4Arthroscopy | JSES KSSTA Arthroscopy 4B journals

Issue 69.3, Arthroscopy, May 2020

Nederlandse Vereniging voor Arthroscopie

Website www.4b.4abstracts.nl

Part of www.4abstracts.com

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

Contact 4@erasmusmc.nl

Manual The titles in the contents are hyperlinks. Use these hyperlinks and the back button underneath every abstract to navigate more easily through the document. All abstracts have a hyperlink to the website of the article. Use this hyperlink to view the article in full-text. Articles can only be accessed in full-text through a personal account or the account of an institution.

Content
May 2020

Upper extremity

Arthroscopy
Volume 36, issue 5

- Arthroscopic Excision Arthroplasty of the Sternoclavicular Joint for Osteoarthritis: A Case Series of 50 Patients
- Missing Data in the National Surgical Quality Improvement Program Database: How Does It Affect the Identification of Risk Factors for Shoulder Surgery Complications?
- Comparison of Subacromial Injection and Interscalene Block for Immediate Pain Management After Arthroscopic Rotator Cuff Repair
- Biomechanical Evaluation of Humerus Fracture After Subpectoral Biceps Tenodesis With Interference Screw Versus Unicortical Button
- Vertical and Rotational Stiffness of Coracoclavicular Ligament Reconstruction: A Biomechanical Study of 3 Different Techniques
- Long-Term Outcomes of Arthroscopic Debridement With or Without Drilling for Osteochondritis Dissecans of the Capitellum in Adolescent Baseball Players: A ≥10-Year Follow-Up Study
- Complications of Elbow Arthroscopy in a Community-Based Practice
- Do Corticosteroid Injections Before or After Primary Rotator Cuff Repair Influence the Incidence of Adverse Events? A Subjective Synthesis
- Adverse Impact of Corticosteroid Injection on Rotator Cuff Tendon Health and Repair: A Systematic Review

Journal of Shoulder and Elbow Surgery (JSES)
Volume 29, issue 5

- Prevention of Cutibacterium acnes infection in arthroscopic shoulder surgery: a systematic review.
- Retrospective review of open and arthroscopic repair of anterosuperior rotator cuff tears with subscapularis involvement: a single surgeon's experience.
- Arthroscopic shoulder stabilization in the young athlete: return to sport and revision stabilization rates.
- Arthroscopic osteocapsular arthroplasty for advanced-stage primary osteoarthritis of the elbow using a computed tomography–based classification.
- The effect of perioperative platelet-rich plasma injections on postoperative failure rates following rotator cuff repair: a systematic review with meta-analysis.

Lower extremity

Arthroscopy
Volume 36, issue 5

- The Learning Curve in Hip Arthroscopy: Effect on Surgical Times in a Single-Surgeon Cohort
- Short-Term Outcomes Following Endoscopic Proximal Hamstring Repair
- Connective Tissue Progenitor Analysis of Bone Marrow Aspirate Concentrate Harvested From the Body of the Ilium During Arthroscopic Acetabular Labral Repair
- Routine Interportal Capsular Repair Does Not Lead to Superior Clinical Outcome Following Arthroscopic Femoroacetabular Impingement Correction With Labral Repair
- Biomechanical Response to Distraction of Hip Capsular Reconstruction With Human Acellular Dermal Patch Graft

BACK

- Clinical Outcomes of Hip Arthroscopy in Patients With Systemic Inflammatory Diseases Compared With Matched Controls at a Minimum of 2-Year Follow-Up
- Can Anatomic Posterolateral Corner Reconstruction Using a Fibular Tunnel Restore Fibular Footprints of the Posterolateral Complex? A Cadaveric Study
- Does Lateral Extra-articular Tenodesis of the Knee Affect Anterior Cruciate Ligament Graft In Situ Forces and Tibiofemoral Contact Pressures?
- Biomechanics Following Isolated Posterolateral Corner Reconstruction Comparing a Fibular-Based Docking Technique With a Tibia and Fibular–Based Anatomic Technique Show Either Technique is Acceptable
- Patellofemoral Contact Pressure for Medial Patellofemoral Ligament Reconstruction Using Suture Tape Varies With the Knee Flexion Angle: A Biomechanical Evaluation
- The Influences of Chronicity and Meniscal Injuries on Pivot Shift in Anterior Cruciate Ligament–Deficient Knees: Quantitative Evaluation Using an Electromagnetic Measurement System
- Assessment of Flexion Strength Following Single- Versus Double-Hamstring Tendon Harvest for Anterior Cruciate Ligament Reconstruction
- Patient-Reported Outcomes Measurement Information System (PROMIS) Instruments Correlate Better With Legacy Measures in Knee Cartilage Patients at Postoperative Than at Preoperative Assessment
- Growth Factor Delivery to a Cartilage-Cartilage Interface Using Platelet-Rich Concentrates on a Hyaluronic Acid Scaffold
- Analyzing Spin in Abstracts of Orthopaedic Randomized Controlled Trials With Statistically Insignificant Primary Endpoints
- Different Intra-articular Injections as Therapy for Hip Osteoarthritis: A Systematic Review and Network Meta-analysis

Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA)
Volume 28, Issue 5

- Arthroscopic versus open repair of lateral ankle ligament for chronic lateral ankle instability: a meta-analysis.
- Despite patient-reported outcomes improve, patients with femoroacetabular impingement syndrome do not increase their objectively measured sport and physical activity level 1 year after hip arthroscopic surgery. Results from the HAFAI cohort.
- Patients aged in their 70s do not have a high risk of progressive osteoarthritis following arthroscopic femoroacetabular impingement correction and labral preservation surgery.

American Journal of Sports Medicine (AJSM)
Volume 48, Issue 6

- Five-Year Outcomes After Arthroscopic Surgery for Femoroacetabular Impingement Syndrome in Elite Athletes
- Biceps Tenodesis Versus Tenotomy in the Treatment of Lesions of the Long Head of the Biceps Tendon in Patients Undergoing Arthroscopic Shoulder Surgery: A Prospective Double-Blinded Randomized Controlled Trial
- Outcomes of Hip Arthroscopic Surgery in Adolescents With a Subanalysis on Return to Sport: A Systematic Review

Clinical Orthopaedics and Related Research (CORR)
Volume 478, Issue 5

- Is Primary Arthroscopic Repair Using the Pulley Technique an Effective Treatment for Partial Proximal ACL Tears?

BACK

Upper extremity

Arthroscopy, Volume 36, Issue 5

Arthroscopic Excision Arthroplasty of the Sternoclavicular Joint for Osteoarthritis: A Case Series of 50 Patients

Graham Tytherleigh-Strong, F.R.C.S. (Orth, James Gill, M.R.C.S., Alex Mulligan, F.R.C.S. (Orth. & Tr.), Nawfal Al-Hadithy, F.R.C.S. (Orth. & Tr.)

Arthroscopy, Volume 36, Issue 5, Received: March 10, 2019; Accepted: December 8, 2019

https://doi.org/10.1016/j.arthro.2019.12.005

Purpose
to report the results of a consecutive series of 50 patients who underwent an arthroscopic excision of the sternoclavicular joint (SCJ) for primary osteoarthritis refractory to conservative treatment.

Methods
We undertook an arthroscopic excision of the SCJ in 50 patients with primary osteoarthritis refractory to conservative treatment. This included an adequate course of physiotherapy and at least 1 ultrasound-guided cortisone injection. There were 26 female and 24 male patients and the mean age at the time of surgery was 54.5 years (range 39-72 years). Patients were assessed preoperatively and at final follow-up with the Constant, Rockwood SCJ, and Quick-DASH scores. The mean follow-up was 41.8 months (range 24-73 months). Surgery was undertaken as a day-case with no shoulder immobilization.

Results
Forty-five patients were available at final-follow up. The median Constant score had increased from 55 (range 37-79) to 72 (range 38-92), Rockwood score from 6 (range 4-9) to 13 (range 4-15), and Quick-DASH 36 (range 18-69) to 12 (range 0-51). All of these changes were statistically significant ($P < .0001$). There were no complications and, specifically, no problems with joint instability. Forty-four of the 45 patients were pleased with the results of their surgery and indicated that they would be happy to have the procedure again.

Conclusions
The results of this study show that arthroscopic excision arthroplasty of the SCJ is a satisfactory treatment for primary SCJ osteoarthritis refractory to conservative treatment.

Level of Evidence
Level IV case series.

BACK

Missing Data in the National Surgical Quality Improvement Program Database: How Does It Affect the Identification of Risk Factors for Shoulder Surgery Complications?

Keith T. Aziz, M.D., Matthew J. Best, M.D., Brendan Y. Shi, B.S., Uma Srikumaran, M.D., M.B.A

Arthroscopy, Volume 36, Issue 5, Received: April 18, 2019; Accepted: December 13, 2019

https://doi.org/10.1016/j.arthro.2019.12.028

Purpose
The main purpose of this study was to establish whether different approaches to handling missingness affect the determination of risk factors associated with 30-day postoperative major and minor complications. A secondary purpose was to determine the frequency of missingness in the National Surgical Quality Improvement Program (NSQIP) records of patients who underwent shoulder surgery.

Methods
We queried the American College of Surgeons NSQIP database using Current Procedural Terminology codes to identify patients who underwent shoulder surgery from 2011 to 2016 (n = 61,963). Data on major and minor postoperative complications were extracted. We also extracted data on patient characteristics, comorbidities, American Society of Anesthesiologists classifications, and preoperative laboratory values. We calculated the percentages of missingness for each variable. Each variable was then evaluated for associations with major and minor complications by using multivariable regression and 4 methods of handling missingness (involving imputation or exclusion, depending on the completeness of the data set). For 10 variables, the method using no exclusion or imputation produced higher odds of major complications compared with imputation. For 5 variables, the method using no exclusion or imputation produced higher odds of minor complications compared with imputation.

Results
Only 6.5% of all patients had no missing data (n = 4,042), whereas 44% had <10% missingness (n = 27,165). Fewer variables were associated with both major and minor complications after shoulder surgery when patient records with missing data were excluded from analysis.

Conclusions
Different methods of handling missingness produced different odds ratios for some variables when determining risk factors for complications after shoulder surgery.

Level of Evidence
III, Case control study.

BACK

Comparison of Subacromial Injection and Interscalene Block for Immediate Pain Management After Arthroscopic Rotator Cuff Repair

Benjamin D. Gross, B.S., Steven A. Paganessi, M.D., Oscar Vazquez, M.D.

Arthroscopy, Volume 36, Issue 5, Received: July 18, 2019; Accepted: January 8, 2020

https://doi.org/10.1016/j.arthro.2020.01.032

Purpose
To compare the efficacy of a subacromial injection (SAI) with a single-shot interscalene block (ISB) for immediate postoperative pain relief after outpatient arthroscopic rotator cuff repair (ARCR).

Methods
We performed a retrospective chart review of consecutive patients who underwent ARCR. Patients received either an ISB before the procedure or an SAI after the procedure. Preoperative baseline patient characteristics were collected and compared. Visual analog scale (VAS) pain scores were recorded preoperatively, at 15-minute intervals over a 120-minute period in the postanesthesia care unit (PACU), and at discharge. Differences in VAS scores between groups were compared with known values of the minimal clinically important difference, and the percentage of patients with VAS scores below the patient acceptable symptom state was tabulated. Differences between preoperative characteristics were assessed using the Mann-Whitney U, Fisher exact, or $\chi 2$ test. The Mann-Whitney U test was also used to evaluate VAS scores and total time spent in the PACU between groups.

Results
The median VAS score was significantly lower in the ISB group at PACU admission, at all intervals throughout the PACU stay, and at discharge ($P < .0001$). The median total time in the PACU was 107 minutes (25th percentile–75th percentile, 90-120 minutes) and 210 minutes (25th percentile–75th percentile, 175-274 minutes) in the ISB and SAI groups, respectively ($P < .0001$). Between-group differences in VAS scores were greater than the values of the minimal clinically important difference at each measured interval. A total of 98% and 67% of patients in the ISB and SAI groups, respectively, were discharged with VAS scores below the patient acceptable symptom state of 3.

Conclusions
Patients receiving an ISB experience significantly less pain than those receiving an SAI. In addition, they are discharged home from the PACU in half the time as patients receiving an SAI. On the basis of the comparative efficacy, an SAI cannot replace an ISB after ARCR. The ISB should therefore remain the standard of care as an adjunct to postoperative analgesia for patients who undergo outpatient ARCR.

Level of Evidence
Level III, retrospective, comparative therapeutic trial.

BACK

Biomechanical Evaluation of Humerus Fracture After Subpectoral Biceps Tenodesis With Interference Screw Versus Unicortical Button

Mohammed A. Khalid, M.D., Randal P. Morris, B.S., Natalie Black, B.S., Nicholas H. Maassen, M.D.

Arthroscopy, Volume 36, Issue 5, Received: June 11, 2019; Accepted: October 27, 2019

https://doi.org/10.1016/j.arthro.2019.10.034

Purpose
To compare the torsional failure strength of the humerus after subpectoral biceps tenodesis with an interference screw versus a unicortical button in a human cadaveric model.

Methods
Thirteen matched pairs of fresh-frozen human cadaveric upper extremities were randomized to receive either 2.6 × 12 mm unicortical button or 6.25-mm interference screw subpectoral biceps tenodesis. After the procedure, the humeri were loaded into a materials testing machine. The humeri were loaded in external rotation with respect to the elbow at 1.0°/s until failure. Rotation angle to failure, failure torque, energy absorbed, and stiffness were compared by paired t-tests with alpha set at 0.05.

Results
Humeri that were fixed with unicortical buttons showed statistically significant higher rotation to failure (26.87 ± 5.83 vs 19.04 ± 3.86°, $P < .001$), failure torque (54.11 ± 22.01 vs 44.95 ± 17.47 Nm, $P < .001$), and energy absorbed (883.93 ± 582.28 vs 451.40 ± 216.19 Nm-Deg, $P = .002$) than humeri fixed with interference screws.

Conclusions
In a cadaveric biomechanical model, at time 0, the use of a 2.7 × 12-mm unicortical button fixation in biceps tenodesis resulted in higher loads required to fracture the humerus when compared with a 6.25-mm interference screw fixation in a torsion model.

Clinical Relevance
This study demonstrates a significant biomechanical difference with regards to fracture of the humerus, between 2 commonly used fixations methods and implant sizes, interference screw, and unicortical button. The results of this study can aid surgeons in implant selection as well as help to improve patient education prior to surgery.

BACK

Vertical and Rotational Stiffness of Coracoclavicular Ligament Reconstruction: A Biomechanical Study of 3 Different Techniques

Haluk Celik, M.D., Aakash Chauhan, M.D., M.B.A., Cesar Flores-Hernandez, B.S., Erik Dorthe, M.S., Thomas Goodine, M.D., F.R.C.S.C., Darryl D'Lima, M.D., Ph.D., Heinz Hoenecke, M.D.

Arthroscopy, Volume 36, Issue 5, Received: June 27, 2019; Accepted: January 8, 2020

https://doi.org/10.1016/j.arthro.2020.01.033

Purpose
To compare the biomechanical stability of 3 different coracoclavicular reconstruction techniques under rotational and vertical loading using a cadaveric model.

Methods
In total, 12 cadaveric shoulders were used for testing. The native state was first tested then followed by 3 different reconstruction configurations using suture tapes and cortical buttons: coracoid loop (CL), single-bundle (SB), and double-bundle (DB). Superior displacement was measured by cycling an inferiorly directed force of 70 N to the scapula. The rotational stiffness of the scapula was determined by cycling the scapula in rotational displacement control between 15° of internal and external rotation. The rotational stiffness of the clavicle was determined by rotating the clavicle around its long axis 20° anteriorly and 30° posteriorly in rotational displacement control. All measurements were captured over 10 cycles at a rate of 200 Hz.

Results
Both the CL and SB techniques demonstrated significantly less internal scapular rotation stiffness. (intact: 19.70 ± 9.07 cNm/deg, CL: 3.70 ± 2.63 cNm/deg, SB:4.30 ± 2.66 cNm/deg, P <.001) External scapular rotation stiffness was significantly decreased in all techniques (intact: 17.70 ± 4.43 cNm/deg, CL: 3.30 ± 1.37 cNm/deg, SB: 4.50 ± 1.56 cNm/deg, DB: 4.67 ± 1.99 cNm/deg, P < .001). The CL and SB reconstructions were significantly less stiff with regards to posterior rotation of the clavicle (intact: 5.60 ± 1.80 cNm/deg, CL: 2.90 ± 1.10 cNm/deg, SB: 1.40 ± 0.65 cNm/deg, P < .001). Anterior rotation stiffness of the clavicle was significantly lower in all of the reconstructions (intact: 6.95 ± 1.90 cNm/deg, CL: 3.08 ± 0.84 cNm/deg, SB: 3.64 ± 0.93 cNm/deg, DB: 4.48 ± 1.21 cNm/deg, P < .001).

Conclusions
None of the described techniques provided equivalent rotational stability in all planes compared with the native state. DB reconstruction presented stiffness characteristics closest to the native state under cyclic loading during internal scapular and posterior clavicular rotation.

Clinical Relevance
Additional procedures such as tendon grafting or acromioclavicular ligament reconstruction may be required to control rotational stability.

BACK

Long-Term Outcomes of Arthroscopic Debridement With or Without Drilling for Osteochondritis Dissecans of the Capitellum in Adolescent Baseball Players: A ≥10-Year Follow-Up Study

Tetsuya Matsuura, M.D., Toshiyuki Iwame, M.D., Naoto Suzue, M.D., Shinji Kashiwaguchi, M.D., Takenobu Iwase, M.D., Daisuke Hamada, M.D., Koichi Sairyo, M.D.

Arthroscopy, Volume 36, Issue 5, Received: July 14, 2019; Accepted: January 3, 2020

https://doi.org/10.1016/j.arthro.2020.01.020

Purpose
To evaluate the long-term clinical outcomes of arthroscopic debridement for capitellar osteochondritis dissecans (OCD) in adolescent baseball players.

Methods
This retrospective study evaluated clinical outcomes of arthroscopic debridement for capitellar OCD in adolescent baseball players seen between 2003 and 2006. Inclusion criteria were at least 10 years of follow-up after surgery. Exclusion criteria were previous elbow surgery and age <12 years or >19 years. Patients were examined for presence of pain, inflammation (effusion), and range of motion. Outcome measures were determined using Timmerman/Andrews scores. Defect severity on preoperative radiographs was classified into 3 grades: small, moderate, and large. Return to baseball, pre- and postoperative range of motion and Timmerman/Andrews elbow score were evaluated according to defect severity.

Results
Twenty-three elbows of 23 baseball players (mean age, 14.7 [range, 13–17] years) underwent arthroscopic debridement for capitellar OCD. Mean follow-up duration was 11.5 (range, 10–13) years. Twenty patients (87%) returned to competitive baseball at their preoperative level; of these, 15 were non-pitchers and returned to the same position but only 1 of 5 pitchers returned to playing pitcher. One patient with a large defect and drilling underwent reoperation 11 years after the initial operation. Mean change in extension was 4.3° and that in flexion was 3.7°. Timmerman/Andrews score improved significantly from 160 (95% confidence interval 146.7-173.3) to 195 (95% confidence interval 185.2-204.8) at the most recent follow-up ($P < .0001$). Osteochondral defects detected on preoperative radiographs were small in 10 patients, moderate in 7, and large in 6. There was no significant between-group difference in extension, flexion, or Timmerman/Andrews score preoperatively or at the most recent follow-up.

Conclusions
Arthroscopic debridement with or without drilling allowed return to play in adolescent baseball players for positions other than pitchers. Long-term outcomes are likely durable regardless of lesion size.

Level of evidence
Level IV, Case series.

BACK

Complications of Elbow Arthroscopy in a Community-Based Practice

Jessica Intravia, M.D., Daniel C. Acevedo, M.D., W-L Joanie Chung, M.P.H., M.A., Raffy Mirzayan, M.D.

Arthroscopy, Volume 36, Issue 5, Received: April 2, 2019; Accepted: November 16, 2019

https://doi.org/10.1016/j.arthro.2019.11.108

Purpose
The purpose of this study was to report the complications of elbow arthroscopy in a large community practice with multiple surgeons and to analyze potential risk factors for these complications.

Methods
Patient demographic information, surgical variables, surgeon variables, and complications were retrospectively reviewed for all elbow arthroscopies performed within the health network from 2006 to 2014. Inclusion criteria included patients of any age undergoing a primary and revision elbow arthroscopy, which may have been performed in conjunction with other procedures. Exclusion criteria included incorrectly coded procedures where arthroscopy was not performed and no postoperative follow-up. Statistical calculations were performed using a binary logistic regression analysis to fit a logistic regression model.

Results
560 consecutive elbow arthroscopies in 528 patients performed between 2006 and 2014, by 42 surgeons at 14 facilities, were reviewed. 113 procedures were performed in pediatric patients under the age of 18. The average age was 38.6 years (range: 5-88). There were 444 males. The average length of follow-up was 375.8 days (2 to 2,739 days). Overall, heterotopic ossification occurred in 14 of 560 cases (2.5%) (all males), and 20 of 560 (3.5%) cases developed transient nerve palsies (8 ulnar, 8 radial, 1 median, 3 medial antebrachial cutaneous). There were 3 (0.5%) deep and 11 (2%) superficial infections. There were no vascular injuries, compartment syndrome, deep vein thrombosis, or pulmonary embolism. Elevated blood sugar was a significantly higher risk for infection (odds ratio [OR] 4.11, 95% confidence interval [CI] 1.337 to 12.645; P = .0136). Previous elbow surgery (OR 3.57, 95% CI 1.440 to 8.938; P = .006) and female sex (OR 4.05; 95% CI 1.642 to 9.970; P = .002) had a significantly higher risk for nerve injury. Relative to pediatric patients, there were higher odds in adults for nerve injury, infection, and heterotopic ossification, but none reached significance.

Conclusions
Elbow arthroscopy is a safe procedure with low complication rates. Diabetes is a risk factor for infection. Prior surgery and female sex are risk factors for nerve injury.

Level of Evidence
Case series, level 4

BACK

Do Corticosteroid Injections Before or After Primary Rotator Cuff Repair Influence the Incidence of Adverse Events? A Subjective Synthesis

Kyle N. Kunze, B.S., Raffy Mirzayan, M.D.. Alexander Beletsky, B.A.. William Cregar, M.D., William Skallerud, B.A., Brady T. Williams, B.S., Nikhil N. Verma, M.D., Brian J. Cole, M.D., M.B.A, Jorge Chahla, M.D., Ph.D.

Arthroscopy, Volume 36, Issue 5, Received: September 15, 2019; Accepted: January 16, 2020

https://doi.org/10.1016/j.arthro.2020.01.039

Purpose
To determine the influence of corticosteroid injections (CSIs) before or after primary rotator cuff repair (RCR) on the risk of (1) revision RCR, (2) retears, and (3) infections.

Methods
The Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials, PubMed, Embase, and MEDLINE databases were queried in accordance with the 2009 Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) statement. Data pertaining to the use of CSIs before or after primary RCR and adverse events were extracted. A subjective synthesis of these outcomes and bias was performed.

Results
A total of 10 studies including 240,976 patients were identified; 20.0% received a perioperative CSI. Of the 48,235 patients who received a CSI, 66.2% did so preoperatively whereas 33.8% did so postoperatively. A total of 78 patients received both preoperative and postoperative CSIs. Three studies examined the influence of preoperative CSIs on revision RCR; the incidence ranged from 3.8% to 10.5% with preoperative CSIs and from 3.2% to 3.4% for controls. Two of these studies analyzed outcomes of patients from the same databases over the same period. Five studies examined the influence of postoperative CSI use on retears; the incidence ranged from 5.7% to 19.0% in patients who received postoperative CSIs and from 10.0% to 18.4% for controls. Three studies examined the influence of CSI use on infection; 2 studies examined the risk of infection after postoperative CSI use, which ranged from 0.0% to 6.7% with CSIs and from 0.0% to 0.5% for controls.

Conclusions
The use of preoperative CSIs could be associated with an increased risk of revision RCR. There were no conclusive data to suggest an increased risk of retear or infection with CSI use based on a subjective synthesis of ranges. There is currently poor-quality literature surrounding this topic. Given that the current literature is limited and heterogeneous, no definitive recommendations can be made on perioperative CSI use for RCR.

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

BACK

Adverse Impact of Corticosteroid Injection on Rotator Cuff Tendon Health and Repair: A Systematic Review

Richard N. Puzzitiello, M.D., Bhavik H. Patel, B.S., Benedict U. Nwachukwu, M.D., M.B.A., Answorth A. Allen, M.D., Brian Forsythe, M.D., Matthew J. Salzler, M.D.

Arthroscopy, Volume 36, Issue 5, Received: June 5, 2019; Accepted: December 8, 2019

https://doi.org/10.1016/j.arthro.2019.12.006

Purpose
To assess adverse effects of preoperative corticosteroid injections (CSIs) in patients with rotator cuff disease, especially before rotator cuff repair (RCR).

Methods
A systematic review of the MEDLINE database was performed according to guidelines from the Preferred Reporting Item for Systematic Reviews and Meta-Analyses for all studies reporting on adverse clinical effects of CSIs on rotator cuff tendon.

Results
A total of 8 articles were identified that report on adverse outcomes and risks associated with corticosteroid injections in the setting of rotator cuff tendinosis. Among these included articles, a single CSI for rotator cuff tendinosis was associated with increased risk of revision rotator cuff repair (odds ratio [OR]: range 1.3 [1.1-1.7] to 2.8 [2.2-3.4]) when administered up to a year before surgery and postoperative infections (OR: 2.1 [1.5-2.7]) when administered within a month before RCR. The risk of adverse outcomes after rotator cuff repair are greatest if a CSI is administered within 6 months of surgery (OR: 1.8 [1.3-2.6]) or if ≥2 injections are given within a year of surgery (OR: range 2.1 [1.8-2.5] to 3.3 [2.7-4.0]).

Conclusion
Several recent clinical trials have demonstrated that CSIs are correlated with increased risk of revision surgery after RCR in a temporal and dose dependent matter. Caution should be taken when deciding to inject a patient, and this treatment should be withheld if an RCR is to be performed within the following 6 months.

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

BACK

Journal of Shoulder and Elbow Surgery (JSES), Volume 29, issue 5

Prevention of Cutibacterium acnes infection in arthroscopic shoulder surgery: a systematic review.

Belk, J.W., Kraeutler, M.J., Smith, J.R. et al.

DOI: https://doi.org/10.1016/j.jse.2019.12.032.

Background
Cutibacterium acnes is a gram-positive anaerobe that can lead to postoperative shoulder infections. The purpose of this study was to determine the incidence of *C acnes* infections following shoulder arthroscopy and evaluate the efficacy of perioperative antibiotic prophylaxis in the prevention of these infections.

Methods
A systematic review was performed by searching PubMed, the Cochrane Library, and Embase to identify studies that evaluated the prevalence and clinical indications of *C acnes* infections after various arthroscopic shoulder surgical procedures. Patients were assessed based on positive culture rates, the contraction of infection, and antibiotic regimens used to prevent infection.

Results
A total of 9 studies (1 level I, 5 level II, 1 level III, and 2 level IV) met the inclusion criteria, including a total of 3758 patients with a mean age of 59.9 years (range, 17-87 years) at the time of surgery. The mean follow-up time was 1.6 months (range, 1.0-12.0 months). Overall, 37.3% of patients (173 of 464) had positive *C acnes* skin and/or joint culture results, and in 0.22% of patients (8 of 3586), a *C acnes* infection was diagnosed postoperatively. The application of a topical benzoyl peroxide antibiotic in the days leading up to surgery significantly reduced the positive culture rate from 41.6% to 9.6% ($P < .001$).

Conclusions
C acnes infections occur at a very low rate (0.22%) following shoulder arthroscopy. The application of a topical benzoyl peroxide antibiotic in the days leading up to surgery in combination with preoperative antibiotic prophylaxis significantly reduces the prevalence of *C acnes* in shoulder arthroscopy patients.

Level of evidence
Level IV, Systematic Review

BACK

Retrospective review of open and arthroscopic repair of anterosuperior rotator cuff tears with subscapularis involvement: a single surgeon's experience.

Neviaser, A.S., Charen, D.A., Cotter, J.M., et al.

DOI: https://doi.org/10.1016/j.jse.2019.09.035

Background
There have been conflicting results when comparing outcomes of open vs. arthroscopic anterosuperior rotator cuff repairs with subscapularis involvement. The purpose of this study was to evaluate midterm outcome differences and complications following open vs. arthroscopic repair of rotator cuff tears involving the subscapularis by a single surgeon.

Methods
This was a retrospective review of 57 rotator cuff repairs involving the subscapularis performed by a single surgeon over a 10-year period. During this time, the surgeon transitioned from open to arthroscopic repair. Preoperative and postoperative range of motion, lift-off test, belly press test, and American Shoulder and Elbow Surgeons (ASES) Standardized Shoulder Assessment form scores were measured.

Results
Eighteen patients had open procedures and 39 had arthroscopic repair. The mean preoperative ASES score for the open group was 39 and postoperatively was 79. The mean preoperative ASES score for the arthroscopic group was 44 and improved to 80 postoperatively. There was no significant difference in score or change in score between the 2 groups ($P > .05$). There was only 1 complication. It occurred in the open group and was a superficial wound dehiscence.

Conclusions
This study demonstrated no outcome differences between open and arthroscopic rotator cuff repair involving the subscapularis, even with large subscapularis tears. Both techniques significantly improved shoulder function. Arthroscopic and open rotator cuff repairs including the subscapularis are relatively safe procedures, and either technique is an acceptable option.

Level of evidence
Level III, retrospective cohort comparison, treatment study.

BACK

Arthroscopic shoulder stabilization in the young athlete: return to sport and revision stabilization rates.

Cordasco, F.A., Lin, B., Heller, M., et al.

DOI: https://doi.org/10.1016/j.jse.2019.09.033

Background
Shoulder instability in young athletes is a complex problem with higher recurrence, higher reoperation, and lower return to sport (RTS) rates after arthroscopic shoulder stabilization compared with adults.

Methods
This is a prospective case series of young athletes with anterior shoulder instability after arthroscopic stabilization surgery. Primary outcomes were RTS and revision surgery, minimum follow-up was 24 months. Exclusion criteria were more than 3 preoperative episodes of instability, significant bone loss, or primary posterior instability. Demographic data, recurrent instability, revision surgery, sports pre- and postsurgery, patient satisfaction, level of RTS, time to RTS, and Single Assessment Numeric Evaluation (SANE) scores were analyzed.

Results
Sixty-seven athletes met inclusion criteria, 19 females and 48 males, with a mean age of 17.5 years (range, 13-21 years). Fifty-nine (88%) athletes returned to sport at an average of 7.1 months (standard deviation, ±1.8); 50 (75%) returned to the same level or higher. Football and lacrosse were the most common sports. Four of 67 athletes (6%), all male, underwent revision stabilization at 11-36 months for recurrent instability. The overall mean SANE score was 88.

Conclusion
This study demonstrates that when the high-risk athlete, 21 years old or younger, is appropriately selected for arthroscopic shoulder stabilization by excluding those with 3 or more preoperative shoulder instability episodes and those with off-track and engaging instability patterns, excellent outcomes can be achieved with low revision surgery rates, high RTS rates, and high patient satisfaction.

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

BACK

Arthroscopic osteocapsular arthroplasty for advanced-stage primary osteoarthritis of the elbow using a computed tomography–based classification.

Kwak, J., Kim, H., Sun, Y., et al.

DOI: https://doi.org/10.1016/j.jse.2019.09.036

Hypothesis
Arthroscopic osteocapsular arthroplasty for stage III osteoarthritis (advanced stage) shows worse clinical and radiologic outcomes compared with stage I or II according to computed tomography (CT)–based classification.

Methods
Clinical and radiologic outcomes in 65 patients treated with arthroscopic osteocapsular arthroplasty were retrospectively analyzed for range of motion (ROM) arc, functional score (Mayo Elbow Performance Score [MEPS]), and pain score (visual analog scale [VAS]). Patients were classified into stage I or II (n = 44) and stage III (n = 21) groups according to CT-based classification, and postoperative clinical outcomes and complications were analyzed.

Results
Mean follow-up duration was 32.9 ± 13.7 months (range, 24-69). The average patient age was 52 ± 10 years (range, 40-63). Improvements from preoperative to final follow-up were seen in the overall ROM-flexion from 94° ± 19° to 129° ± 14° ($P < .01$), ROM-extension from 25° ± 12° to 14° ± 7° ($P < .01$), MEPS from 45 ± 13 to 78 ± 14 ($P < .01$), and VAS score from 6.3 ± 1.6 to 3.1 ± 1.4 ($P < .01$). Subgroup analysis using the CT-based classification revealed that stage III led to worsened VAS score and MEPS than stage I or II.

Conclusions
Arthroscopic osteocapsular arthroplasty can be recommended for its favorable overall treatment outcomes for elbow osteoarthritis. However, stage III shows worse clinical and radiologic outcomes compared with stage I or II according to CT-based classification.

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

BACK

The effect of perioperative platelet-rich plasma injections on postoperative failure rates following rotator cuff repair: a systematic review with meta-analysis.

Cavendish, P.A., Everhart, J.S., DiBartola, A.C., et al.

DOI: https://doi.org/10.1016/j.jse.2020.01.084

Background
Platelet-rich plasma (PRP) has gained significant interest in recent years to potentially add biological augmentation of healing to surgical repairs of soft-tissue injuries. We sought to determine whether perioperative PRP injection influences the risk of failure following rotator cuff repair.

Methods
A systematic search was performed in the Embase and PubMed databases and identified 16 randomized controlled trials or prospective cohort studies (1045 participants) reporting rates of failure, defined as a subsequent tear on postoperative imaging, after rotator cuff repair with or without perioperative PRP administration. A random-effects meta-analysis of the included studies was performed to determine the pooled effect of PRP administration on the postoperative failure risk.

Results
Among the 16 studies investigating rotator cuff repairs, PRP augmentation resulted in a 25% reduction in the risk of repair failure, with low heterogeneity among the included studies. A significant protective effect was seen for studies of only small to medium tears (7 studies) ($P = .007$) and studies including large or massive tears (9 studies) ($P < .001$).

Conclusions
Intraoperative PRP reduces the failure risk following rotator cuff repair and has a consistent effect regardless of tear size. However, because of the variability in PRP preparations, a specific recommendation cannot be made.

Level of evidence
Level II, systematic review

BACK

Lower Extremity

Arthroscopy, Volume 36, Issue 5

The Learning Curve in Hip Arthroscopy: Effect on Surgical Times in a Single-Surgeon Cohort

Guillaume D. Dumont, M.D., M.B.A., Randy M. Cohn, M.D., Melissa M. Gross, M.D., Travis J. Menge, M.D., Nicole C. Battle, M.S., A.T.C., Zachary T. Thier, B.S.

Arthroscopy, Volume 36, Issue 5, Received: June 6, 2019; Accepted: November 18, 2019

https://doi.org/10.1016/j.arthro.2019.11.121

Purpose
To quantify the effect of the learning curve in performing hip arthroscopy for femoroacetabular impingement (FAI) and labral tears on total operating room time, including times for setup, surgery, and wake up, during a single surgeon's initial hip arthroscopy procedures.

Methods
A single surgeon's case list was retrospectively reviewed to identify all primary hip arthroscopy surgeries between November 1, 2018, and February 28, 2018, for the treatment of FAI and labral tears. Surgical times were recorded, including total room time; surgical time; setup time; and wake-up time. Linear regression was used to evaluate the relationship of these times relative to case number in the series. In addition, the series was divided into 3 sequential groups to further compare these times.

Results
In total, 225 patients were included in the study. The mean total room time for all cases was 155.4 minutes, 95% confidence interval ([CI] 150.9-160.0); mean surgical time was 115.6 minutes (95% CI 111.5-119.8), and mean setup time was 32.6 minutes (95% CI 31.8-33.4). Decreasing surgical time was associated with advancing number in the case series ($P < .001$, $R2 = 0.36$). Decreasing total room time was accordingly associated with advancing number in the case series ($P < .001$, $R2 = 0.34$). There were no significant differences in setup time and wake-up time as the case series advanced. When groups of 75 sequential cases were compared, significant decreases in surgical and total room time were noted between the first and second groups ($P < .001$) but not between the second and third groups ($P = .52$). Increasing complexity of surgeries was noted as the series advanced, including capsular closure and subspine decompression.

Conclusions
This study supports the existence of a substantial learning curve for hip arthroscopy in the treatment of FAI and labral tears. Our findings suggest decreasing surgical time as the surgeon advances through the learning curve, with the initial 75 procedures requiring longer time to perform than subsequent cases.

Clinical Relevance
Hip arthroscopy is a technically demanding procedure. Understanding the long duration of the hip arthroscopy learning curve is helpful for surgeons considering the addition of hip arthroscopy to their practice.

BACK

Short-Term Outcomes Following Endoscopic Proximal Hamstring Repair

Jennifer Kurowicki, M.D., Thomas A. Novack, M.D., Erica S. Simone, M.S., A.T.C., O.T.C., Samuel J. Mease, M.D., Anthony Festa, M.D. Vincent K. McInerney, M.D., Anthony J. Scillia, M.D.

Arthroscopy, Volume 36, Issue 5, Received: April 17, 2019; Accepted: November 20, 2019

https://doi.org/10.1016/j.arthro.2019.11.126

Purpose
The purpose of this study was to evaluate the outcomes of endoscopic proximal hamstring repair (ePHR), specifically: (1) functional and subjective outcomes, (2) effectiveness of treatment (preoperative-to-postoperative change), (3) complications, (4) acute versus chronic tears, and (5) partial versus complete tears.

Methods
A retrospective case series of a single-surgeon database for all patients who underwent ePHR between November 2014 and January 2019 with a minimum 1-year follow-up (range, 12 to 48 months) was performed. Charts were analyzed for preoperative and postoperative passive range of motion (PROM), strength, VAS pain, UCLA activity, and modified Harris Hip Score (mHHS). Manual muscle strength testing based on standard grading scale of 0 to 5 was performed. Complications including re-tear of the repair site, infection, iatrogenic nerve injury, inability to return to work/sport at the same level as preinjury, persistent hamstring weakness, pain with sitting, and subsequent surgery were recorded.

Results
We identified 20 ePHR (6 males, 14 females) with a mean age of 46 years (range, 18 to 63 years). At most recent follow-up, mean VAS pain was 1.85 (SD 2), UCLA activity was 8 (SD 2), mHHS was 90.6 (SD 10.5), and PROM hip flexion of 121.7° (SD 14.5°). Effectiveness of treatment demonstrated significant improvement in objective hamstring strength, hip flexion PROM by 17.3°, UCLA activity by 3, and VAS pain by 3 points. Subjective hamstring weakness was reported in 8 (42.1%) and persistent pain with sitting in 3 (15.8%). Return to work and sport were 100% and 95%, respectively. mHHS was significantly higher postoperatively in patients with complete versus partial tears (95.5 versus 85.7).

Conclusion
Endoscopic proximal hamstring repair is an effective approach that provides patients significant improvement in pain and function.

Level of Evidence
IV, Case Series

BACK

Connective Tissue Progenitor Analysis of Bone Marrow Aspirate Concentrate Harvested From the Body of the Ilium During Arthroscopic Acetabular Labral Repair

Mark R. Nazal, M.P.H., Mary Beth R. McCarthy, B.S., Augustus D. Mazzocca, M.D., M.S., Scott D. Martin, M.D.

Arthroscopy, Volume 36, Issue 5, Received: August 15, 2019; Accepted: November 24, 2019

https://doi.org/10.1016/j.arthro.2019.11.125

Purpose
To evaluate the number and concentration of progenitors of the bone marrow aspirate (BMA) harvest from the body of the ilium in comparison with other established aspiration sites.

Methods
The inclusion criteria consisted of primary hip arthroscopy for acetabular labral tear. BMA was performed by placing an aspiration needle into the body of ilium just proximal to the sourcil in 33 patients. The BMA was centrifuged and processed in the operating room, resulting in approximately 3 to 5 mL of bone marrow aspirate concentrate (BMAC). Samples of both BMA and BMAC sample were analyzed.

Results
The cohort of 30 patients had a mean number of nucleated cells of 24.0 million nucleated cells/cc of BMA. The BMAC samples had a mean connective tissue progenitor (CTP) cell concentration of 879.3 stem cells/cc of BMAC, a mean CTP prevalence of 34.1 stem cells/million nucleated cells, and a mean number of days to form colonies of 2.97 days. All 4 metrics of CTP harvest did not vary significantly with age, body mass index, sex, or laterality. The nucleated cell count was significantly associated with both CTP prevalence, $r2 = 0.287$ ($P = .002$), and CTP concentration, $r2 = 0.388$ ($P < .001$).

Conclusions
BMAC harvested from the body of the ilium during concurrent hip arthroscopy is a technically and biologically feasible option. Furthermore, the harvest site was found to have a CTP concentration that is similar or exceeds other published harvest sites. Finally, BMAC processing and application to areas of articular cartilage wear was performed efficiently and safely with no increase in morbidity or complications.

Clinical Relevance
The body of the ilium is a reliable and rich source of CTP cells. This study may assist orthopaedic surgeons interested in performing biologic augmentation during hip surgery in determining a harvest site.

BACK

Routine Interportal Capsular Repair Does Not Lead to Superior Clinical Outcome Following Arthroscopic Femoroacetabular Impingement Correction With Labral Repair

David Filan, M.Sc., Patrick Carton, M.D., F.R.C.S. (Tr&Orth)

Arthroscopy, Volume 36, Issue 5, Received: June 25, 2019; Accepted: December 3, 2019

https://doi.org/10.1016/j.arthro.2019.12.002

Purpose
To evaluate the impact of routine capsular repair on clinical outcome in a consecutive series of patients undergoing arthroscopic correction of symptomatic femoroacetabular impingement.

Methods
Between 2009 and 2015, patients were assigned to 1 of 2 groups based on whether a capsular repair was performed as part of their index hip arthroscopic procedure. Exclusion criteria included previous underlying hip conditions, Tönnis >1, age >45 years, and labrum not repaired. Patients were assessed preoperatively and 2-years postoperatively using patient-reported outcome measures (PROMs), including the modified Harris hip score (mHHS), UCLA activity scale, short form-36, Western Ontario and McMaster Universities Osteoarthritis Index score, and measures of range of hip movements. The incidence of any subsequent revision surgery within 2 years was recorded. Sex and age groups were specifically analyzed.

Results
In total, 966 consecutive cases were included (96.4% follow-up rate): 508 in group A (no repair) and 458 in group B (repair). Average age for all cases was 28.1 ± 7.0 years (14.6-44.9). There were significant improvements in all PROMs following surgery for both groups ($P < .001$). Statistical significance between groups at 2 years was observed for Short Form-36 ($P = .001$) and WOMAC ($P = .041$), greater in group A. Both groups similarly met the minimal clinically important difference (mHHS $P = .414$ and .605; UCLA, $P = .549$ and .614; Short Form-36, $P = .455$ and .079; WOMAC, $P = .425$ and .750 for distribution and anchor-based methods, respectively). In total, 38 (7.8%) cases group A and 24 (5.4%) cases group B required repeat hip arthroscopy (HA) ($P = .148$); No (0%) cases in group A and 2 (0.45%) cases in group B required total hip replacement ($P = .226$). There was significantly lower rate of repeat HA among 25- to 34-year age group (8.6% vs 3.9%, $P = .047$) where capsular repair was performed. No significant difference in the rate of repeat HA between groups for male ($P = .203$) or female ($P = .603$) subjects. Adhesions were more common in the repair group (79.2%, 95% confidence interval [CI] 57.8-92.9 vs 55.3%, CI 38.3-71.4; $P = .055$), with further capsular repair/plication required more frequently in the unrepaired group (50%, CI 33.4-66.6 vs 25%, CI 10.8-44.3); however, differences between groups were not significant ($P = .051$). Internal rotation was larger in group A compared with group B at 2 years (36.2 vs 28.1, $P = .000$). Female patients with capsular repair had reduced PROM scores at 2 years compared with female patients without repair (WOMAC, $P = .004$, and mHHS, $P = .037$).

Conclusions
Arthroscopic correction of femoroacetabular impingement with labral repair results in significant improvements in patient-reported outcomes at 2-years postsurgery, irrespective of whether the capsule is repaired. Routine capsular repair in a consecutive series of patients did not lead to superior outcomes compared with a nonrepaired group; similar proportions of cases in both groups were able to achieve minimal clinically important difference. In female patients, routinely repairing the capsule may lead to statistically inferior clinical outcome at 2-years postsurgery, although this may not be clinically significant. Routine capsular repair, however, may be beneficial in the younger, active patient, where a significant reduction in repeat arthroscopy was observed.

BACK

Level of Evidence
Level III, retrospective comparative study.

BACK

Biomechanical Response to Distraction of Hip Capsular Reconstruction With Human Acellular Dermal Patch Graft

Stephen Jacobsen, M.D., J. Jared Guth, M.D., Patrick J. Schimoler, M.S., Alexander Kharlamov, M.D., Ph.D., Brian D. Giordano, M.D., Mark Carl Miller, Ph.D., John J. Christoforetti, M.D.

Arthroscopy, Volume 36, Issue 5, Received: June 24, 2019; Accepted: December 17, 2019

https://doi.org/10.1016/j.arthro.2019.12.026

Purpose
To quantify the biomechanical properties of the hip capsule with human dermal allograft reconstruction to determine whether a dermal patch restored capsular resistance to distraction.

Methods
Nine cadaveric hip specimens were dissected until capsule and bony structures remained and were then mounted in a testing fixture in neutral flexion and abduction. Four states of the hip capsule were sequentially tested under axial distraction of 5 mm measured with video analysis and with resultant force measurement: (1) intact hip capsule, (2) interportal capsulotomy, (3) capsulectomy to the zona orbicularis, and (4) capsular reconstruction with human dermal allograft using acetabular anchors and capsule-to-patch sutures.

Results
Capsulectomy was different from intact (P = .036), capsulotomy differed from capsulectomy (P = .012), and the repair was statistically significantly different from capsulectomy (P = .042); intact and reconstructed cases were not statistically significantly different. The force required for 5 mm of distraction decreased after interportal capsulotomy by an average of 9% compared with the intact state and further decreased after capsulectomy by 30% compared with the intact state. After capsular reconstruction using dermal allograft, force requirements increased by an average of 36% from the capsulectomy state, only 5% below the intact state.

Conclusions
Human dermal allograft tissue graft provides restoration of distractive strength for use during hip capsule reconstruction with acetabular anchor fixation and distal soft-tissue fixation after capsulectomy in a cadaveric model.

Clinical Relevance
Capsular repair or reconstruction with a dermal patch offers time-zero restoration of function; intact and reconstructed cases showed no difference, and reconstruction restored a capsulectomy to a biomechanical equivalent of the intact case when distraction was applied.

BACK

Clinical Outcomes of Hip Arthroscopy in Patients With Systemic Inflammatory Diseases Compared With Matched Controls at a Minimum of 2-Year Follow-Up

Shalen Kouk, M.D, Samuel L. Baron, B.S., Hien Pham, M.D., Abigail Campbell, M.D., John Begly, M.D., Thomas Youm, M.D.

Arthroscopy, Volume 36, Issue 5, Received: March 15, 2019; Accepted: January 9 19, 2019

https://doi.org/10.1016/j.arthro.2020.01.017

Purpose
To evaluate postoperative outcomes and preoperative risk factors for patients with underlying systemic inflammatory disorders after hip arthroscopy.

Methods
A retrospective analysis of patients who had undergone hip arthroscopy, with a history of systemic inflammatory disease, was performed. This included patients with a diagnosis of lupus, a positive antinuclear antibody test, rheumatoid arthritis, psoriatic arthritis, sarcoidosis, inflammatory bowel disease, Reiter syndrome, and mixed connective tissue disease. These cases were 1:2 matched to a control group of patients with no history of systemic inflammatory disease based on age and sex. An a priori power analysis was conducted and A 1:2 case–control ratio was selected to increase study power. Inclusion criteria included all skeletally mature patients with hip pain refractory to nonoperative management who underwent hip arthroscopy for labral tears and femoroacetabular impingement. Skeletally immature patients, those with Tönnis grades of 2 or more (less than 2 mm of joint space), hip dysplasia, patients undergoing revision hip arthroscopy, and patients whose pain failed to improve after intra-articular injection were excluded. The primary outcome was rate of revision hip arthroscopy or total hip arthroplasty 24 months after surgery. Secondary outcomes included 2 patient-reported outcome scores, the modified Harris Hip Score (mHHS) and Non-Arthritic Hip Score (NAHS).

Results
Twenty patients (21 hip arthroscopy procedures) and 42 controls were included. There was no significant difference in proportion of patients who met failure criteria (28.6% vs 16.7%, P = .271) or 2-year survivorship (76.2% vs 83.3%, P = .496) between the systemic inflammatory disorder and control groups, respectively. Both groups had a significant improvement in mHHS and NAHS at 24 months compared with baseline; however, there was no significant difference in mHHS (P = .28) or NAHS (P = .22) at 24 months between the 2 groups.

Conclusions
Patients with underlying inflammatory conditions have similar 2-year outcomes after hip arthroscopy for intra-articular pathology compared with patients with no history of inflammatory disease.

Level of Evidence
III, retrospective comparative study

BACK

Can Anatomic Posterolateral Corner Reconstruction Using a Fibular Tunnel Restore Fibular Footprints of the Posterolateral Complex? A Cadaveric Study

Yong Seuk Lee, M.D., PhD., Jae Ho Cho, M.D., Ph.D., Myung Chul Lee, M.D., Ph.D., Heesoo Han, M.D., Tae Woo Kim, M.D. Ph.D.

Arthroscopy, Volume 36, Issue 5, Received: June 17, 2019; Accepted: November 4 19, 2019

https://doi.org/10.1016/j.arthro.2019.11.099

Purpose
This study aimed to (1) quantitatively analyze the fibular footprints of the lateral collateral ligament (LCL) and popliteofibular ligament (PFL) and (2) evaluate whether a fibular tunnel can restore the LCL and PFL fibular footprints simultaneously without modification in anatomic posterolateral corner reconstruction of the knee.

Methods
In 20 cadaveric knees, anatomic characteristics, such as diameter, location and relationship with anatomic landmarks, of the LCL and PFL footprints were analyzed. Subsequently, a fibular tunnel that connected the LCL and PFL footprint centers was created with 1.5 mm drill bit, and tunnel depth, which is defined as the distance between the tunnel and the nearest cortex, was evaluated. An additional tunnel from the anteroinferior border of the LCL footprint to the posteroinferior border of the PFL footprint was created, and its tunnel depth was evaluated as well and compared with that of the original tunnel.

Results
The LCL footprint was longitudinally ovoid (8.4 ± 1.0 × 13 ± 1.0 mm), and its inferior margin corresponded well with the lateral apex of the fibula (distance, 1.0 ± 0.7 mm). The PFL footprint was round (9.7 ± 1.3 × 9.0 ± 1.1 mm), and its center was very close to the tip of the fibular styloid process (1.2 ± 0.8 mm). The tunnel depth of the original fibular tunnel was 1.8 ± 0.7 mm, and it was very shallow for tunnel reaming. On the contrary, the tunnel depth of the modified fibular tunnel (6.4 ± 1.1 mm) was significantly higher than that of the original tunnel ($P < 0.05$), and it was relatively safe for tunnel reaming.

Conclusions
A single fibular tunnel cannot reproduce the LCL and PFL footprint centers simultaneously because the trajectory is too close to the cortex. A modified fibular tunnel, using the margins of the footprints, is recommended to avoid cortical blowout.

Clinical Relevance
A modified fibular tunnel that covers only portions of the LCL and PFL footprints, from the anteroinferior LCL footprint to the posteroinferior PFL footprint, is less likely to blow out the lateral fibula than is a similar tunnel using the anatomic footprint centers.

BACK

Does Lateral Extra-articular Tenodesis of the Knee Affect Anterior Cruciate Ligament Graft In Situ Forces and Tibiofemoral Contact Pressures?

João V. Novaretti, M.D., Ph.D. Justin W. Arner, M.D., Calvin K. Chan, M.S., Sene Polamalu, M.S., Christopher D. Harner, M.D., Richard E. Debski, Ph.D., Bryson P. Lesniak, M.D.

Arthroscopy, Volume 36, Issue 5, Received: August 17, 2019; Accepted: January 19, 2020

https://doi.org/10.1016/j.arthro.2020.01.051

Purpose
To quantify the effects of lateral extra-articular tenodesis (LET) on tibiofemoral compartment contact area and pressures, knee kinematics, and forces.

Methods
Nine cadaveric knees were tested using a robotic testing system. Two loading conditions, (1) anterior tibial translational load coupled with axial compression and (2) internal tibial torque coupled with axial compression, were applied for each knee state at full extension and 30°, 60°, and 90° of knee flexion. Kinematic data was recorded for 3 knee states: anterolateral capsule (ALC) competent, ALC deficient, and post-LET using a 6-mm semitendinosus graft. In situ force in the anterior cruciate ligament (ACL) was quantified using the principle of superposition by comparing the change in force measured before and after the removal of the ALC. Contact area and pressures in each tibiofemoral compartment were measured by replaying kinematics after soft tissues were removed and pressure sensors were inserted.

Results
In response to an anterior tibial translational load, mean contact area in the medial compartment decreased by 33.1% from the ALC-competent to post-LET knee states at 90° of knee flexion ($P = .042$). No significant differences in lateral compartment contact pressure were found between knee states. In situ force in the ACL in response to an anterior tibial translational load decreased by 43.4% and 50% from the ALC-deficient to post-LET knee states at 60° ($P = .02$) and 90° ($P = .006$). No significant difference in kinematics was observed between the ALC-competent and post-LET knee states in each of the loading conditions at all knee flexion angles ($P > .05$).

Conclusions
In this in vitro model, LET with a semitendinosus graft did not significantly overconstrain the knee or increase pressure in the lateral compartment. Additionally, LET reduced the in situ force in the ACL in the setting of ALC injury.

Clinical Relevance
The lack of knee overconstraint without significant increases in lateral compartment pressures indicates that if an LET with semitendinosus graft is not overtensioned, accelerated degenerative changes in the lateral compartment may not be expected after this procedure.

BACK

Biomechanics Following Isolated Posterolateral Corner Reconstruction Comparing a Fibular-Based Docking Technique With a Tibia and Fibular–Based Anatomic Technique Show Either Technique is Acceptable

Peter S. Vezeridis, M.D., Ian D. Engler, M.D., Matthew J. Salzler, M.D., Ali Hosseini, Ph.D., F. Winston Gwathmey Jr., M.D., Guoan Li, Ph.D., Thomas J. Gill IV, M.D.

Arthroscopy, Volume 36, Issue 5, Received: June 28, 2019; Accepted: December 8, 2019

https://doi.org/10.1016/j.arthro.2019.12.007

Purpose
To analyze the biomechanical integrity of 2 posterolateral corner (PLC) reconstruction techniques using a sophisticated robotic biomechanical system that enables analysis of joint kinematics under dynamic external loads.

Methods
Eight cadaveric human knee specimens were tested. Five N·m external torque followed by 5 N·m varus torque was dynamically applied to each specimen. The 6 degrees of freedom kinematics of the joint were measured in 4 states (intact, PLC-deficient, fibular-based docking, and anatomic PLC reconstructed) at 30°, 60°, and 90° of flexion. Tibial external rotation (ER) and varus rotation (VR) were compared.

Results
Under external torque, ER significantly increased from the intact state to the PLC-deficient state across all flexion angles. At 30° of flexion, ER was not significantly different between the intact state (19.9°) and fibular-based (18.7°, P = .336) and anatomic reconstructions (14.9°, P = .0977). At 60°, ER was not significantly different between the intact state and fibular-based reconstruction (22.4°, compared with 19.8° in intact; P = .152) but showed overconstraint after anatomic reconstruction (15.7°; P = .0315). At 90°, ER was not significantly different between the intact state and anatomic reconstruction (15.4°, compared with 19.7° in intact; P = .386) but was with the fibular-based technique (23.5°; P = .0125).

Conclusion
Both a fibular-based docking technique and an anatomic technique for isolated PLC reconstruction provided appropriate constraint through most tested knee range of motion, yet the fibular-based docking technique underconstrained the knee at 90°, and the anatomic reconstruction overconstrained the knee at 60°. Biomechanically, either technique may be considered for surgical treatment of high-grade isolated PLC injuries.

Clinical Relevance
This biomechanical study utilizing clinically-relevant dynamic forces on the knee shows that either a simplified fibular-based docking technique or a more complex anatomic technique may be considered for surgical treatment of high-grade isolated PLC injuries.

BACK

Patellofemoral Contact Pressure for Medial Patellofemoral Ligament Reconstruction Using Suture Tape Varies With the Knee Flexion Angle: A Biomechanical Evaluation

Yukiko Sakamoto, M.D., Shizuka Sasaki, M.D., Yuka Kimura, M.D., Yuji Yamamoto, M.D., Eiichi Tsuda, M.D., Yasuyuki Ishibashi, M.D.

Arthroscopy, Volume 36, Issue 5, Received: August 13, 2019; Accepted: December 18, 2019

https://doi.org/10.1016/j.arthro.2019.12.027

Purpose
The purpose of this study was to evaluate the effect of the knee flexion angle during graft fixation on patellofemoral (PF) contact pressure in medial patellofemoral ligament (MPFL) reconstruction using polyester suture tape and knotless anchors.

Methods
Nine human knees (mean age 74.9 ± 14.1 years) were used in this study. Polyester suture tape was fixed at the medial edge of the patella with two 3.5-mm knotless anchors, and then to the femur with a 4.75-mm knotless anchor at 4 different knee flexion angles (0°, 30°, 60°, and 90°). A pressure sensor was used to measure the maximum contact pressure (MCP) of the medial and lateral PF joints in the intact knee and in postreconstruction knees at each knee flexion angle (0°, 30°, 60°, and 90°). Each MCP was normalized to that of the intact knee. A statistical comparison was made between MCP in the intact and reconstructed knees.

Results
The normalized MCP of the medial PF joint fixed at either 0° or 30° significantly increased at 60° of knee flexion (P = .036 and .042, respectively) and at 90° of knee flexion (P = .002 and .001, respectively). Conversely, the normalized MCP fixed at 60° and 90° remained at the same level as the intact knees at all angles of knee flexion. The normalized MCP of the lateral PF joint showed no significant difference at any fixation angle compared with intact knees.

Conclusion
To avoid excessive PF joint contact pressure after MPFL reconstruction, it may be best to fix polyester suture tape between 60° and 90° of knee flexion.

Clinical Relevance
Fixation of the polyester suture tape with a knotless anchor for MPFL reconstruction should be at 60° to 90° of knee flexion to most closely restore PF joint contact pressures to that of the intact knee.

BACK

The Influences of Chronicity and Meniscal Injuries on Pivot Shift in Anterior Cruciate Ligament–Deficient Knees: Quantitative Evaluation Using an Electromagnetic Measurement System

Kyohei Nishida, M.D., Ph.D., Takehiko Matsushita, M.D., Ph.D., Yuichi Hoshino, M.D., Ph.D., Daisuke Araki, M.D., Ph.D., Tomoyuki Matsumoto, M.D., Ph.D., Takahiro Niikura, M.D., Ph.D., Ryosuke Kuroda, M.D., Ph.D.

Arthroscopy, Volume 36, Issue 5, Received: May 8, 2019; Accepted: January 3, 2020

https://doi.org/10.1016/j.arthro.2020.01.018

Purpose
To investigate the influences of time from injury to surgery and meniscal injuries on knee rotational laxity in anterior cruciate ligament (ACL)-deficient knees using the electromagnetic system retrospectively.

Methods
Ninety-four unilateral ACL-injured patients (44 male and 50 female, mean age: 27.3 ± 11.8 years) were included. The pivot-shift test was performed before ACL reconstruction, as was a quantitative evaluation using the electromagnetic system to determine tibial acceleration. Patients were divided into 4 groups according to the chronicity: group 1, within 3 months (22 patients); group 2, between 3 and 6 months (29 patients); group 3, between 6 and 12 months (23 patients); and group 4, more than 12 months (20 patients). The presence of meniscal injuries was examined arthroscopically.

Results
The tibial acceleration was significantly greater in group 4. There was a positive correlation between tibial acceleration and the time from injury to surgery ($r = 0.47$, $P = .02$). In groups 1, 2 and 3, the tibial acceleration in patients with a lateral meniscal injury was significantly greater than in patients with a medial meniscal injury and without meniscal injury. When patients with lateral meniscal injury were excluded (leaving those with medial meniscus injury or without meniscal injury), group 4 had significantly greater accelerations than other groups.

Conclusions
In ACL-deficient knees, rotational laxity increased with time and the increased rotational laxity was evident more than 1 year after injury whereas it increased with concomitant lateral meniscal injuries within 1 year after injury.

Level of Evidence
Ⅳ, diagnostic study of nonconsecutive patients.

BACK

Assessment of Flexion Strength Following Single- Versus Double-Hamstring Tendon Harvest for Anterior Cruciate Ligament Reconstruction

Alex Hu, B.S., Cort D. Lawton, M.D., Patrick Nelson, B.A., Ryan S. Selley, M.D., Patrick Sweeney, M.D.a John Tuttle, M.D., Daniel J. Johnson, M.D., Earvin S. Balderama, Ph.D., Stephen M. Gryzlo, M.D., Michael A. Terry, M.D.

Arthroscopy, Volume 36, Issue 5, Received: June 23, 2019; Accepted: January 5, 2020

https://doi.org/10.1016/j.arthro.2020.01.019

Purpose
To compare isometric hamstring strength deficits, knee laxity, functional outcomes, and patient-reported outcomes between patients who underwent anterior cruciate ligament (ACL) reconstruction with doubled semitendinosus and gracilis tendon autograft (ST/G) versus quadrupled semitendinosus autograft (ST), at a minimum follow-up of 1-year postoperatively.

Methods
Patients who underwent ACL reconstruction with ST/G or ST hamstring autografts were retrospectively identified. Isometric hamstring strength was tested with a hand-held dynamometer at 30, 60, and 90° of knee flexion. Anterior knee laxity was assessed using a KT-1000 arthrometer. Functional outcomes were collected using the single-leg hop test and single-leg squat test. Side-to-side differences were determined and compared between the ST/G and ST groups. Patient-reported outcomes were collected on all patients.

Results
Eighty-four patients who underwent ST/G (n = 34) or ST (n = 50) autograft ACL reconstruction were recruited to participate in this study. There was no difference in knee laxity between the groups. Side-to-side hamstring strength deficits increased with increased flexion angles. At 90° of flexion, the ST/G group had a significantly greater flexion strength deficit compared with the ST group (37.8 ± 15.1% vs 24.7 ± 12.5%, P < .001). Aside from a significant difference in the KOOS pain Score (P .045), no other significant differences in functional or patient reported outcomes between the groups were identified.

Conclusions
Patients who underwent ACL reconstruction with ST/G compared with ST autograft have a significantly greater isometric flexion strength deficit at 90° of flexion. Future investigations are required to determine the clinical relevance of this difference and whether specialized therapy protocols can mitigate this deficit.

Level of Evidence
Level III, retrospective comparative study.

BACK

Patient-Reported Outcomes Measurement Information System (PROMIS) Instruments Correlate Better With Legacy Measures in Knee Cartilage Patients at Postoperative Than at Preoperative Assessment

Benedict U. Nwachukwu, M.D., M.B.A., Alexander Beletsky, B.A., Neal Naveen, B.S., Taylor M. Southworth, B.S., Kelechi R. Okoroha, M.D., Brian Forsythe, M.D., Nikhil Verma, M.D, Adam Yanke, M.D., Ph.D., Brian J. Cole, M.D., M.B.A.

Arthroscopy, Volume 36, Issue 5, Received: May 23, 2019; Accepted: January 16, 2020

https://doi.org/10.1016/j.arthro.2020.01.036

Purpose
To define the psychometric properties of the Patient-Reported Outcomes Measurement Information System (PROMIS) Physical Function (PF), Pain Interference (PI), and Depression computer adaptive tests (CATs) in patients undergoing knee cartilage surgical procedures.

Methods
The PROMIS PF, PI, and Depression CATs were administered preoperatively and at 6 months alongside legacy knee patient-reported outcome measures (PROMs) in patients undergoing knee cartilage surgical procedures. Statistical analysis consisted of the time to completion, psychometric analysis for correlative strengths, absolute and relative floor and ceiling effects, and Cohen effect size.

Results
Our study included 250 patients (57.2% male patients), averaging 1.87, 1.53, and 1.91 minutes for completion of the PF, PI, and Depression CATs, respectively. Preoperatively, the PROMIS PF and PI CATs showed wide ranges of correlation coefficients with respect to function (r = 0.14-0.72 and r = 0.29-0.77, respectively) and health-related quality-of-life PROMs (r = 0.64-0.70). At 6 months, the PROMIS PF CAT (r = 0.82-0.93) and PI CAT (r = 0.77-0.93) both exhibited excellent correlations with respect to legacy function and health-related quality-of-life PROMs except for the Marx Activity Rating Scale (r = 0.36-0.44). None of the PROMIS instruments exhibited any significant floor or ceiling effects.

Conclusions
The PROMIS PF, PI, and Depression CATs performed better with respect to legacy PROMs in the postoperative period than the preoperative period. In addition, the PROMIS PF and PI measures performed best with respect to the International Knee Documentation Committee questionnaire, and no floor or ceiling effects were identified for the PROMIS instruments. The PROMIS instruments may be more suited to track outcomes postoperatively than to establish preoperative baselines in cartilage surgery patients.

Level of Evidence
Level IV, retrospective case series.

BACK

Growth Factor Delivery to a Cartilage-Cartilage Interface Using Platelet-Rich Concentrates on a Hyaluronic Acid Scaffold

Ashley Titan, M.D., Michael Schär, M.D., Ian Hutchinson, M.D., Marco Demange, M.D., Tony Chen, Ph.D., Scott Rodeo, M.D.

Arthroscopy, Volume 36, Issue 5, Received: June 27, 2019; Accepted: December 4, 2019

https://doi.org/10.1016/j.arthro.2019.12.004

Purpose
To determine whether (1) human leukocyte-platelet-rich plasma (L-PRP) or (2) leukocyte-platelet-rich fibrin (L-PRF) delivered on a hyaluronic acid (HA) scaffold at a bovine chondral defect, a simulated cartilage tear interface, in vitro would improve tissue formation based on biomechanical, histologic, and biochemical measures.

Methods
L-PRF and L-PRP were prepared from 3 healthy volunteer donors and delivered in conjunction with HA scaffolds to defects created in full-thickness bovine cartilage plugs harvested from bovine femoral condyle and trochlea. Specimens were cultured in vitro for up to 42 days. Treatment groups included an HA scaffold alone and scaffolds containing L-PRF or L-PRP. Cartilage repair was assessed using biomechanical testing, histology, DNA quantification, and measurement of sulfated glycosaminoglycan and collagen content at 28 and 42 days.

Results
L-PRF elicited the greatest degree of defect filling and improvement in other histologic measures. L-PRF–treated specimens also had the greatest cellularity when compared with L-PRP and control at day 28 (560.4 μg vs 191.4 μg vs 124.2 μg, P = .15); at day 48, there remained a difference, although not significant, between L-PRF versus L-PRP (761.1 μg vs 589.3 μg, P = .219) . L-PRF had greater collagen deposition when compared with L-PRP at day 42 (40.1 μg vs 16.3 μg, P < .0001). L-PRF had significantly greater maximum interfacial strength compared with the control at day 42 (10.92 N vs 0.66 N, P = .015) but had no significant difference compared with L-PRP (10.92 N vs 6.58 N, P = .536). L-PRP facilitated a greater amount of sulfated glycosaminoglycan production at day 42 when compared with L-PRF (15.9 μg vs 4.3 μg, P = .009).

Conclusions
Delivery of leukocyte-rich platelet concentrates in conjunction with a HA scaffold may allow for improvements in cartilage healing through different pathways. L-PRF was not superior to L-PRP in its biomechanical strength, suggesting that both treatments may be effective in improving biomechanical strength of healing cartilage through different pathways.

Clinical Relevance
The delivery of platelet-rich concentrates in conjunction HA scaffolds may augment healing cartilaginous injuries.

BACK

Analyzing Spin in Abstracts of Orthopaedic Randomized Controlled Trials With Statistically Insignificant Primary Endpoints

Wade Arthur, B.S., Zachariah Zaaza, B.S., Jake X. Checketts, B.S., Austin L. Johnson, B.S., Kevin Middlemist, D.O., Clint Basener, D.O., Sam Jellison, B.S., Cole Wayant, B.S., Matt Vassar, Ph.D.

Arthroscopy, Volume 36, Issue 5, Received: June 21, 2019; Accepted: December 13, 2019

https://doi.org/10.1016/j.arthro.2019.12.025

Purpose
To evaluate the prevalence of spin among abstracts in orthopaedic randomized controlled trials (RCTs) with nonsignificant primary endpoints.

Methods
This study was conducted in accordance with a previously written protocol publicly available via the Open Science Framework. PubMed (which includes Medline) was searched for RCTs in orthopaedic surgery. The articles that were identified were then uploaded to Rayyan, and the abstracts were screened for inclusion. To be included, a trial had to have randomized the patients for intervention, statistically compare multiple groups, and have a primary endpoint that was not significant. Odds ratios and summary statistics (frequencies and proportions) were then calculated for spin in the abstracts.

Results
Of the 780 articles retrieved from our search string, 250 articles met the inclusion criteria. Analysis resulted in 112/250 (44.80%; 95% confidence interval [CI], 38.64-50.96) RCTs that containing spin within the abstract. Of the 112 RCTs, 52 (46.43%; 95% CI, 37.19-55.66) had spin in the results, and 89 (79.46%; 95% CI, 71.98-86.95) had spin in the conclusion of the abstract. The Journal of Bone and Joint Surgery was found to have the highest prevalence of spin (21/37, 56.76%; 95% CI, 40.79%-72.72%) whereas Arthroscopy: The Journal of Arthroscopic & Related Surgery had the lowest prevalence of spin (5/15, 33.33%; 95% CI, 9.48%-57.19%). No correlation was found between industry funding and increased odds of spin in the abstract (unadjusted odds ratio, 1.10; 95% CI, 0.45-2.63). Discrepancies for our primary endpoint, prevalence of spin among abstracts, were analyzed with Gwet's AC1 inter-rater statistic and found to be 81% (95% CI, 0.75-0.87).

Conclusions
Spin was found in 44.8% of the abstracts within our sample of orthopaedic RCTs. Nonsignificant primary data were often represented to seem significant, many orthopaedic RCTs did not indicate primary endpoints, and orthopaedic RCTs infrequently reported trial registration.

Clinical Relevance
Because spin can alter a physician's opinion of study findings, spin has direct clinical implications as it may potentially create false impressions about the true validity of an intervention.

BACK

Different Intra-articular Injections as Therapy for Hip Osteoarthritis: A Systematic Review and Network Meta-analysis

Zhihu Zhao, M.D., Jian-xiong Ma, Ph.D., Xin-long Ma, M.D.

Arthroscopy, Volume 36, Issue 5, Received: June 5, 2019; Accepted: December 8, 2019

https://doi.org/10.1016/j.arthro.2019.09.043

Purpose
This systematic review and network meta-analysis aimed to compare the clinical outcomes between 4 intra-articular injections (platelet-rich plasma [PRP], hyaluronic acid [HA], corticosteroid [CS], and HA plus PRP) for hip osteoarthritis (OA).

Methods
We performed a systematic literature search in PubMed, Embase, Web of Science, and the Cochrane database through April 2018 to identify any randomized controlled trials that evaluated the clinical efficacy of HA, PRP, CS, HA-plus-PRP, and control treatments for hip OA. Baseline information—country, mean age, number of patients, and Kellgren-Lawrence grade of hip OA in the treatment and control groups—was collected. The primary outcome was the visual analog scale (VAS) score at 1, 3, 6, and 12 months after injection.

Results
We included 11 randomized controlled trials with a total of 1,060 patients. The Kellgren-Lawrence grades of the treatment and control groups were similar in individual studies. The pair-wise meta-analysis indicated that CS and HA were superior to the control group in reducing the VAS score at 1 month and 3 months ($P < .05$) and that CS was superior to HA in reducing the VAS score at 1 month ($P < .05$). The network meta-analysis results indicated that HA and CS exhibited a beneficial role in reducing the VAS score at 1 month. CS achieved the lowest value for the surface under the cumulative ranking curve (SUCRA) for the VAS score at 1 month (0.23), and the SUCRA values of the 5 interventions showed that PRP achieved the lowest SUCRA value for the VAS score at 6 months (0.53).

Conclusions
CS injections are recommended as the most efficient agent in hip OA patients in the short term. Moreover, PRP is reported to have the highest rank for pain relief for up to 6 months. Considering the limitations of this meta-analysis, future direct comparisons with more samples are needed.

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

BACK

Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA), Volume 28, Issue 5

Arthroscopic versus open repair of lateral ankle ligament for chronic lateral ankle instability: a meta-analysis.

Brown, A.J., Shimozono, Y., Hurley, E.T., et al.

DOI: https://doi.org/10.1007/s00167-018-5100-6

Purpose
The purpose of this meta-analysis was to analyze the current comparative studies of arthroscopic and open techniques for lateral ankle ligament repair to treat chronic lateral ankle instability.

Methods
A systematic search of MEDLINE, EMBASE and Cochrane Library databases was performed during February 2018. Included studies were evaluated with regard to level of evidence and quality of evidence using the Modified Coleman Methodology Score. Total number of patients, patient age, follow-up time, gender ratio, surgical technique, surgical complications, complication rate, recurrent instability or revision rate, clinical outcome measures and percentage of patients who returned to sport at previous level were also evaluated. Statistical analysis was performed using RevMan, and a p value of < 0.05 was considered to be statistically significant.

Results
Four comparative studies for a total of 207 ankles were included. There was a significant difference in favor of arthroscopic repair with regard to AOFAS score, and there was no significant difference with regard to Karlsson score. There was a statistically significant difference in AOFAS score in favor of the arthroscopic repair (MD; 1.41, 95% CI 0.29–2.52, $I_2 = 0\%$, $p < 0.05$). There was no statistically significant difference in Karlsson score (MD; 0.00, 95% CI − 3.51 to 3.51, $I_2 = 0\%$, n.s.). There was no statistically significant difference in total, nerve, or wound complications.

Conclusions
The current meta-analysis found that short-term AOFAS functional outcome scores were significantly improved with arthroscopic lateral ankle repair compared to open repair. There was no significant difference between arthroscopic and open repair with regards to Karlsson functional outcome score, total complication rate, or the nerve and wound complication subsets with the included studies with at least 12 months of follow-up. However, the current evidence is still limited, and further prospective trials with longer follow-up are needed.

Level of evidence
III.

BACK

Despite patient-reported outcomes improve, patients with femoroacetabular impingement syndrome do not increase their objectively measured sport and physical activity level 1 year after hip arthroscopic surgery. Results from the HAFAI cohort.

Kierkegaard, S., Dalgas, U., Lund, B., et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-019-05503-5

Purpose
Patients with femoroacetabular impingement syndrome (FAIS) are young and middle-aged persons living physically active lives including sports activities. However, measurements of the physical activity level before and after hip arthroscopic surgery in patients with FAIS using both self-reported and objective accelerometer-based measures are lacking. Furthermore, comparing patients with a reference group of persons reporting no hip problems and conducting subgroup analyses investigating changes in physical activity level and self-reported outcomes according to pre-surgery activity level may further highlight the activity pattern for patients.

Methods
Sixty patients with FAIS eligible for hip arthroscopic surgery were consecutively included in a prospective cohort study (HAFAI cohort) together with 30 reference persons reporting no hip problems. Participants completed the Copenhagen Hip and Groin Outcome Score (HAGOS) together with questions regarding their sports activities. Furthermore, participants wore a three-axial accelerometer for five consecutive days during waking hours. The accelerometer-based data were analysed and presented as total activity and type, frequency and duration of activities.

Results
Patients experienced significant and clinically relevant changes in all HAGOS scores. 88% of patients participated in some kind of sports activity 1 year after surgery. Overall, objectively measured physical activity did not change from before to 1 year after surgery. However, subgroup analyses of the most sedentary patients preoperatively revealed significant changes towards a more active pattern. Compared to reference persons, patients performed less bicycling and running.

Conclusion
Despite clinically relevant changes in self-reported outcomes, patients did not increase their overall physical activity level 1 year after surgery. Physical activity levels were lower in patients than in the reference group and patients continued bicycling and running less compared with the reference group.

Level of evidence
II.

BACK

Patients aged in their 70s do not have a high risk of progressive osteoarthritis following arthroscopic femoroacetabular impingement correction and labral preservation surgery.

Honda, E., Utsunomiya, H., Hatakeyama, A., et al.

DOI: https://doi-org.eur.idm.oclc.org/10.1007/s00167-019-05520-4

Purpose
The purposes of this study were to (1) evaluate the effect of age on clinical outcomes of arthroscopic femoroacetabular impingement (FAI) with labral preservation surgery and (2) identify predictors of poor postoperative clinical outcomes.

Methods
Eighty-four patients who underwent hip arthroscopic treatment for FAI between 2009 and 2013 were retrospectively reviewed. Patients were divided into three groups based on age. The Advanced age group consisted of patients over 70 years old, the Middle age group consisted of patients in their 50s and 60s, and the Younger age group consisted of patients less than 50 years of age. Total hip arthroplasty (THA) conversion, radiographic progression of osteoarthritis and patient-reported outcomes including modified Harris Hip Score (MHHS) and Non-arthritic Hip Score (NAHS) were investigated.

Results
The mean follow-up period was 32.2 (range 24–60) months. THA was required in 3 patients in their 50s and 60s, which was a significantly higher rate compared to that in patients Younger than 50 years old (17% vs 0%, $p = 0.036$). Progression to osteoarthritis was also significantly more frequent in patients in their 50s and 60s than in patients in their 70s (50s and 60s: 33%; 70s: 0%, $p = 0.030$). In all age groups, the preoperative MHHS and NAHS improved at last follow-up ($p < 0.001$). The 50s and 60s age group [hazard ratio (HR) 6.62], preoperative mild osteoarthritic change (Tönnis grade 1, HR: 3.29) and severe cartilage damage on the acetabulum (HR: 2.63) were risk factors for progressive osteoarthritis and THA conversion.
Conclusions
Arthroscopic FAI correction and labral preservation surgery provide favourable clinical outcomes for patients over 70 years old in the absence of significant osteoarthritis and severe acetabular chondral damage. Patients in their 50s and 60s have a higher risk of both THA conversion and progressive osteoarthritis, while patients aged over 70 years show no evidence of progressive osteoarthritis. Chronologic age in isolation is not an absolute contra-indication to hip arthroscopy.

Level of evidence
III.

BACK

American Journal of Sports Medicine (AJSM), Volume 48, Issue 6

Five-Year Outcomes After Arthroscopic Surgery for Femoroacetabular Impingement Syndrome in Elite Athletes

Ida Lindman, MD*, Axel Öhlin, MD, Neel Desai, MD, PhD, Kristian Samuelsson, MD, PhD, Olufemi R. Ayeni, MD, PhD, Eric Hamrin Senorski, PT, PhD, Mikael Sansone, MD, PhD

First Published March 20, 2020; pp. 1416–1422

https://doi.org/10.1177/0363546520908840

Background: Femoroacetabular impingement syndrome (FAIS) is a common cause of hip pain and disability in athletes. Arthroscopic treatment for FAIS is well-established; however, the long-term results in elite athletes are limited.

Purpose: To evaluate outcomes 5 years after arthroscopic treatment for FAIS in elite athletes.

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

Methods: Elite athletes undergoing arthroscopic treatment for FAIS with a minimum 5-year follow-up were included. They were prospectively followed up with patient-reported outcome measures. An elite athlete was defined as having a Hip Sports Activity Scale (HSAS) level of 7 or 8 before the onset of symptoms. Preoperatively and 5 years after surgery, all athletes completed a web-based questionnaire, including the Copenhagen Hip and Groin Outcome Score (comprising 6 subscales), the EQ-5D and EQ-VAS (European Quality of Life–5 Dimensions Questionnaire and European Quality of Life–Visual Analog Scale), iHOT-12 (International Hip Outcome Tool), a visual analog scale for hip function, and the HSAS. Moreover, patients reported their overall satisfaction with their hip function. Preoperative measurements were compared with the 5-year follow-up.

Results: A total of 64 elite athletes (52 men, 12 women) with a mean ± SD age of 24 ± 6 years were included. On average, patients reported a statistically significant and clinically relevant improvement from preoperative patient-reported outcome measures to the 5-year follow-up ($P < .0003$), Copenhagen Hip and Groin Outcome Score subscales (symptoms, 51.7 vs 71.9; pain, 61.0 vs 81.1; function of daily living, 67.1 vs 83.6; function in sports and recreation, 40.0 vs 71.5; participation in physical activity, 25.0 vs 67.4; hip and groin–related quality of life, 34.4 vs 68.0), EQ-5D (0.60 vs 0.83), EQ-VAS (66.1 vs 76.7), and iHOT-12 (40.0 vs 68.8). At the 5-year follow-up, 90.5% reported satisfaction with their overall hip function. In total, 54% still participated in competitive sports (HSAS, 5-8) at follow-up, while 77% had decreased their level. Older patients and patients with longer duration of symptoms reported a significantly lower level of sports activity (HSAS, 0-4; $P < .009$).

Conclusion: Arthroscopic treatment for FAIS in elite athletes results in a statistically significant and clinically relevant improvement regarding symptoms, hip function, quality of life, and pain 5 years after surgery. Approximately half of the cohort was still in competitive sports at follow-up, yet 77% had decreased their level of sports. Nine of 10 patients were satisfied with their surgery.

BACK

Biceps Tenodesis Versus Tenotomy in the Treatment of Lesions of the Long Head of the Biceps Tendon in Patients Undergoing Arthroscopic Shoulder Surgery: A Prospective Double-Blinded Randomized Controlled Trial

Peter MacDonald, MD*, Fleur Verhulst, MD, Sheila McRae, PhD, Jason Old, MD, Greg Stranges, MD, Jamie Dubberley, MD, Randy Mascarenhas, MD, James Koenig, MD, Jeff Leiter, PhD, Mark Nassar, MD, Peter Lapner, MD

First Published March 30, 2020; pp. 1439–1449

https://doi.org/10.1177/0363546520912212

Background: The biceps tendon is a known source of shoulder pain. Few high-level studies have attempted to determine whether biceps tenotomy or tenodesis is the optimal approach in the treatment of biceps pathology. Most available literature is of lesser scientific quality and shows varying results in the comparison of tenotomy and tenodesis.

Purpose: To compare patient-reported and objective clinical results between tenotomy and tenodesis for the treatment of lesions of the long head of the biceps brachii.

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

Methods: Patients aged ≥18 years undergoing arthroscopic surgery with intraoperative confirmation of a lesion of the long head of the biceps tendon were randomized. The primary outcome measure was the American Shoulder and Elbow Surgeons (ASES) score, while secondary outcomes included the Western Ontario Rotator Cuff Index (WORC) score, elbow and shoulder strength, operative time, complications, and the incidence of revision surgery with each procedure. Magnetic resonance imaging was performed at postoperative 1 year to evaluate the integrity of the procedure in the tenodesis group.

Results: A total of 114 participants with a mean age of 57.7 years (range, 34 years to 86 years) were randomized to undergo either biceps tenodesis or tenotomy. ASES and WORC scores improved significantly from pre- to postoperative time points, with a mean difference of 32.3% ($P < .001$) and 37.3% ($P < .001$), respectively, with no difference between groups in either outcome from presurgery to postoperative 24 months. The relative risk of cosmetic deformity in the tenotomy group relative to the tenodesis group at 24 months was 3.5 (95% CI, 1.26-9.70; $P = .016$), with 4 (10%) occurrences in the tenodesis group and 15 (33%) in the tenotomy group. Pain improved from 3 to 24 months postoperatively ($P < .001$) with no difference between groups. Cramping was not different between groups, nor was any improvement in cramping seen over time. There were no differences between groups in elbow flexion strength or supination strength. Follow-up magnetic resonance imaging at postoperative 12 months showed that the tenodesis was intact for all patients.

Conclusion: Tenotomy and tenodesis as treatment for lesions of the long head of biceps tendon both result in good subjective outcomes but there is a higher rate of Popeye deformity in the tenotomy group.

Registration: NCT01747902 (ClinicalTrials.gov identifier)

BACK

Outcomes of Hip Arthroscopic Surgery in Adolescents With a Subanalysis on Return to Sport: A Systematic Review

Sarah L. Chen, BA, David R. Maldonado, MD, Cammille C. Go, BS, Cynthia Kyin, BA, Ajay C. Lall, MD, MS, Benjamin G. Domb, MD‡

First Published September 20, 2019; pp. 1526–1534

https://doi.org/10.1177/0363546519875131

Background: There is a plethora of literature on outcomes after hip arthroscopic surgery in the adult population; however, outcomes in the adolescent population have not been as widely reported. Additionally, as adolescents represent a very active population, it is imperative to understand their athletic activity and return to sport after hip arthroscopic surgery.

Purpose: To analyze patient-reported outcomes (PROs) after hip arthroscopic surgery in adolescents (aged 10-19 years) and present a return-to-sport analysis in the athletic adolescent subgroup.

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

Methods: The PubMed, Embase, and Cochrane databases were searched according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to identify articles that reported PROs after hip arthroscopic surgery in adolescents. The standardized mean difference was calculated to compare the effect size of hip arthroscopic surgery on various PROs. For the athletic subgroup, a return-to-sport summary was also provided.

Results: Ten studies, with 618 adolescent hips and a collective study period of December 2004 to February 2015, were included in this systematic review. Across all studies, the mean age was 15.8 years (range, 11.0-19.9 years), and female patients composed approximately 56.7% of the entire cohort. The mean follow-up was 34.5 months (range, 12-120 months). The modified Harris Hip Score (mHHS) was reported in 9 studies, and at latest follow-up, scores were excellent in 4 studies (range, 90-95) and good in the remaining 5 studies (range, 82.1-89.6). All adolescents also showed significant improvement on the Non-Arthritic Hip Score (NAHS), the Hip Outcome Score–Activities of Daily Living (HOS-ADL), the HOS–Sport-Specific Subscale (HOS-SSS), the physical component of the 12-Item Short Form Health Survey (SF-12P), a visual analog scale for pain (VAS), and both versions of the International Hip Outcome Tool (iHOT-12 and iHOT-33) at latest follow-up ($P < .05$). Further, mean improvements reported in all studies surpassed reported values of the minimal clinically important difference and patient acceptable symptomatic state for the mHHS, HOS-ADL, HOS-SSS, and iHOT-33. Finally, the collective return-to-sport rate among athletic adolescents was 84.9%.

Conclusion: In the setting of labral tears and femoroacetabular impingement, hip arthroscopic surgery can safely be performed in adolescents and leads to significant functional improvement. Furthermore,

BACK

Clinical Orthopaedics and Related Research (CORR), Volume 478, Issue 5

Is Primary Arthroscopic Repair Using the Pulley Technique an Effective Treatment for Partial Proximal ACL Tears?

Liao, Weixiong PhD; Zhang, Qiang PhD

Clinical Orthopaedics and Related Research: May 2020 - Volume 478 - Issue 5 - p 1031-1045

DOI: 10.1097/CORR.0000000000001118

Background
Attention has recently been paid to primary arthroscopic repair to treat ACL tears because of the disadvantages associated with reconstruction. However, there remain many unanswered questions and concerns about its application in the treatment of ACL tears.

Questions/purposes
(1) Does primary arthroscopic repair using the pulley technique result in satisfactory ROM (a functional ROM with a flexion contracture of 30° or less), knee stability, and functional scores in patients with partial proximal ACL tears? (2) What complications are associated with primary arthroscopic repair using the pulley technique in patients with partial proximal ACL tears?

Methods
Between January 2014 and March 2016, we treated 23 patients surgically who had partial proximal ACL tears and excellent tissue quality (defined as a remnant with mild interstitial tearing and the ability to hold sutures). All patients meeting those two criteria were treated using primary arthroscopic repair using the pulley technique. During that period, this represented 13% (23 of 183) of the patients we treated surgically for an ACL tear. Patients were excluded if they had other ACL tear types, insufficient tissue quality (defined as a severely torn remnant that was not strong enough to hold sutures), multi-ligamentous injuries, or substantial arthrosis (chondromalacia greater than Outerbridge grade 3, most of which underwent conversion to ACL reconstruction). Clinical outcomes were assessed using ROM, the anterior drawer test, the Lachman test, Lysholm score, Tegner activity score, IKDC subjective score, and radiographs. Twenty-one patients were observed for a mean (range) period of 36 months (25-49), and two were lost to follow-up.

Results
At the most-recent follow-up examination, all patients achieved full extension and only one patient lacked full flexion, with a flexion contracture of 10°. Twenty patients had no instability on the anterior drawer test and Lachman test findings, and one patient had a 1 + anterior drawer test. The mean Lysholm score improved from a mean ± SD of 71 ± 9 before surgery to 94 ± 6 (mean difference 23 points [95% CI 20 to 25]; $p < 0.001$) at latest follow-up. The IKDC subjective score improved from 64 ± 10 to 86 ± 11 points (mean difference 22 points; $p < 0.001$). We found no difference in the Tegner score from before surgery to latest follow-up (6.3 ± 1.2 versus 6.1 ± 1.2; mean difference 0.2; $p = 0.056$). One patient re-ruptured his ACL 2 months after surgery in military training during an obstacle race. No complications such as infection, thrombosis, stiffness, patellofemoral pain, or implant failure were observed.

Conclusions
Primary arthroscopic repair using the pulley technique can achieve short-term clinical success in a carefully selected (the selection process includes first identifying the ACL injury pattern preoperatively with MRI, then confirming the diagnosis under arthroscopy, and deciding whether

BACK

to perform a repair intraoperatively) subset of patients with partial proximal ACL tears and excellent tissue quality (defined as a remnant with mild interstitial tearing and the ability to hold sutures). Despite the promising clinical outcomes of our study, this technique should not be widely adopted unless it has been compared directly with ACL reconstruction, so future studies should be conducted to compare the clinical outcomes between this technique and ACL reconstruction, and longer-term follow-up is necessary to identify whether there is deterioration in the clinical outcomes over time.

Level of Evidence
Level IV, therapeutic study.

BACK