesions in an otherwise healthy knee were enrolled. The defects were located on the femoral condyles ($n = 18$), in the trochlea ($n = 7$) and at the patella ($n = 5$). Follow-up consisted of a clinical evaluation with assessment of subjective scores. Patient satisfaction was evaluated on a visual analog scale (VAS). 3-Tesla MRI and T2 mapping of the operated and the contralateral healthy knees were included to control the quality of the regenerated cartilage. The MOCART score was assessed by three blinded independent radiologists.

Results
At the mean follow-up of 3 years ± 10.2 months 26 of the 30 patients (86.6%) were subjectively highly satisfied with the surgical result and assured they would undergo the same procedure again. The mean Lysholm score increased to 77.7 ± 14.6, the mean subjective IKDC significantly to 84.2 ± 5.6 ($p < 0.05$) and all five subgroups of the KOOS improved significantly ($p < 0.05$). The subjective outcome was not influenced by the duration of symptoms, age, location, size of defects nor dose of spheroids. The modified MOCART score was a mean of 60 ± 21 (0–80) points. Twenty-four patients (82.7%) were rated higher than 60 points. T2 mapping documented similar cartilage quality of the area of the ACI and the same location at the contralateral knee. Three patients had a MOCART score of 0 with few or no cartilage regeneration on MRI and were considered as failure of the ACI.

Conclusion
In this small cohort of 30 patients, minimal invasive all-arthroscopic ACT 3D using spheroids led to convincing clinical short-to-mid-term results with a significant increase in patients quality of life, satisfaction, reduction of pain, and improvement in knee function. The high morphologic integrity and quality of the ACI was reconfirmed by the Mocart Score and T2 mapping.

Level of evidence
IV.

BACK

All-arthroscopic AMIC® (AT-AMIC®) technique with autologous bone graft for talar osteochondral defects: clinical and radiological results

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https://link.springer.com/article/10.1007/s00167-016-4318-4

Purpose
Autologous Matrix-Induced Chondrogenesis (AMIC®) is known to provide satisfactory clinical results for the treatment of knee, hip, and ankle cartilage lesions. The purpose of this study was to evaluate clinical and radiological outcomes of patients treated with a new all-arthroscopic AMIC® (AT-AMIC®) technique with autologous bone graft for talar osteochondral defects at a follow-up of 24 months.

Methods
Twenty patients underwent the AT-AMIC® procedure and autologous bone graft for type III and IV talar osteochondral lesions. Patients were evaluated pre-operatively and at 6, 12, and 24 months post-operatively using the American Orthopedic Foot and Ankle Society (AOFAS) score, the visual analog scale, and the SF-12 (Short Form-12). Radiological assessment included computed tomography (CT), magnetic resonance imaging (MRI), and magnetic resonance observation of cartilage repair tissue (MOCART).

Results
All scores significantly improved ($p < 0.05$) with respect to pre-operative values after 6 months. Further improvements were detected at 24 months (AOFAS, from 57.1 ± 14.9 before surgery to 86.6 ± 10.9 after 24 months; VAS, from 8.1 ± 1.4 to 2.5 ± 2.2; SF-12, from 29.9 ± 4.1 to 48.5 ± 6.9 and from 43.8 ± 2.9 to 53.1 ± 3.9, respectively, for Physical and Mental component score). Lesion area significantly reduced from 111.1 ± 43.2 mm2 pre-operatively to 76.9 ± 38.1 mm2 ($p < 0.05$) at final follow-up as assessed by CT, and from 154.1 ± 93.6 to 94.3 ± 61.3 mm2 ($p < 0.05$) as assessed by MRI. The mean MOCART score was 42.8 ± 23.5 points and 50.9 ± 24.9 points, respectively, at 12 and 24 months after surgery ($p < 0.05$).

Conclusions
AT-AMIC® with autologous bone grafting has proven to be a safe and effective minimal invasive technique, able to rapidly and significantly improve pain, function, and radiological healing of osteochondral talar lesions, with progressive further improvements up to 24 months. Orthopedic surgeons specialized in foot and ankle surgery should adopt the AT-AMIC® technique for the treatment of osteochondral talar lesions, which proved to be effective and minimally invasive, avoiding malleolar osteotomy with a low risk of complications.

Level of evidence
IV.

BACK

Arthroscopic suture bridge fixation technique with multiple crossover ties for posterior cruciate ligament tibial avulsion fracture

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https://link.springer.com/article/10.1007/s00167-016-4339-z

Purpose
This study examined the clinical outcomes of a newly developed technique, arthroscopic suture bridge fixation with crossover ties of PCL tibial avulsion fracture using two tibial tunnels and a posterior trans-septal portal.

Methods
Records were reviewed of 18 patients (median age 33.5 years, range 13–55 years) with PCL tibial avulsion fractures treated with an arthroscopic suture bridge technique. Knee function before surgery and at last follow-up was evaluated by Lysholm and Tegner scores. A KT-2000 arthrometer was used to evaluate knee stability, and fracture union was assessed by plain radiographs.

Results
Mean postoperative Lysholm ($P < 0.001$) and Tegner ($P = 0.011$) scores showed significant improvements compared with preoperative scores. Arthrometry showed that the mean side-to-side difference improved significantly, from 7.8 ± 0.8 mm preoperatively to 3 ± 1.2 mm postoperatively ($P = 0.012$). Radiographic evaluation showed solid union at the fracture site in all 18 patients at last follow-up.

Conclusion
This new arthroscopic double-tunnel pull-out suture bridge fixation with multiple crossover ties and posterior trans-septal technique for PCL tibial avulsion fracture yielded good clinico-radiological outcomes, including satisfactory stability and fracture site healing. This technique can be a useful treatment option for PCL tibial avulsion fracture even with small comminuted fracture due to compression by the unique crossover configuration mesh of multiple fixation sutures.

Level of evidence
IV.

BACK

Assessing long-term return to play after hip arthroscopy in football players evaluating risk factors for good prognosis

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KSSTA, March 2018, Volume 26, Issue 3, pp 963–968

https://link.springer.com/article/10.1007/s00167-017-4573-z

Purpose
Groin pain is the third most common disease in football players and has often been associated with hip pathology such as femoroacetabular impingement and labral lesions. Hip arthroscopy offers possibilities of function restoration via minimally invasive procedures. The aim of this study is to evaluate professional football player's injuries and their return to play after hip arthroscopy for FAI and labral injuries.

Methods
Patients that underwent hip arthroscopy between 2009 and 2014 were selected retrospectively. From this population, only professional soccer players competing at national level were included (Tegner 10). Arthroscopic surgery was proposed in patients with persistent pain. All patients were assessed for VAS score preoperatively and at 3, 6, 12 and 24 months post-op. HOS (sport and DLA) and mHHS tests were performed at the same time periods.

Results
All patients were men with a mean age of 26.5 ± 7.1 years old. Preoperative VAS (7.4 ± 1.3), HOS ADL (67.7 ± 5.5), HOS sport (37.6 ± 18.7) and mHHS (72.5 ± 8.8) showed improved scores during long-term follow-up. Time to return to play was 10.8 months (SD ± 4.3), with range between 4 and 20 months. Mean follow-up was 45.4 ± 15.6 months (range from 26 to 72 months). No differences were observed between non-active and active patients at final follow-up with respect to chondral lesions, but significant differences were observed with reference to management of the labrum (p = 0.031), where a higher rate of labrectomies existed among inactive patients and a higher rate of suture among active patients.

Conclusions
Hip arthroscopy is a safe procedure with very good return to play results, but for optimized return to football one should consider patient age at the time of surgery, the condition of the labrum and low scores on the Harris Hip Score (mHHS) and HOS (sport version) as predictive factors for poor prognosis.

Level of evidence
IV.

BACK

Pudendal nerve injury is a relatively common but transient complication of hip arthroscopy

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KSSTA, March 2018, Volume 26, Issue 3, pp 969–975

https://link.springer.com/article/10.1007/s00167-017-4783-4

Purpose
Hip arthroscopy is emerging as the standard of care for conditions involving the hip, and has a unique set of complications. The purpose of this review was to identify (1) the crude rate of pudendal nerve injury following hip arthroscopy and (2) the specific factors leading to pudendal nerve injury.

Methods
MEDLINE, EMBASE, and PubMed were searched from database inception to October 2016. Patient demographics, indications, surgical technique, complication rates, treatment approaches, and rehabilitation strategies were extracted.

Results
Twenty-four studies ($n = 3405$) were included, with the majority (66%) of studies being level IV evidence. The mean age was 33.9 ± 9.7 years (range 12–78) and 48.2% were males. Average follow-up was 30.2 ± 19.1 months. 62 patients were reported to have sustained pudendal nerve injury (1.8%) post-operatively, and all resolved within 6 weeks to 3 months. Of the seven studies that reported using a perineal post, 20 patients were diagnosed with pudendal nerve injury (4.3%), in contrast to two studies (189 patients) reporting only 0.5% pudendal nerve injury without the use of perineal post. Two studies commented on time of traction during surgical intervention with mean times of 98 and 68 min with complication rates of 10% and 6.6%, respectively.

Conclusions
Pudendal nerve injury is not uncommon following hip arthroscopy, with a reported rate found in this review of 1.8%. Potential risk factors may include the use of a perineal post and long traction times. All reported cases resolved within 3 months. Patients should be informed of complications related to pudendal nerve injury, which include sexual and urinary dysfunction.

Level of evidence
Level IV, systematic review of level I–IV studies.

BACK

Gluteus maximus contraction velocity assessed by tensiomyography improves following arthroscopic treatment of femoroacetabular impingement

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https://link.springer.com/article/10.1007/s00167-017-4572-0

Purpose
Muscular impairment, particularly for the gluteus maximus (GM), has been observed in femoroacetabular impingement (FAI). The purpose of this study was to evaluate the tensiomyographic changes of the GM, rectus femoris (RF) and adductor longus (AL) before and after arthroscopic surgery for FAI. It was hypothesized that arthroscopic treatment of FAI would improve the preoperative muscular impairment.

Methods
All patients undergoing arthroscopic treatment of FAI between January and July 2015 were approached for eligibility. Patients included had a tensiomyography (TMG) evaluation including maximal displacement (Dm) and contraction time (Tc) of these muscles in both lower extremities. TMG values between the injured and healthy sides were compared at the preoperative and post-operative (3, 6 and 12 months after surgery) periods.

Results
There were no significant differences for the RF and AL, and Dm of the GM for any of the comparisons (n.s.). However, GM Tc was significantly lower at 3 ($p = 0.016$), 6 ($p = 0.008$), and 12 ($p = 0.049$) months after surgery in the injured side compared to preoperatively. GM Tc of the healthy side was significantly lower than the injured side at the preoperative period ($p = 0.004$) and at 3 ($p = 0.024$) and 6 ($p = 0.028$) months after surgery, but these significant differences were no longer observed at 12 months after surgery (n.s.). There was a significant reduction of pain in the GM area at 1 year after surgery compared to preoperatively ($p < 0.0001$).

Conclusions
Arthroscopic treatment of FAI and the subsequent rehabilitation improves contraction velocity of the GM of the injured side. Despite Tc is elevated in the GM of the injured compared to the healthy side preoperatively and at 3 and 6 months after surgery, differences in Tc between both sides are no longer significant at 12 months. Athletes with FAI participating in sports with great involvement of GM may benefit from arthroscopic treatment and its subsequent rehabilitation. TMG can be used as an objective measurement to monitor muscular improvements of the GM after surgery in these patients.

Level of evidence
II.

BACK

Bone and Joint Journal (BJJ), Volume 100, issue 3

Risk factors for progression of articular artilage damage after anatomical anterior cruciate ligament reconstruction; a second-look arthroscopic evaluation

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Bone Joint J 2018;100-B:285–93.

https://doi.org/10.1302/0301-620X.100B3.BJJ-2017-0837.R1

Aims
To investigate the risk factors for progression of articular cartilage damage after anatomical anterior cruciate ligament (ACL) reconstruction.

Patients and Methods
A total of 174 patients who underwent second-look arthroscopic evaluation after anatomical ACL reconstruction were enrolled in this study. The graded condition of the articular cartilage at the time of ACL reconstruction was compared with that at second-look arthroscopy. Age, gender, body mass index (BMI), ACL reconstruction technique, meniscal conditions, and other variables were assessed by regression analysis as risk factors for progression of damage to the articular cartilage.

Results
In the medial compartment, multivariable logistic regression analysis indicated that partial medial meniscectomy (odds ratio (OR) 6.82, 95% confidence interval (CI) 2.11 to 22.04, p = 0.001), pivot-shift test grade at the final follow-up (OR 3.53, CI 1.39 to 8.96, p = 0.008), BMI (OR 1.15, CI 1.03 to 1.28, p = 0.015) and medial meniscal repair (OR 3.19, CI 1.24 to 8.21, p = 0.016) were significant risk factors for progression of cartilage damage. In the lateral compartment, partial lateral meniscectomy (OR 10.94, CI 4.14 to 28.92, p < 0.001) and side-to-side differences in anterior knee laxity at follow-up (OR 0.63, p = 0.001) were significant risk factors.

Conclusion
Partial meniscectomy was found to be strongly associated with the progression of articular cartilage damage despite r anatomical ACL reconstruction.

BACK

Miscellaneous

Arthroscopy, Volume 34, Issue 3, p649-1000

Warming of Irrigation Fluids for Prevention of Perioperative Hypothermia During Arthroscopy: A Systematic Review and Meta-analysis

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https://doi.org/10.1016/j.arthro.2017.09.024

Purpose
To determine whether warming of irrigation fluids (32°C-40°C) compared with using room-temperature irrigation fluids (20°C-22°C) decreases the risk of perioperative hypothermia (<36°C) for patients undergoing shoulder, hip, or knee arthroscopy.

Methods
One reviewer, with the assistance of a medical librarian, searched the following databases: PubMed, Embase, Cochrane Central, SPORTDiscus, Web of Science, and CINAHL (Cumulative Index to Nursing and Allied Health Literature). Level I and II studies involving shoulder, hip, or knee arthroscopy were included. Two reviewers screened the abstracts and titles. Two reviewers assessed the risk of bias of selected studies using The Cochrane Collaboration tool. Meta-analyses were conducted on the following outcomes: hypothermia, lowest temperature, maximum temperature drop, and shivering.

Results
Seven studies of patients undergoing arthroscopy were included in the qualitative synthesis (5 shoulder studies, 1 hip study, and 1 knee study; 501 patients). The study involving knee arthroscopy was excluded from the meta-analyses because of insufficient data and high clinical heterogeneity (surgical site distal to the core, not involving extravasation of large amounts of fluid). The remaining 6 studies were included in 1 or more meta-analyses: hypothermia (5 shoulder and 1 hip study), lowest temperature (3 shoulder and 1 hip study), maximum temperature drop (2 shoulder and 1 hip study), and shivering (5 shoulder and 1 hip study). Warming of irrigation fluids for shoulder or hip arthroscopy significantly decreased the risk of hypothermia (odds ratio, 0.15; 95% confidence interval [CI], 0.06-0.40; P = .0001), increased the lowest mean temperature (mean difference, 0.46°C; 95% CI, 0.11°C-0.81°C; P = .01), decreased the maximum temperature drop (mean difference, −0.64°C; 95% CI, −0.94°C to −0.35°C; P < .0001), and decreased the risk of shivering (odds ratio, 0.25; 95% CI, 0.07-0.86; P = .03).

Conclusions
When irrigation fluids are warmed for shoulder and hip arthroscopy, the risk of hypothermia is less, the drop in intraoperative temperature is less, the lowest body temperature is higher, and the risk of postoperative shivering is reduced.

Level of Evidence
Level II, systematic review of Level I and II studies.

BACK