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Content October 2018

Upper extremity

Arthroscopy, Volume 34, issue 10

- Higher Critical Shoulder Angle and Acromion Index Are Associated With Increased Retear Risk After Isolated Supraspinatus Tendon Repair at Short-Term Follow Up
- Comparison of Curved and Straight Anchor Insertion for SLAP Repair: A Cadaveric Study
- No Functional Difference Between Three and Six Weeks of Immobilization After Arthroscopic Rotator Cuff Repair: A Prospective Randomized Controlled Non-Inferiority Trial
- Greater Tuberosity Decortication Decreases Load to Failure of All-Suture Anchor Constructs in Rotator Cuff Repair
- Pullout Strength of All-Suture Anchors: Effect of the Insertion and Traction Angle—A Biomechanical Study
- The Clinical Outcomes and Their Associated Factors in Staged Bilateral Arthroscopic Rotator Cuff Repair
- Retrospective Comparative Outcomes Analysis of Arthroscopic Versus Open Bone Graft and Fixation for Unstable Scaphoid Nonunions
- Recurrence Rate of Instability After Remplissage for Treatment of Traumatic Anterior Shoulder Instability: A Systematic Review in Treatment of Subcritical Glenoid Bone Loss
- Return to Sport and Clinical Outcomes After Surgical Management of Acromioclavicular Joint Dislocation: A Systematic Review

Journal of Shoulder and Elbow Surgery (JSES), Volume 27, issue 10

- Comparative proteome analysis of the capsule from patients with frozen shoulder
- A prospective evaluation of predictors of pain after arthroscopic rotator cuff repair: psychosocial factors have a stronger association than structural factors
- Immediate physical therapy without postoperative restrictions following open subpectoral biceps tenodesis: low failure rates and improved outcomes at a minimum 2-year follow-up
- Surgical management of lateral epicondylitis combined with ligament insufficiency
- Biceps tenodesis versus labral repair for superior labrum anterior-to-posterior tears: a systematic review and meta-analysis
- Arthroscopic autologous chondrocyte implantation in the glenohumeral joint: a case report

American Journal of Sports Medicine (AJSM), Volume 46, Issue 12

- Recurrence After Arthroscopic Labral Repair for Traumatic Anterior Instability in Adolescent Rugby and Contact Athletes

Lower extremity

Arthroscopy, Volume 34, issue 10

- Arthroscopic Repair of Acetabular Cartilage Lesions by Chitosan-Based Scaffold: Clinical Evaluation at Minimum 2 Years Follow-up
- Epidemiology and Detrimental Impact of Opioid Use in Patients Undergoing Arthroscopic Treatment of Femoroacetabular Impingement Syndrome
- Sectioning of the Anterior Intermeniscal Ligament Changes Knee Loading Mechanics
- Time From Injury to Surgery Affects Graft Maturation Following Posterior Cruciate Ligament Reconstruction With Remnant Preservation: A Magnetic Resonance Imaging–Based Study
- Comparison of Modified Transtibial and Outside-In Techniques in Anatomic Single-Bundle Anterior Cruciate Ligament Reconstruction
- Ultrasound Anatomic Demonstration of the Infrapatellar Nerve Branches
- Risk of Retear Following Anterior Cruciate Ligament Reconstruction Using a Hybrid Graft of Autograft Augmented With Allograft Tissue: A Systematic Review and Meta-analysis

Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA), Volume 26, Issue 10

- No risk of arthrofibrosis after acute anterior cruciate ligament reconstruction
- Decline in clinical scores at long-term follow-up of arthroscopically treated discoid lateral meniscus in children
- The percutaneous pie-crusting medial release during arthroscopic procedures of the medial meniscus does neither affect valgus laxity nor clinical outcome
- Hydrogel implant is as effective as osteochondral autologous transplantation for treating focal cartilage knee injury in 24 months
- Coronal tibial anteromedial tunnel location has minimal effect on knee biomechanics
- Concomitant injuries may not reduce the likelihood of achieving symmetrical muscle function one year after anterior cruciate ligament reconstruction: a prospective observational study based on 263 patients
- Surgeon experience with dynamic intraligamentary stabilization does not influence risk of failure
- Dynamic augmentation restores anterior tibial translation in ACL suture repair: a biomechanical comparison of non-, static and dynamic augmentation techniques
- Translation and validation of the simplified Chinese version of the anterior cruciate ligament-return to sport after injury (ACL-RSI)
- Altered movement during single leg hop test after ACL reconstruction: implications to incorporate 2-D video movement analysis for hop tests
- Septic arthritis after arthroscopic posterior cruciate ligament and multi-ligament reconstructions is rare and can be successfully treated with arthroscopic irrigation and debridement: analysis of 866 reconstructions
- Graft bending angle affects allograft tendon maturity early after anterior cruciate ligament reconstruction
- Microfracture provides better clinical results than debridement in the treatment of acute talar osteochondral lesions using arthroscopic assisted fixation of acute ankle fractures
- Results and recurrence of pigmented villonodular synovitis of the ankle: does diffuse PVNS with extra-articular extension tend to recur more often?
- Endoscopic plantar fascia release via a suprafascial approach is effective for intractable plantar fasciitis
- Concurrent arthroscopic osteochondral lesion treatment and lateral ankle ligament repair has no substantial effect on the outcome of chronic lateral ankle instability
- Arthroscopic treatment combined with the ankle stabilization procedure is effective for sinus tarsi syndrome in patients with chronic ankle instability
- Endoscopic shelf acetabuloplasty can improve clinical outcomes and achieve return to sports-related activity in active patients with hip dysplasia
- Hip capsular thickness correlates with range of motion limitations in femoroacetabular impingement

American Journal of Sports Medicine (AJSM), Volume 46, Issue 12

- High Degree of Variability in Reporting of Clinical and Patient-Reported Outcomes After Hip Arthroscopy

Journal of Bone and Joint Surgery (JBJS), Volume 100, Issue 19

- Opioid Consumption After Knee Arthroscopy

[BACK](#)

Upper extremity

Arthroscopy, Volume 34, Issue 10

Higher Critical Shoulder Angle and Acromion Index Are Associated With Increased Retear Risk After Isolated Supraspinatus Tendon Repair at Short-Term Follow Up

Bastian Scheiderer, M.D, Florian B. Imhoff, M.D., Jeremiah D. Johnson, M.D., James Aglio, M.D., Mark P. Cote, P.T., D.P.T., M.S. (C.T.R.), Knut Beitzel, M.D., Andreas B. Imhoff, M.D., Robert A. Arciero, M.D., Augustus D. Mazzocca, M.S., M.D., Daichi Morikawa, M.D., Ph.D.

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Purpose

To evaluate the effect of critical shoulder angle (CSA), acromion index (AI), and glenoid inclination (GI) on the postoperative healing rate after arthroscopic supraspinatus tendon repair.

Methods

Patients after arthroscopic repair of a symptomatic, unilateral, single-tendon, full-thickness supraspinatus tear in whom nonoperative management had failed were retrospectively reviewed. Magnetic resonance imaging (MRI) studies were obtained 6 months postoperatively and were evaluated by 2 independent observers. Repair integrity was classified as either intact or torn. Preoperative true anteroposterior radiographs were used to measure CSA, AI, and GI.

Results

Fifty-seven patients were evaluated 6 months postoperatively. The mean patient age at surgery was 54.7 ± 7.7 years. On MRI studies, 41 patients (71.9%) had an intact repair and 16 patients (28.1%) had a full-thickness re-tear. There were no significant differences between the intact and re-tear group in regard to patient age ($P = .648$), initial tear size ($P = .205$), or fatty degeneration ($P = .508$). The mean CSA for the re-tear group ($37^\circ \pm 4^\circ$) was significantly higher than that in the intact group ($35^\circ \pm 3^\circ$; $P = .014$). If the CSA was $>38^\circ$, the odds ratio of having a re-tear was 3.78 (95% confidence interval 1.05 to 13.58; $P = .042$). Average AI for the re-tear group (0.73 ± 0.09) was significantly higher than that in the intact group (0.69 ± 0.06 ; $P = .049$). The mean GI was $17^\circ \pm 6^\circ$ for the intact group and $16^\circ \pm 6^\circ$ for the re-tear group ($P = .739$).

Conclusions

At short-term follow-up, higher CSA and AI significantly increased the re-tear risk after arthroscopic supraspinatus tendon repair. CSA $>38^\circ$ increased the re-tear risk almost 4-fold. Overall GI was elevated but did not correlate with failure rate.

Level of Evidence

III, case control study.

Comparison of Curved and Straight Anchor Insertion for SLAP Repair: A Cadaveric Study

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Purpose

To compare a curved drill guide with a straight guide for suture anchor placement into the posterosuperior glenoid from an anterolateral portal with respect to glenoid perforation, drill contact with the suprascapular nerve, and maximum load.

Methods

Ten bilateral pairs of fresh human cadaveric shoulders were randomized to the curved technique on 1 side and the straight technique on the contralateral side. An anterolateral trans-rotator cuff portal was used for placement of anchors at the posterior (11 o'clock right shoulder) and far posterior (10 o'clock right shoulder) positions on the glenoid with a 24-mm drill stop, and the drill tip was marked with ink. Specimens were dissected for glenoid perforation and drill contact with the suprascapular nerve. The maximum load of each anchor was measured using a material testing system.

Results

Glenoid perforation occurred in 30% in the curved group and 60% in the straight group overall ($P = .01$). Ink markings demonstrated a direct hit on the suprascapular nerve in most of the penetrations (13 of 18) but was not significantly different between the curved and straight guides ($P = .25$). Maximum load of the posterior anchor was greater in the curved group than that in the straight group (199.5 vs 146.7 N, respectively; $P = .01$).

Conclusions

The curved technique has a lower rate of glenoid perforation and greater maximum load than the straight technique. However, the curved technique can result in glenoid perforation and injury to the suprascapular nerve, and we do not recommend it.

Clinical Relevance

Placing suture anchors through an anterolateral portal with a curved guide provides a more optimal trajectory with decreased risk of glenoid perforation and superior biomechanical strength than that with the straight guide, but it is not safe.

No Functional Difference Between Three and Six Weeks of Immobilization After Arthroscopic Rotator Cuff Repair: A Prospective Randomized Controlled Non-Inferiority Trial

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Purpose

The aim of this study was to compare clinical and radiologic results among patients with 3 versus 6 weeks of immobilization after arthroscopic rotator cuff (RC) repair in a prospective randomized controlled non-inferiority trial.

Methods

One hundred twenty patients were included after RC surgery for a small- to medium-sized tear of supraspinatus and upper infraspinatus tendons. Group A was immobilized in a simple sling for 3 weeks, and group B had a brace with a small abduction pillow with the arm in neutral position for 6 weeks. All patients started active range of motion when they removed the sling/brace. One hundred eighteen (98%) patients were assessed at 1-year follow-up. They underwent magnetic resonance imaging (MRI) of the shoulder, filled out the Western Ontario Rotator Cuff (WORC) index, and were evaluated with a Constant Murley (CM) score.

Results

Statistical non-inferiority was demonstrated for the 2 groups on the basis of the WORC index, the primary endpoint at 1 year. The objective for the non-inferiority test was to determine whether the expected mean WORC index for group A was at most 13% worse than standard treatment (Group B). The WORC index at 1 year was similar in both groups, with mean percent scores of 83% in group A and 87% in group B (mean difference = -4; 95% one-sided CI -9, -4). Age-adjusted CM scores were also similar, with means of 86 in group A and 90 in group B (mean difference = -4; 95% CI -13, 5; $P = .37$). MRI after 1 year showed 50 (89%) patients in each group with healed RC repair. Four patients in group A had complications: 1 acute postoperative infection, 2 cases of postoperative capsulitis treated with corticosteroid injections, and 1 repeat operation because of a loose anchor and subacromial pain. No patients in group B had complications.

Conclusion

RC repair resulted in improved postoperative shoulder function, regardless of whether the shoulder was immobilized for 3 or 6 weeks. Three weeks of postoperative immobilization with sling use was non-inferior to the commonly used regimen involving 6 weeks of immobilization in a brace with regard to the WORC index at 12 months' follow-up. MRI indicated similar degrees of healing between the groups. Based on these findings, it is safe to immobilize patients in a simple sling for 3 to 6 weeks after repair of small to medium RC tears.

Level of evidence

Level I, high-quality randomized controlled trial with statistically significant differences.

Greater Tuberosity Decortication Decreases Load to Failure of All-Suture Anchor Constructs in Rotator Cuff Repair

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Purpose

To evaluate the effect of greater tuberosity decortication on ultimate load to failure and displacement after cyclic loading with an all-suture anchor.

Methods

A 2.9-mm all-suture anchor was evaluated in decorticated and nondecorticated greater tuberosities of 10 matched pairs of human cadaveric shoulders. Greater tuberosity decortication was performed to a mean depth of 1.7 mm. Anchors were placed in the anterior, middle, and posterior tuberosity. Anchors were tested under cyclic loads followed by load-to-failure testing. Displacement after 20, 100, and 200 cycles and ultimate failure strength were determined. Clinical failure was defined as displacement greater than 5 mm during cyclic loading.

Results

After 20 and 100 cycles, there was no difference in mean displacement between the decorticated and nondecorticated cohorts ($P = .139$ and $P = .127$, respectively). The mean displacement after 200 cycles was greater in the decorticated cohort, although not significantly (3.4 vs 2.7 mm; $P = .05$). The mean ultimate load to failure was significantly lower in the decorticated cohort (314 vs 386 N, $P = .049$). There were 2 clinical failures in the decorticated specimens and 1 in the nondecorticated specimens.

Conclusions

A minimal greater tuberosity decortication significantly decreases the ultimate load to failure of an all-suture anchor. However, decreased biomechanical strength may not necessitate actual clinical failure.

Clinical Relevance

A decrease in ultimate load to failure could increase the risk of catastrophic postoperative anchor failure. However, while this decrease in strength is statistically significant, the overall decrease in strength may not be sufficient in magnitude to translate to clinical failure.

Pullout Strength of All-Suture Anchors: Effect of the Insertion and Traction Angle— A Biomechanical Study

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Purpose

To evaluate the pullout strength of the all-suture anchor (ASA), based on the angles of anchor insertion and traction.

Methods

Synthetic saw bones of 2 densities (0.16 and 0.32 g/cm³) with 3 mm thick cortical bone models were used. ASAs were inserted at 45°, 60°, 75°, or 90° and pulled at 2 angles from the surface: 45° (simulating the physiological pull of the supraspinatus) and 90° (simulating pulling out during knot tying). Five consecutive pullout tests for each insertion and traction angle combination per saw bone were conducted to evaluate the ultimate load to failure and mode of failure (80 tests total). Thereafter, 9 matched pairs of human cadaveric humeri with 2 ASA types were used (insertion angles, 45°, 75°, 90°; traction angle, 90°). Nine consecutive tests were conducted for each insertion angle and anchor type (54 tests total).

Results

The pullout strength was significantly higher for high density- than for low-density saw bones (all $P < .05$). The pullout strength was higher at the 45° than at the 90° traction angle (all $P < .05$) and was significantly higher at the 90° and 75° than at the 45° insertion angle in both high-density saw bones and cadaveric humeri (all $P < .05$). However, the pullout strength was not significantly different by ASA type (all $P > .05$).

Conclusions

ASA showed stronger pullout strength in higher density bones. Furthermore, it presented stronger pullout strength in the physiological traction direction of supraspinatus rather than in the knot-tying direction, consistent with the deadman theory. However, stronger pullout strength was observed in the vertically directed insertion angle, not 45°. Therefore, implanting the ASA vertically may be clinically more beneficial not only when performing knot tying during surgery, but also when the supraspinatus tendon loads the ASA postoperatively.

Clinical Relevance

The study provides biomechanical evidence that the optimal insertion angle for an ASA is more vertical than the 45°.

The Clinical Outcomes and Their Associated Factors in Staged Bilateral Arthroscopic Rotator Cuff Repair

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Purpose

To compare perioperative characteristics and postoperative outcomes of both shoulders in patients who underwent arthroscopic bilateral rotator cuff repair sequentially and to assess the associated factors that would affect the anatomic healing in staged bilateral rotator cuff repair.

Methods

The study enrolled 64 patients who underwent bilateral rotator cuff repair with follow-up imaging at least 12 months postoperatively. We allocated the shoulders operated on first to the surgery I group and those operated on second to the surgery II group. Visual analog scale (VAS) pain and satisfaction scores, range of motion, the American Shoulder and Elbow Surgeons score, the Simple Shoulder Test score, and healing failure were evaluated.

Results

Range of motion improved with no significant between-group differences (all $P > .05$). In the surgery II group, VAS pain and VAS satisfaction scores were significantly worse at 6 months postoperatively ($P = .048$ and $P = .041$, respectively) but were comparable at final follow-up ($P = .598$ and $P = .065$, respectively). American Shoulder and Elbow Surgeons and Simple Shoulder Test scores at 6 months were worse in the surgery II group ($P = .038$ and $P = .048$, respectively) but similar at final follow-up ($P = .786$ and $P = .087$, respectively). Tear size was similar between the 2 surgical procedures ($\kappa = 0.537$, $P < .001$). Of the 11 patients with nonhealing in the surgery I group, 7 (63.6%) had subsequent failure in the other shoulder, and if one shoulder had healing failure, the other shoulder had a high possibility of healing failure as well ($\kappa = 0.373$, $P = .004$).

Conclusions

Bilateral arthroscopic rotator cuff repair showed good outcomes at final follow-up on both sides. Tear size was closely related in both shoulders, and healing failure after the first rotator cuff repair was an associated factor with healing failure after the second operation.

Level of Evidence

Level IV, case series.

Retrospective Comparative Outcomes Analysis of Arthroscopic Versus Open Bone Graft and Fixation for Unstable Scaphoid Nonunions

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Purpose

To compare union rates and clinical and radiologic outcomes after arthroscopic and open bone grafting and internal fixation for unstable scaphoid nonunions.

Methods

Between March 2009 and November 2014, patients with unstable scaphoid nonunion underwent arthroscopic (group A) or open (group O) bone grafting and internal fixation. One senior surgeon alternatively performed either arthroscopic or open osteosynthesis for the same surgical indications. Visual analog scale score, grip strength, active range of motion, Mayo wrist score (MWS), and Disabilities of Arm, Shoulder, and Hand score were assessed preoperatively and postoperatively. Union was determined by computed tomography 8 to 10 weeks postoperatively with bridging trabecula at the nonunion site. Scapholunate angle (SLA), radiolunate angle (RLA), and lateral intrascaphoid angle (LISA), plus height/length ratio (HLR) served to gauge carpal bone alignment in preoperative and postoperative radiographs. Those outcomes of patients with carpal collapse deformities, who met following conditions; (1) LISA of $>45^\circ$ or HLR of >0.65 on computed tomography images or (2) SLA of $>60^\circ$ or RLA of $>10^\circ$ on plain radiographs, were also compared.

Results

Overall, 62 patients qualified for study (group A, 28; group O, 34). Union rates did not differ by patient subset (group A, 96.4%; group O, 97.1%; $P = 1$); and visual analog scale score, grip strength, range of motion, Mayo Wrist Score, and Disabilities of Arm, Shoulder, and Hand scores were similar at last follow-up. In radiographic assessments, SLA, RLA, and LISA were similar, whereas scaphoid HLR excelled through open technique (group A, 0.59 ± 0.07 ; group O, 0.55 ± 0.05 ; $P = .002$). Subgroup analysis of patients with carpal collapse deformities (group A, 9; group O, 14) showed that all radiographic measures in group A (vs group O) reflected lesser correction (SLA, $56.7^\circ \pm 7.3^\circ$ vs $49.2^\circ \pm 9.1^\circ$ [$P = .049$]; RLA, $9.2^\circ \pm 2.0^\circ$ vs $5.7^\circ \pm 3.0^\circ$ [$P = .005$]; LISA, $34.8^\circ \pm 4.8^\circ$ vs $25.6^\circ \pm 13.0^\circ$ [$P = .028$]; HLR, 0.66 ± 0.04 vs 0.54 ± 0.07 [$P < .001$]).

Conclusions

Arthroscopic and open bone grafting and internal fixation in treating unstable scaphoid nonunions, did not show any significant differences in clinical and radiologic outcomes at the minimum of 2 years after operation. In scaphoid nonunions with carpal collapse deformities, open bone grafting restored better carpal alignment than arthroscopic bone grafting, although there were no differences in clinical outcomes between the 2 techniques.

Level of Evidence

Level III, retrospective comparative study.

[BACK](#)

Recurrence Rate of Instability After Remplissage for Treatment of Traumatic Anterior Shoulder Instability: A Systematic Review in Treatment of Subcritical Glenoid Bone Loss

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Purpose

To report outcomes after arthroscopic remplissage in patients with anterior shoulder instability and subcritical glenoid bone loss, specifically regarding recurrence of instability, return to sport, and changes in range of motion.

Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines were used to perform a search using the PubMed, Embase, Cochrane Library, and Scopus databases. Forest plots were used to evaluate the overall values for recurrent instability, change in external rotation, and return to sport after arthroscopic Bankart repair with or without remplissage. The Methodological Index for Non-randomized Studies and Risk of Bias in Nonrandomized Studies–Interventions checklist were used to evaluate bias.

Results

Twenty-two articles met the inclusion and exclusion criteria. The Methodological Index for Non-randomized Studies and Risk of Bias in Nonrandomized Studies–Interventions checklists deemed studies as acceptable quality with low bias. Among 694 patients (522 male and 106 female patients) undergoing remplissage, the mean age was 28.3 ± 5.3 years and the mean duration of follow-up was 32.5 ± 13.9 months. The recurrence rate of instability ranged from 0% to 20%. The change in external rotation in 90° of abduction ranged from -11.3° to -1.0° , and the change in external rotation with the arm fully adducted ranged from -8.0° to $+4.5^\circ$. The overall rate of return to sport ranged from 56.9% to 100% after remplissage. The rate of return to sport at the preinjury level ranged from 41.7% to 100%. In addition, arthroscopic remplissage in addition to Bankart repair had a reduced odds of recurrent instability developing, ranging from 0.07 to 0.88, when compared with isolated Bankart repair.

Conclusions

Arthroscopic remplissage combined with Bankart repair is an effective procedure in the treatment of patients with engaging Hill-Sachs lesions and minimal glenoid bone loss. Patients can expect favorable rates of recurrent instability with a negligible loss of external rotation when compared with isolated Bankart repair. Treatment algorithms may be updated to include this procedure for engaging Hill-Sachs lesions, measuring between 20% and 40% in volume, with subcritical (<20%) glenoid bone loss.

Level of Evidence

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

Return to Sport and Clinical Outcomes After Surgical Management of Acromioclavicular Joint Dislocation: A Systematic Review

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Purpose

To evaluate the rate at which athletes return to sport after surgical management of acute and chronic acromioclavicular (AC) joint dislocations.

Methods

Three databases—PubMed, MEDLINE, and EMBASE—were searched from database inception until October 28, 2017, by 2 reviewers independently and in duplicate. The inclusion criteria were English language studies that reported return to sport outcomes in patients undergoing surgical management of AC joint dislocations.

Results

Overall, 12 studies with a combined total of 315 patients met the inclusion criteria, with a mean age of 33.8 years (range, 18-65 years) and a mean follow-up of 34.9 months (range, 6-126 months). Of the 12 included studies, 1 was a prospective comparative study (Level II), 1 was a retrospective comparative study (Level III), 1 was a prospective case series (Level IV), and 9 were retrospective case series (Level IV). The rates of return to any level of sport ranged from 94% to 100% ($I^2 = 0\%$), whereas the rates of return to the preinjury level of sport ranged from 62% to 100% ($I^2 = 61\%$). The pooled rate of return to preinjury level of sport in type V AC joint separations was 86.2% (95% confidence interval = 68.1%-98.0%), whereas that after type III or IV AC joint injuries was 89.6% (95% confidence interval = 79.9%-96.9%).

Conclusions

An almost perfect rate of return to sport participation after surgical management of AC joint dislocations have been reported, with most returning to their preinjury level of sport. The rates of return to sport were comparable across the different types of injuries and surgical procedures.

Level of Evidence

Level IV, systematic review of Level II, III, and IV investigations.

Comparative proteome analysis of the capsule from patients with frozen shoulder

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Background

The etiology of frozen shoulder (FS) is unclear. Accordingly, this study used a label-free quantitative shotgun proteomic approach to elucidate the pathogenesis of FS based on protein expression levels.

Methods

Tissue samples from the rotator interval (RI), middle glenohumeral ligament (MGHL), and anterior-inferior glenohumeral ligament (IGHL) were collected from 12 FSs with severe stiffness and 7 shoulders with a rotator cuff tear (RCT) as controls. Protein mixtures were digested and analyzed by nano-liquid chromatography/electrospray ionization–tandem mass spectrometry. Relative protein expression levels were calculated by the signal intensity of identified peptide ions on mass spectra. Differentially expressed proteins between FS and RCT samples were evaluated by a gene enrichment analysis using Gene Ontology and Kyoto Encyclopedia of Genes and Genomes.

Results

We identified 1594 proteins, 1358 of which were expressed in all 6 tissue groups. We detected more upregulated proteins in the upper (RI and MGHL) FS groups and the lower (IGHL) RCT group than in the comparative groups, respectively. Various proteins with functions in tissue repair, collagen metabolism and fibrillation, cell–cell and cell–matrix adhesion, blood coagulation, and the immune response were expressed more highly in the RI and MGHL FS groups than in the RCT group. Proteins with functions in phagocytosis, glutathione metabolism, retinoid metabolism, and cholesterol metabolism were expressed more highly in the IGHl RCT group than in the FS group.

Conclusions

The pathophysiology of FS differs between the upper and lower parts of the joint capsule. Different treatment strategies for FS may be appropriate, depending on the location.

A prospective evaluation of predictors of pain after arthroscopic rotator cuff repair: psychosocial factors have a stronger association than structural factors

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Hypothesis

We evaluated the correlation of preoperative factors with pain after arthroscopic rotator cuff repair (ARCR). We hypothesized that nonstructural factors, including metrics of psychological well-being and preoperative narcotic use, would correlate with higher pain levels postoperatively and that structural factors, such as tear size, would not be predictive.

Methods

Ninety-three patients were prospectively enrolled and evenly distributed by tear size. Patient sex, age, occupation, smoking status, tear mechanism, tear characteristics on magnetic resonance imaging, visual analog scale (VAS) pain scores, narcotic usage, range of motion (ROM) by goniometry, and functional and psychological assessments through the American Shoulder and Elbow Surgeons (ASES) Standardized Shoulder Assessment Form, Simple Shoulder Test, Western Ontario Rotator Cuff Index (WORC), and RAND 36-item Short Form Survey questionnaires were obtained preoperatively. VAS scores and ROM were collected postoperatively at 2 weeks, 6 weeks, 3 months, 6 months, and 1 year. The ASES, SST, WORC, and RAND 36-item Short Form Survey questionnaires were repeated 1 year postoperatively.

Results

The patients (54% men) were a mean age of 56.4 years. There were 68% traumatic tears, 11% smokers, and 13% used narcotics preoperatively. ROM, VAS, ASES, and WORC scores improved significantly from the preoperative to 1-year postoperative assessment. Correlating with increased pain scores at 1 year were preoperative narcotic use, higher preoperative VAS, and lower scores on the WORC index and emotion sections.

Conclusion

Our data show that the factors most predictive of persistent pain after ARCR are psychosocial characteristics, including poor performance on validated measures of emotional well-being. Demographic and tear-specific structural factors did not correlate with postoperative pain scores.

Level of Evidence

Level I

Immediate physical therapy without postoperative restrictions following open subpectoral biceps tenodesis: low failure rates and improved outcomes at a minimum 2-year follow-up

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Hypothesis

We aimed to determine patient-reported outcomes in patients undergoing open subpectoral biceps tenodesis with a dual-fixation construct who had no postoperative range-of-motion or weight-bearing restrictions. Our hypothesis was that patients without postoperative restrictions would have low failure rates with improved patient-reported outcomes. We further hypothesized that this technique would allow an earlier return to activity and similar functional outcomes when compared with those reported in the literature.

Methods

In this institutional review board–approved retrospective outcome study, we evaluated 105 patients who underwent primary open subpectoral biceps tenodesis with a bicortical suture button and interference screw construct without postoperative restrictions. The primary outcome measure was failure of the biceps tenodesis. Postoperative outcome scores included the Short Form 12 (SF-12) Physical Component Score; SF-12 Mental Component Score; American Shoulder and Elbow Surgeons total score and subscales; and Disabilities of the Arm, Shoulder and Hand score.

Results

A total of 98 patients (85%) were available for final follow-up at an average of 3.5 years. There were 2 failures (2.2%), at 5 weeks and 9 weeks postoperatively. Four patients underwent additional surgery unrelated to the previous tenodesis procedure. Final outcome scores indicated high levels of function, including the SF-12 Physical Component Score (mean, 51.5; SD, 7.8), SF-12 Mental Component Score (mean, 54.7; SD, 6.7), American Shoulder and Elbow Surgeons total score (mean, 89.4; SD, 14.2), and Disabilities of the Arm, Shoulder and Hand score (mean, 11.3; SD, 13.4).

Conclusion

Open subpectoral biceps tenodesis using a dual-fixation construct with no postoperative motion restrictions resulted in excellent outcomes with a low incidence of failure.

Level of Evidence

Level IV

Surgical management of lateral epicondylitis combined with ligament insufficiency

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Background

Lateral collateral ligament (LCL) insufficiency may occur in patients with chronic lateral epicondylitis (LE). We report on 14 consecutive patients with chronic LE and LCL insufficiency.

Methods

We performed a retrospective review of 14 patients with LE and LCL insufficiency diagnosed between 2006 and 2015. The patients had undergone débridement for LE and ligament reconstruction for LCL insufficiency. The study included 9 men and 5 women with an average age of 53 years (range, 41-69 years). The mean follow-up period was 36 months (range, 24-97 months). We analyzed the pain visual analog scale score; Mayo Elbow Performance Score; Disabilities of the Arm, Shoulder and Hand score; range of motion; and posterolateral rotatory drawer test. We compared histories of steroid injection, trauma, and surgery.

Results

The pain visual analog scale score, Mayo Elbow Performance Score, and Disabilities of the Arm, Shoulder and Hand score were significantly improved postoperatively and improved in all patients. Three patients had mild instability on the stress test at final follow-up. All patients had a history of steroid injection, 2 had a history of trauma, and 3 had a history of surgery. The number of steroid injections and the number of cases receiving steroid injections more than 3 times were significantly higher in patients with LCL insufficiency.

Conclusions

Assessment of stability is important in patients with chronic LE and risk factors such as multiple steroid injections. Simultaneous surgical treatment including open débridement and ligament reconstruction provides satisfactory pain relief and functional improvement in patients with LE and LCL insufficiency.

Level of Evidence

Level IV

Biceps tenodesis versus labral repair for superior labrum anterior-to-posterior tears: a systematic review and meta-analysis

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Background

This study systematically reviewed the comparative studies in the literature to ascertain whether biceps tenodesis or labral repair results in superior clinical outcomes in the treatment of superior labrum anterior-to-posterior (SLAP) tears.

Methods

A systematic search of articles in PubMed, EMBASE and The Cochrane Library databases was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Cohort studies of biceps tenodesis compared with labral repair of SLAP tears were included. Statistical analysis was performed using Review Manager software (The Nordic Cochrane Centre, The Cochrane Collaboration, Copenhagen, Denmark). A P value of <.05 was considered to be statistically significant.

Results

Included were 5 studies with 234 patients. Biceps tenodesis resulted in improved rates of patient satisfaction (95.6% vs. 76.2%, P = .01) and rate of return to sport (81.3% vs, 64.3%, P = .02), compared with SLAP repair. Although the difference in reoperation rates was not statistically significant, there was a trend toward higher reoperation rates in patients treated with SLAP repair (14.2% vs 6.5%, P = .09). In addition, there was no difference in complication rates or functional outcomes.

Conclusion

Our study found that biceps tenodesis resulted in higher rates of patient satisfaction and return to sport in the studies published in the literature and that biceps tenodesis and SLAP repair resulted in similar functional outcome scores.

Level of Evidence

Level III

Arthroscopic autologous chondrocyte implantation in the glenohumeral joint: a case report

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Case report

Autologous chondrocyte implantation (ACI) is a 2-stage surgical technique used to address full-thickness, symptomatic chondral lesions. Initially, it involves a cartilage biopsy, isolation and expansion of chondrocytes *ex vivo*, and subsequent reimplantation into the damaged joint. Chondrocyte-seeded porcine collagen membrane as graft composite is considered the next-generation ACI technique, and the cell-seeded graft can be fixed to the subchondral bone without suture. Encouraging clinical outcomes using a chondrocyte-seeded collagen membrane (matrix-induced ACI) have been reported in the knee and ankle.

Recurrence After Arthroscopic Labral Repair for Traumatic Anterior Instability in Adolescent Rugby and Contact Athletes

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Background Traumatic glenohumeral dislocation of the shoulder is one of the most common shoulder injuries, especially among adolescent athletes. The treatment of instability for young athletes continues to be controversial owing to high recurrence rates.

Purpose To investigate the recurrence rate of shoulder instability after arthroscopic capsulolabral repair for adolescent contact and collision athletes.

Study Design Case series; Level of evidence, 4.

Methods Sixty-seven patients aged <18 years underwent an arthroscopic labral repair over a 5-year period. The mean \pm SD age of the cohort was 16.3 ± 0.9 years (range, 14–17 years) and consisted of 1 female and 66 males. All patients were contact athletes, with 62 of 67 playing rugby. Demographic, clinical, and intraoperative data for all patients with shoulder instability were recorded in our database. Recurrence rates were recorded and relative risks calculated.

Results At a follow-up of 33 ± 20 months, 34 of 67 patients had recurrent instability for an overall recurrence rate of 51% among adolescent contact athletes after arthroscopic labral repair surgery. The mean time to recurrence was 68.1 ± 45.3 weeks. All recurrences occurred as a result of a further sporting injury. Relative risk analysis demonstrated that athletes aged <16 years had 2.2 (95% CI, 1.2–2.1) times the risk of developing a further instability episode as compared with athletes aged ≥ 16 years at the time of index surgery ($P = .0002$). The recurrence rate among adolescent athletes after bony Bankart repairs was 57.9% versus 47.9% for soft tissue labral repairs ($P = .4698$). The incidence of Hill-Sachs lesions ($P = .0002$) and bony Bankart lesions ($P = .009$) among adolescent athletes was significantly higher than among adult controls ($P = .002$). The presence of bone loss did not lead to a significant increase in recurrence rate over and above the effect of age.

Conclusion Adolescent contact athletes undergoing arthroscopic labral repair have an overall recurrence rate of 51%. Rugby players who undergo primary arthroscopic shoulder stabilization aged <16 years have 2.2 times the risk of developing a further instability episode when compared with athletes aged ≥ 16 years at the time of index surgery, with a recurrence rate of 93%.

Lower Extremity

Arthroscopy, Volume 34, Issue 10

Arthroscopic Repair of Acetabular Cartilage Lesions by Chitosan-Based Scaffold: Clinical Evaluation at Minimum 2 Years Follow-up

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Purpose

To evaluate the functional outcome of using chitosan-based material in our patients after 2 years of follow-up.

Methods

Nonarthritic nondysplastic femoroacetabular impingement patients with an acetabular chondral lesion, 18 to 55 years of age, were included for arthroscopic repair between May 2013 and July 2015. Full-thickness chondral defects $\geq 2 \text{ cm}^2$ were filled with chitosan-based implant after microfractures. Follow-up consisted of alpha angle assessment and clinical outcome in the form of the Non Arthritic Hip Score (NAHS), International Hip Outcome Tool 33 (iHOT33), Hip Outcome Score of Activities of Daily Living (HOS-ADL), and Hip Outcome Score of Sports Specific Scale (HOS-SSS).

Results

Twenty-three patients were included. The mean follow-up was 38.4 ± 7.0 months (range, 24-50 months). The mean defect size was $3.5 \pm 1.0 \text{ cm}^2$, principally involving zone 2 and to a lesser extent in zones 1 and 3. Using femoroplasty, the alpha angle was corrected from a mean $70.5 \pm 6.3^\circ$ to $44.3 \pm 4.9^\circ$ ($P = .00001$). Significant improvement occurred comparing the preoperative to the first-year postoperative patient-reported outcomes: $P = .00001$ for the NAHS, $P = .00004$ for the iHOT33, $P = .00005$ for the HOS-ADL, and $P = .0002$ for the HOS-SSS. No statistically significant change has been observed in the patient-reported outcomes obtained at the endpoint when compared with the first-year values ($P = .13$ for the NAHS, $P = .21$ for the HOS-ADL, and $P = .29$ for the HOS-SSS), except for the iHOT33, which showed further significant improvement ($P = .02$). Up to 91% of the patients met or exceeded the minimal clinically important difference. One patient needed total hip arthroplasty. Perineal hypoesthesia occurred in 3 patients, who recovered within 2 to 6 weeks, and 1 patient needed a prolonged physiotherapy program for postoperative muscular stiffness.

Conclusions

The arthroscopic combined treatment of microfractures and chitosan-based scaffold has maintained satisfactory clinical outcomes in 91% of the patients with a large ($\geq 2 \text{ cm}^2$) full-thickness acetabular chondral defect associated with femoroacetabular impingement at a mean follow-up of 38.4 months. The study could not definitely draw any conclusion regarding the safety of chitosan-based material for use in the hip joint.

Level of Evidence

Level IV, case series.

[BACK](#)

Epidemiology and Detrimental Impact of Opioid Use in Patients Undergoing Arthroscopic Treatment of Femoroacetabular Impingement Syndrome

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Purpose

To determine the prevalence of preoperative opioid use in patients with femoroacetabular impingement (FAI) syndrome and to define how opioid use influences preoperative hip pain and function at a single center.

Methods

Between February 2015 and September 2016, patients undergoing hip arthroscopy at a single Midwest institution for FAI syndrome were retrospectively reviewed. Patients undergoing arthroscopy for non-FAI conditions and those with undocumented preoperative opioid use were excluded. Baseline validated measures (Hip Disability and Osteoarthritis Outcome Score [HOOS] pain and physical function; University of California, Los Angeles, activity scores; Veterans RAND 12 Item Health Survey) of health were collected at the time of surgery. Articular cartilage status was documented at the time of surgery. Opioid use was extracted from the electronic medical record retrospectively, and patients were designated current users, past users, or nonusers. Analysis of variance and 2-tailed Student's *t*-tests were used to detect differences between groups according to preoperative opioid use, and significance was set to $P < .05$.

Results

During the study period 321 patients underwent arthroscopic hip surgery for FAI and met the inclusion criteria (75 were excluded). Preoperatively, 55 patients (17%) were current opioid users, 89 (28%) were past users (not within 3 months of surgery), and 177 (55%) were opioid naive. Current opioid use was associated with significantly worse measures of joint and general health including HOOS-Pain (15.3 point difference, $P < .001$), HOOS-Physical Function (13.6 point difference, $P < .001$), University of California, Los Angeles, activity score (1.7 point difference, $P < .001$), and Veterans RAND 12 Item Health Survey mental component score (5.5 point difference, $P < .001$). Outerbridge cartilage grading and presence or length of labral tears were not worse in opioid users ($P = .2-.61$).

Conclusions

Preoperative opioid use is common prior to arthroscopy for FAI and has detrimental impacts on hip pain and function. The present data also suggest cessation of opioid medication for 3 months prior to surgery may have meaningful impacts on baseline measures of hip and general health.

Level of Evidence

Level III, prognostic.

Sectioning of the Anterior Intermeniscal Ligament Changes Knee Loading Mechanics

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Purpose

The purpose of this cadaver research project was to describe the biomechanical consequences of anterior intermeniscal ligament (AIML) resection on menisci function under load conditions in full extension and 60° of flexion.

Methods

Ten unpaired fresh frozen cadaveric knees were dissected leaving the knee joint intact with its capsular and ligamentous attachments. The femur and tibia were sectioned 15 cm from the joint line and mounted onto the loading platform. A linear motion x-y table allows the tibial part of the joint to freely translate in the anterior-posterior direction. K-scan sensors were used to define contact area, contact pressure, and position of pressure center of application (PCOA). Two series of analysis were planned: before and after AIML resection, mechanical testing was performed with specimens in full extension (1,400 N load) and in 60° of flexion (700 N load) to approximate heel strike and foot impulsion during the gait.

Results

Sectioning of the AIML produced mechanical variations below the 2 menisci when specimens were at full extension and loaded to 1,400 N: increasing the mean contact pressure (delta 0.4 ± 0.2 MPa, +15% variation $P = .008$) and maximum contact pressure (delta 1.50 ± 0.8 MPa, 15% variation $P < .0001$) and decreasing of tibiofemoral contact area (delta 71 ± 51 mm², -15% variation $P < .0001$) and PCOA (delta 2.1 ± 0.8 mm). At 60° flexion, significant differences regarding lateral meniscus mechanical parameters were observed before and after AIML resection: mean contact pressure increasing (delta 0.06 ± 0.1 MPa, +21% variation $P = .001$), maximal contact-pressure increasing (delta 0.17 ± 0.9 MPa, +28% variation $P = .001$), mean contact area decreasing (delta 1.84 ± 8 mm², 4% variation $P = .3$), and PCOA displacement to the joint center (mean displacement 0.6 ± 0.5 mm).

Conclusions

The section of the intermeniscal ligament leads to substantial changes in knee biomechanics, increasing femerotibial contact pressures, decreasing contact areas, and finally moving force center of application, which becomes more central inside the joint.

Clinical Relevance

AIML resection performed ex vivo in this study, might potentially be deleterious in vivo. Clinical studies focusing on preserving or even repairing the AIML are needed to evaluate those ex vivo elements.

Time From Injury to Surgery Affects Graft Maturation Following Posterior Cruciate Ligament Reconstruction With Remnant Preservation: A Magnetic Resonance Imaging– Based Study

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Purpose

To evaluate the clinical outcomes and graft maturation following posterior cruciate ligament reconstruction (PCLR) with preserved remnant and further analyze the correlated factors affecting graft maturation.

Methods

Consecutive patients who underwent unilateral single-bundle PCLR with remnant preservation from January 2011 to October 2014 by the same senior doctor using tibialis anterior allografts and same surgical technique were included. At a follow-up of more than 2 years, range of motion (ROM) and posterior laxity assessed by posterior drawer test and the KT-1000 arthrometer were examined. Tegner, Lysholm, and International Knee Documentation Committee scores were evaluated. The graft maturation was assessed by a 3.0-T magnetic resonance imaging. Overall correlation analyses and multivariate regression analysis were performed to identify correlated factors of graft maturation, and then subgroups were divided and analyzed according to significant risk factor.

Results

Forty-three (84.3%) of 51 enrolled patients were successfully followed up (38.4 months, 24-54 months). All clinical scores improved significantly, and there were no complications. The results of KT-1000 difference revealed significant decline of posterior laxity (9.4 ± 1.5 vs 2.2 ± 1.5 mm; $P < .001$). The MRI evaluation confirmed no ligament retears. Both correlation and regression analyses showed time from injury to surgery had a positive, statistically significant weak correlation with the signal intensity score ($R = 0.38$, $P = .012$; coefficient = 0.10; $P = .036$). Subgroup (group 1: time from injury to surgery <3 months; group 2: 3-6 months; group 3: 6-12 months; group 4: ≥ 12 months) analysis showed there were no significant differences of clinical outcomes between subgroups, while MRI signal intensity was significantly lower in the group with shorter time from injury to surgery ($P = .02$).

Conclusions

The remnant-preserved PCLR resulted in satisfactory clinical outcomes and graft maturation at a mean follow-up of 38.4 months. The time from injury to surgery showed a weak positive correlation with postoperative graft signal intensity on MRI.

Level of Evidence

Level III, retrospective comparative study.

Comparison of Modified Transtibial and Outside-In Techniques in Anatomic Single-Bundle Anterior Cruciate Ligament Reconstruction

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Purpose

To compare the bending angle of anterior cruciate ligament (ACL) graft at femoral tunnel, graft maturation, and tunnel positions and the clinical outcomes of the modified transtibial (mTT) and outside-in (OI) techniques.

Methods

Patients who met the inclusion criteria were divided into the mTT group (n = 50) and the OI group (n = 50). Using 3-dimensional computed tomography (3-D CT), tunnel placement and femoral tunnel bending angle were analyzed. The 3.0-T magnetic resonance imaging (MRI) was used to assess the graft signal intensity (indicative of maturation) with signal/noise quotient (SNQ). Graft tension and synovialization were evaluated with second-look arthroscopy in all cases. Clinical and functional tests were completed at 36 months of follow-up.

Results

When tunnel placements were analyzed using the quadrant method, no significant differences were found between the mTT group and the OI group. The femoral graft bending angle was reduced in the mTT group, and the total mean of SNQ values and mean SNQ values at the femoral intraosseous and proximal graft of the mTT group were significantly lower than in the OI group ($P < .001$), respectively. The femoral graft bending angle on the coronal and axial planes showed moderate-to-strong correlation with the SNQ values at the femoral intraosseous and proximal graft. Second-look arthroscopy revealed better synovialization in the mTT group than in the OI group ($P = .040$), with no significant difference in graft tension between the 2 groups ($P = .328$).

Conclusions

Anatomic tunnel placements did not vary between the mTT group and the OI group. However, the mTT group had more benefits in femoral graft bending angle and showed higher graft maturity and better synovial coverage than the OI group, although there were no significant differences in clinical outcomes. The acute femoral graft bending angle might negatively affect the maturation of proximal graft.

Level of Evidence

Level III, retrospective comparative study.

Ultrasound Anatomic Demonstration of the Infrapatellar Nerve Branches

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Purpose

To (1) confirm the correct identification of the infrapatellar branches of the saphenous nerve (IPBSNs) by high-resolution ultrasound (HRUS) with ink marking and consecutive dissection in anatomic specimens; (2) evaluate the origin, course, and end-branch distribution in healthy volunteers; and (3) visualize the variable anatomic course of the IPBSN by HRUS.

Methods

HRUS with high-frequency probes (15-22 MHz) was used to locate the IPBSN in 14 fresh anatomic specimens at 4 different locations. The correct identification of the IPBSN was verified by ink marking and consecutive dissection. Moreover, the IPBSNs were located in both knees of 20 healthy volunteers (n = 40). Their courses were marked on the volunteers' skin in a flexed-knee position. Distances were measured from the IPBSN branch closest to the median of the patella base (D1), center (D2), and apex (D3) and in a 45° (D4) and 0° (D5) relation to the median patella apex. Standardized photographs of all knees were mapped on 1 typically shaped knee.

Results

Dissection confirmed the correct identification of the IPBSN in 86% to 100% of branches, depending on their location. Intraindividual differences for distance measurements were observed for D1 ($P < .001$) and D2 ($P = .002$). The coefficient of variation was highest for D5 (0.86) and lowest for D1 (0.14). Mapping of the nerve branches on a typical knee showed a highly variable course for the IPBSN.

Conclusions

This study confirmed the reliable ability to visualize the IPBSN and its variations with HRUS in anatomic specimens and in healthy volunteers; such visualization may therefore enhance the diagnostic and therapeutic management of patients with anteromedial knee pain.

Clinical Relevance

Ultrasound successfully pinpoints the variable course of the IPBSN from the origin to the most distal point and, therefore, may enable the correct identification of (iatrogenic) nerve damage in every location.

Risk of Retear Following Anterior Cruciate Ligament Reconstruction Using a Hybrid Graft of Autograft Augmented With Allograft Tissue: A Systematic Review and Meta-analysis

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Purpose

To compare the risk of anterior cruciate ligament reconstruction failure in patients who undergo anterior cruciate ligament reconstruction with either autograft tissue or hybrid grafts.

Methods

A systematic search was performed on February 28, 2018, on PubMed, Scopus, Arthroscopy, and Cochrane Library. Included studies were clinical outcome studies of primary anterior cruciate ligament reconstructions that compared failure risk for hybrid grafts versus autografts. Baseline and outcomes data were extracted, and reporting quality was assessed via modified Coleman criteria. A random effects meta-analysis was conducted for both randomized and nonrandomized studies.

Results

Nine studies were identified with a mean of 40.1 months of follow-up. The mean Coleman methodology score was 66.5 (standard deviation, 12.8). One randomized study (Level II evidence) was identified with no difference in failure rates (0% for both groups, 8-mm minimum graft diameter for all patients). Eight nonrandomized studies (all Level III evidence) were identified with no difference in failure risk for hybrid grafts versus autograft (pooled odds ratio, 1.29; 95% confidence interval, 0.57-2.92; $P = .55$; $I^2 = 34\%$). Mean graft diameters were significantly larger in hybrid groups (range, 8.5-9.9 mm) than in autograft groups (range, 6.4-8.8 mm) in nonrandomized studies (mean difference, 0.5-2.5 mm; $P \leq .003$). There was no evidence of small study bias or bias owing to reporting quality, and adjustment for length of follow-up, mean patient age, percentage of male patients, year of publication, or reporting quality did not improve statistical heterogeneity.

Conclusions

Based on the current literature, although it may be theoretically detrimental to add allograft to a small-diameter autograft, it cannot be definitively shown based on the findings of this review with meta-analysis. Currently, it remains unclear that there is an advantage or disadvantage to hybridization of small autograft with allograft, although randomized studies of patients with small (<8-mm) autograft diameters are lacking.

Level of Evidence

Level III, systematic review of Level II and III studies.

risk of arthrofibrosis after acute anterior cruciate ligament reconstruction

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Purpose

To compare acute ACL reconstruction (ACLR) within 8 days of injury with delayed reconstruction after normalized range of motion (ROM), 6–10 weeks after injury. It was hypothesized that acute ACL reconstruction with modern techniques is safe and can be beneficial in terms of patient-reported outcomes and range of motion.

Methods

Sample size calculation indicated 64 patients would be required to find a 5° difference in ROM at 3 months. Seventy patients with high recreational activity level, Tegner level 6 or more, were randomized to acute (within 8 days) or delayed (6–10 weeks) ACLR between 2006 and 2013. During the first 3 months following surgery patients were contacted weekly by SMS and asked 'How is your knee functioning?', with answers given on a Visual-Analog Scale (0–10). ROM was assessed after 3 months by the rehab physiotherapist. Patient-reported outcomes, objective IKDC and manual stability measurements were collected by an independent physiotherapist not involved in the rehab at the 6-month follow-up.

Results

At 3-month follow-up, 91% of the patients were assessed with no significant differences in flexion, extension or total ROM demonstrated between groups. At the 6-month follow-up, the acute group had significantly less muscle atrophy of the thigh muscle compared to the contralateral leg. Furthermore, a significantly higher proportion of patients in the acute group passed or were close to passing the one leg hop test (47 versus 21%, $p = 0.009$). No difference was found between the groups in the other clinical assessments. Additionally, no significant difference between the groups was found in terms of associated injuries.

Conclusion

Acute ACLR within 8 days of injury does not appear to adversely affect ROM or result in increased stiffness in the knee joint when compared to delayed surgery.

Level of evidence

II.

Decline in clinical scores at long-term follow-up of arthroscopically treated discoid lateral meniscus in children

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Purpose

The purpose of this study was to examine the long-term clinical outcomes of arthroscopic partial meniscectomy for the treatment of discoid lateral meniscus in children.

Methods

A previous study identified 34 consecutive patients that underwent arthroscopic meniscal saucerization by one of the two surgeons between 1997 and 2002. Patients were asked to complete several outcomes questionnaires and were given the opportunity to receive a knee exam performed by their treating surgeon.

Results

Of the 34 eligible patients, 21 agreed to participate. Seventeen patients (19 knees) had greater than 2-year follow-up, with an average follow-up of 11.0 years (range 3.4–16.6 years). Average age at the time of surgery was 9.3 years. Average IKDC, Kujala, and Lysholm scores at follow-up were 82.8 ± 28.9 , 86.6 ± 15.2 , and 83.7 ± 18.6 , respectively. In addition, median Marx and Tegner scores were 5 (range 0–14) and 6 (range 3–8), respectively. Stratifying the Lysholm scores revealed outcomes that were 45.4% “excellent”, 16.7% “good”, 25.0% “fair”, and 16.7% “poor”. In total, 36.8% (7 of 19) of knees underwent at least one subsequent surgical procedure. There were no significant associations between outcome scores and discoid type, meniscal stability, location of instability, or age at time of surgery.

Conclusions

The results of the current study suggest that clinical outcome scores decline over time in patients treated arthroscopically for symptomatic discoid meniscus. Compared to our previous study with 2-year follow-up, there is an increased incidence of knee pain and mechanical/functional limitations. The overall modest, long-term results of this study illustrate the need for improved operative treatments for symptomatic discoid meniscus in children to prevent progressive, long-term clinical decline in these patients.

The percutaneous pie-crusting medial release during arthroscopic procedures of the medial meniscus does neither affect valgus laxity nor clinical outcome

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Purpose

To analyze the effect of percutaneous pie-crusting medial release on valgus laxity before and after surgery and on clinical outcomes.

Methods

Eight-hundred fourteen consecutive patients who underwent an arthroscopic procedure for the medial compartment of the knee were evaluated retrospectively. Sex, age, type of operation (meniscectomy, meniscal repair, and posterior root repair), type of accompanying surgery (none, cartilage procedure, ligament procedure and osteotomy) were documented. Sixty-four patients who underwent percutaneous pie-crusting medial release (release group) and 64 who did not undergo medial release (non-release group) were matched using the propensity score method. Each patient was evaluated for the following variables: degree of valgus laxity on stress radiographs, Lysholm knee score, visual analog scale score, and International Knee Documentation Committee knee score and grade.

Results

At the 24-month follow-up, no significant increase in side-to-side differences in the valgus gap was observed in comparison to the preoperative value in the release group [preoperative, -0.1 ± 1.3 mm; follow-up, -0.1 ± 1.4 mm; (n.s.)]. The follow-up Lysholm score, visual analog scale score and International Knee Documentation Committee knee score and grade were similar between the two groups.

Conclusions

Percutaneous pie-crusting medial release is an additional procedure that can be performed during arthroscopic surgery for patients with a narrow medial joint space of the knee. Percutaneous pie-crusting medial release reduces iatrogenic injury to the cartilage and does not produce any residual valgus laxity of the knee.

Level of evidence

IV.

Hydrogel implant is as effective as osteochondral autologous transplantation for treating focal cartilage knee injury in 24 months

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Purpose

The treatment approach for a patient with knee joint focal cartilage lesion is a difficult decision. To date, there has been no randomized clinical trial involving Hydrogel (Cartiva™). This study evaluated and compared the results of a hydrogel implant (Cartiva™) with autologous osteochondral transplantation (AOT) for treating knee joint focal cartilage lesions.

Methods

Thirty-eight symptomatic patients, with a focal cartilage lesion of Outerbridge grades III or IV, were randomized into one of two groups according to the inclusion and exclusion criteria. Group I underwent AOT, and Group II was treated with a Hydrogel implant. Patients were evaluated preoperatively and again postoperatively at 6, 12, and 24 months using the subjective International Knee Documentation Committee (IKDC) scores, Visual Analog Scale for Pain (VAS Pain), Activities of Daily Living Scale (ADLS) and Lysholm score.

Results

Both groups showed significant improvements from baseline (pre-surgery) to post-surgery (6, 12, and 24 months; $p < 0.05$), but there was no difference between the groups. Regarding complications, prolonged pain was observed in four patients (10.5%), two from each group, with a regression of symptoms within 1 year.

Conclusion

The Hydrogel implant showed similar efficiency as the autologous osteochondral graft for treating knee joint focal cartilage lesions. Both techniques showed satisfactory results compared to preoperative status. The Hydrogel implant was safe and effective, and it provided good stability and joint function at 2-year follow-up.

Level of evidence

I.

Coronal tibial anteromedial tunnel location has minimal effect on knee biomechanics

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Purpose

Studies have found anatomic variation in the coronal position of the insertion site of anteromedial (AM) bundle of the anterior cruciate ligament (ACL) on the tibia, which can lead to questions about tunnel placement during ACL reconstruction. The purpose of this study was to determine how mediolateral placement of the tibial AM graft tunnel in double-bundle ACL reconstructions affects knee biomechanics.

Methods

Two different types of double-bundle ACL reconstructions were performed. The AM tibial tunnel was placed at either the medial or lateral portion of tibial AM footprint. Nine cadaveric knees were tested with the robotic/universal force-moment sensor system with the use of (1) an 89.0-N anterior tibial load at full extension (FE), 30°, 60° and 90° of knee flexion and (2) a combined 7.0-Nm valgus torque and 5.0-Nm internal tibial rotation torque at FE, 15°, 30° and 45° of knee flexion.

Results

Both medial (2.6 ± 1.2 mm) and lateral (1.6 ± 0.9 mm) double-bundle reconstructions reduced the anterior tibial translation (ATT) to less than the intact value (3.9 ± 0.7 mm) at FE. At all other flexion angles, there was no significant difference in ATT between the intact knee and the reconstructions. At FE, the ATT for the medial AM reconstruction was different from that of the lateral AM reconstruction and closer to the intact ACL value.

Conclusion

The coronal tibial placement of the AM tunnel had only a slight effect on knee biomechanics. In patients with differing AM bundle coronal positions, the AM tibial tunnel can be placed anatomically at the native insertion site.

Concomitant injuries may not reduce the likelihood of achieving symmetrical muscle function one year after anterior cruciate ligament reconstruction: a prospective observational study based on 263 patients

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Purpose

A better understanding of patient characteristics and the way common concomitant injuries affect the recovery of muscle function after surgery should help providers to treat patients with anterior cruciate ligament (ACL) injuries. The aim of this study was to determine whether patient characteristics, concomitant injuries and graft choice at ACL reconstruction were associated with symmetrical knee muscle function at one year. The hypothesis was that the presence of concomitant injuries would negatively influence the opportunity to achieve symmetrical knee function at the one-year follow-up.

Methods

Data was extracted from the Swedish National Knee Ligament Register and a rehabilitation outcome register between August 2012 and December 2016. The patients had been evaluated with a battery of tests comprising knee extension and flexion strength, vertical jump, hop for distance and the side-hop test one year after ACL reconstruction. Univariable and multivariable logistic regression analyses were performed with achieving a limb symmetry index (LSI) of $\geq 90\%$ in all tests of muscle function as primary outcome.

Results

A total of 263 patients with a mean age of 26.7 ± 10.3 years were included in the study (47% females). No patient demographic or intra-operative predictors were found to be significant when attempting to predict the achievement of a symmetrical muscle function. Lateral meniscus injury and a patellar tendon autograft reduced the odds of achieving an LSI of $\geq 90\%$ in knee extension strength, OR = 0.49 [(95% CI 0.25–0.97), $p = 0.039$] and OR = 0.30 [(95% CI 0.14–0.67), $p = 0.0033$] respectively. In addition, reduced odds of recovering knee extension strength were found in older patients, OR = 0.76 [(95% CI 0.60–0.98), $p = 0.034$]. A higher pre-injury level of physical activity increased the odds of recovering knee flexion strength, OR = 1.14 [(95% CI 1.01–1.29), $p = 0.037$].

Conclusion

Intra-operatively identified concomitant injuries or graft choice did not affect the likelihood of recovering symmetrical performance in five different tests of muscle function one year after ACL reconstruction. However, fewer than one in four patients achieved an LSI of $\geq 90\%$ in all tests.

Level of evidence

Prospective observational study: Level 2.

Surgeon experience with dynamic intraligamentary stabilization does not influence risk of failure

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Purpose

Studies on dynamic intraligamentary stabilization (DIS) of acute anterior cruciate ligament (ACL) ruptures reported failure rates similar to those of conventional ACL reconstruction. This study aimed to determine whether surgeon experience with DIS is associated with revision rates or patient-reported outcomes. The hypothesis was that more experienced surgeons achieved better outcomes following DIS due to substantial learning curve.

Methods

The authors prospectively enrolled 110 consecutive patients that underwent DIS and evaluated them at a minimum of 2 years. The effects of independent variables (surgeon experience, gender, age, adjuvant procedures, tear location, preinjury Tegner score, time from injury to surgery, and follow-up) on four principal outcomes (revision ACL surgery, any re-operation, IKDC and Lysholm score) were analyzed using univariable and multivariable regressions.

Results

From the 110 patients enrolled, 14 patients (13%) were lost to follow-up. Of the remaining 96 patients, 11 underwent revision ACL surgery, leaving 85 patients for clinical assessment at a mean of 2.2 ± 0.4 years (range 2.0–3.8). Arthroscopic reoperations were performed in 26 (27%) patients, including 11 (11%) revision ACL surgeries. Multivariable regressions revealed: (1) no associations between the reoperation rate and the independent variables, (2) better IKDC scores for ‘designer surgeons’ ($b = 10.7$; CI 4.9–16.5; $p < 0.001$), higher preinjury Tegner scores ($b = 2.5$, CI 0.8–4.2; $p = 0.005$), and younger patients ($b = 0.3$, CI 0.0–0.6; $p = 0.039$), and (3) better Lysholm scores for ‘designer surgeons’ ($b = 7.8$, CI 2.8–12.8; $p = 0.005$) and preinjury Tegner score ($b = 1.9$, CI 0.5–3.4; $p = 0.010$).

Conclusion

Surgeon experience with DIS was not associated with rates of revision ACL surgery or general re-operations. Future, larger-scaled studies are needed to confirm these findings. Patients operated by ‘designer surgeons’ had slightly better IKDC and Lysholm scores, which could be due to better patient selection and/or positively biased attitudes of both surgeons and patients.

Level of evidence

Level II, prospective comparative study.

Dynamic augmentation restores anterior tibial translation in ACL suture repair: a biomechanical comparison of non-, static and dynamic augmentation techniques

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Purpose

There is a lack of objective evidence investigating how previous non-augmented ACL suture repair techniques and contemporary augmentation techniques in ACL suture repair restrain anterior tibial translation (ATT) across the arc of flexion, and after cyclic loading of the knee. The purpose of this work was to test the null hypotheses that there would be no statistically significant difference in ATT after non-, static- and dynamic-augmented ACL suture repair, and they will not restore ATT to normal values across the arc of flexion of the knee after cyclic loading.

Methods

Eleven human cadaveric knees were mounted in a test rig, and knee kinematics from 0° to 90° of flexion were recorded by use of an optical tracking system. Measurements were recorded without load and with 89-N tibial anterior force. The knees were tested in the following states: ACL-intact, ACL-deficient, non-augmented suture repair, static tape augmentation and dynamic augmentation after 10 and 300 loading cycles.

Results

Only static tape augmentation and dynamic augmentation restored ATT to values similar to the ACL-intact state directly postoperation, and maintained this after cyclic loading. However, contrary to dynamic augmentation, the ATT after static tape augmentation failed to remain statistically less than for the ACL-deficient state after cyclic loading. Moreover, after cyclic loading, ATT was significantly less with dynamic augmentation when compared to static tape augmentation.

Conclusion

In contrast to non-augmented ACL suture repair and static tape augmentation, only dynamic augmentation resulted in restoration of ATT values similar to the ACL-intact knee and decreased ATT values when compared to the ACL-deficient knee immediately post-operation and also after cyclic loading, across the arc of flexion, thus allowing the null hypotheses to be rejected. This may assist healing of the ruptured ACL. Therefore, this study would support further clinical evaluation of dynamic augmentation of ACL repair.

Translation and validation of the simplified Chinese version of the anterior cruciate ligament-return to sport after injury (ACL-RSI)

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Purpose

The aim of this study is to obtain a translation and adaptation of the anterior cruciate ligament-return to sport after injury (ACL-RSI) into simplified Chinese and validate the simplified Chinese version.

Methods

Translation and adaptation were performed according to the guidelines of the American Academy of Orthopaedic Surgeons Outcome Committee. A total of 122 patients who were diagnosed with an ACL injury and underwent primary arthroscopic anterior cruciate ligament reconstruction (ACLR) between 2015 and 2016 were included in this study. The simplified Chinese version of the ACL-RSI (SC-ACL-RSI), Knee injury and Osteoarthritis Outcome Score (KOOS), Lysholm score and International Knee Documentation Committee (IKDC) subjective knee form were completed. Psychometric evaluations included score distribution, internal consistency, test–retest reliability, and construct and discriminant validity.

Results

SC-ACL-RSI scores exhibited a normal distribution without ceiling and floor effects. Internal consistency was high (Cronbach's alpha = 0.94). The intraclass correlation coefficient was 0.98, indicating excellent test–retest reliability. SC-ACL-RSI scores were correlated with all KOOS subscales ($r = 0.30$ to 0.69 , $p < 0.001$), the IKDC subjective knee form ($r = 0.46$, $p < 0.001$) and the Lysholm score ($r = 0.56$, $p < 0.001$). The mean scores between patients who returned to the same preinjury level of sport (65.1 ± 14.3) and those who could not return to the same level (51.0 ± 15.0) were significantly different ($p < 0.001$).

Conclusions

The SC-ACL-RSI is a reliable and valid instrument to evaluate the psychological impact of a patient returning to sport after ACLR. It is important to evaluate patients' ability to return to sport after an ACL injury. The information provided by the SC-ACL-RSI will affect decisions regarding treatment and rehabilitation plans, which are more likely to influence clinical outcomes.

Level of evidence

II.

Altered movement during single leg hop test after ACL reconstruction: implications to incorporate 2-D video movement analysis for hop tests

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Purpose

There is a lack of objective factors which can be used in guiding the return to sport (RTS) decision after an anterior cruciate ligament reconstruction (ACLR). The purpose of the current study was to conduct qualitative analysis of the single leg hop (SLH) in patients after ACLR with a simple and clinical friendly method and to compare the possible difference in movement pattern between male and female patients.

Methods

Sixty-five patients performed the single leg hop (SLH) test at 6.8 ± 1.0 months following isolated ACLR. Digital video camcorders recorded frontal and sagittal plane views of the patient performing the SLH. Knee flexion at initial contact (IC), peak knee flexion, knee flexion range of motion (RoM), and knee valgus RoM were calculated. In addition, limb symmetry index (LSI) scores were calculated.

Results

No differences were found in movement pattern between males and females. Movement analysis revealed that males had a decrease in knee flexion at IC ($p = 0.018$), peak knee flexion ($p = 0.002$), and knee flexion RoM ($p = 0.017$) in the injured leg compared to the non-injured leg. Females demonstrated a decrease in peak knee flexion ($p = 0.011$) and knee flexion RoM ($p = 0.023$) in the injured leg compared to the non-injured leg. Average LSI scores were 92.4% for males and 94.5% for females.

Conclusions

Although LSI scores were $> 90\%$, clinical relevant altered movement patterns were detected in the injured leg compared to the non-injured leg. Caution is warranted to solely rely on LSI scores to determine RTS readiness.

Level of evidence

III.

Septic arthritis after arthroscopic posterior cruciate ligament and multi-ligament reconstructions is rare and can be successfully treated with arthroscopic irrigation and debridement: analysis of 866 reconstructions

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Purpose

The purpose of this study was to determine the incidence of septic arthritis following arthroscopic posterior cruciate ligament (PCL) and multi-ligament reconstructions, and to evaluate a treatment regime with sequential arthroscopic irrigation and debridement procedures combined with antibiotic therapy that is focused on retention of the graft.

Methods

Between 2004 and 2016 a total of 866 PCL reconstructions and multi-ligament reconstructions were performed at our institution (408 isolated PCL reconstructions, 458 combined reconstructions). Medical charts of all cases were retrospectively reviewed with regard to the occurrence of septic complications. These cases were analysed with special focus on clinical management, number of reoperations and if the grafts were retained. Further, microbiological findings, postoperative clinical course and available clinical outcome data were evaluated.

Results

Four cases of septic arthritis (0.5%) were identified (follow-up rate 96.5%): two following isolated PCL reconstruction (0.5%), and two following multi-ligament reconstruction (0.4%), respectively. Septic arthritis was successfully treated in all cases with a mean of 2.5 ± 2.4 irrigation and debridement procedures (1–6). In one case of isolated PCL reconstruction, the graft was resected within the fifth irrigation and debridement due to septic loosening of the femoral fixation. All other grafts were retained. With regard to the outcome, all patients were subjectively satisfied with good stability (stress radiographs) in cases of retained grafts.

Conclusion

Postoperative septic arthritis after arthroscopic PCL and complex knee ligament reconstructions is a rare but serious complication. Arthroscopic graft-retaining treatment is recommended, as it is established in ACL surgery. Graft retention can be expected in the majority of the cases.

Level of evidence

Case series, Level 4.

Graft bending angle affects allograft tendon maturity early after anterior cruciate ligament reconstruction

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Purpose

The aim of this study was to clarify the association of the anterior cruciate ligament (ACL) graft bending angle and graft maturity of autograft and allograft tendons using high-resolution MRI.

Methods

Patients with unilateral ACL reconstruction were invited to participate in this study, and they were examined using a 3.0-T MRI scan at 3, 6 and 12 months after the operation. Anatomic single-bundle ACL reconstruction was performed on 48 patients using the trans-portal technique, including 28 with autograft hamstring tendons and 20 with allograft tendons. To evaluate graft healing, the signal/noise quotient (SNQ) was measured in four regions of interest (ROIs) of the femoral tunnel, proximal, midsubstance and distal ACL grafts. The graft bending angle was defined as the angle between the femoral bone tunnel and the line connecting the femoral and tibial tunnel apertures. Graft SNQ and graft bending angle were assessed at 3, 6 and 12 months postoperatively, and the association between SNQ and the average graft bending angle was analyzed.

Results

Generally, the mean graft bending angle of this cohort increased gradually with time. The SNQ value of each graft region increased from 3 to 6 months and then decreased from 6 to 12 months. In the whole cohort, the graft bending angle had a significant positive association with graft SNQ in the femoral tunnel or proximal site. In the allograft subgroup, the graft bending angle had a significant positive association with the graft SNQ in the femoral tunnel or proximal site at 6 months after surgery, while there was no association between the graft bending angle and SNQ at 12 months. In the autograft subgroup, the graft bending angle had a significant positive association with graft SNQ in the femoral tunnel or proximal site at 12 months after surgery.

Conclusion

Generally, the graft bending angle was correlated with a high signal intensity of the proximal graft in the early postoperative period for allograft tendons and in the late postoperative period for autograft tendons. This suggests that the biomechanical effect from the graft bending angle on graft healing may be different for allografts and autografts after ACL reconstruction.

Level of evidence

III.

Microfracture provides better clinical results than debridement in the treatment of acute talar osteochondral lesions using arthroscopic assisted fixation of acute ankle fractures

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Purpose

Ankle arthroscopy is a useful tool for detection and treatment of accompanying intraarticular pathologies in acute ankle fractures. The purpose of this study was to compare the treatment results of talus osteochondral lesions (OLT) with debridement and microfracture in arthroscopy assisted surgery of acute ankle fractures.

Methods

Eleven consecutive patients who were treated with arthroscopic acute debridement and 14 consecutive patients who were treated with arthroscopic acute microfracture in the treatment of ankle fracture were included in the study. All patients were controlled clinically and radiologically in the postoperative period. Ankle pain was evaluated with the visual analog score (VAS), ankle functions were assessed with American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Scale (AOFAS), and osteoarthritic changes were analyzed with Van Dijk score.

Results

There was no significant difference between the groups in terms of age, gender, injury side and trauma mechanism (n.s). Mean time to surgery, fracture healing duration, first weight-bearing and full weight-bearing, follow-up period and Van Dijk score were all similar in both groups (n.s). The AOFAS score and VAS activity score were statistically significantly better in the microfracture group ($p = 0.044$ and $p = 0.001$).

Conclusions

The clinical relevance of the present study is to define the acute treatment of the first osteochondral damage that occurred simultaneously with ankle fracture, to improve postoperative functional outcomes and to prevent post-traumatic osteoarthritis. Both debridement and microfracture yield good functional outcomes in the second year of the treatment. Microfracture ensures significantly more successful clinical results than debridement.

Level of evidence

Level III.

Results and recurrence of pigmented villonodular synovitis of the ankle: does diffuse PVNS with extra-articular extension tend to recur more often?

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Purpose

The aim of this study was to provide the outcomes and to analyze the recurrence of Pigmented Villonodular Synovitis (PVNS) of the ankle joint treated by surgical synovectomy.

Methods

Thirty-one PVNS cases of the ankle, including 5 localized PVNS cases and 26 diffuse PVNS cases, were treated in our institute between 2004 and 2015. The median age was 35 (range 18–63) years. The 5 localized PVNS cases were treated with partial synovectomy (group I); 10 diffuse PVNS cases limited to intra-articular synovium received arthroscopic comprehensive synovectomy (group II); and 16 cases with diffuse PVNS spreading to extra-articular tendon sheaths underwent combined arthroscopic and open synovectomy (group III). Adjuvant radiotherapy was provided in groups II and III. The American Orthopaedic Foot and Ankle Society (AOFAS) score and subjective grading of procedure were used to evaluate the results.

Results

Twenty-seven patients were followed with a median of 54 (range 15–108) months. In the three groups, the average AOFAS score improved from 75 (in all three groups) points preoperatively to 100 (group I), 97 (group II), and 90 points (group III) postoperatively. The rate of good-to-excellent result was 100% in group I and II and 73.3% in group III. Only in group III, recurrence occurred in five cases.

Conclusions

Diffuse PVNS of the ankle can be successfully managed with surgical synovectomy and adjuvant radiotherapy. Radiotherapy is not needed for localized PVNS. The recurrence rate in PVNS patients with extra-articular extension is higher.

Level of evidence

IV.

Endoscopic plantar fascia release via a suprafascial approach is effective for intractable plantar fasciitis

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Purpose

To evaluate the medium-term clinical results of endoscopic plantar fascia release (EPFR) using a suprafascial approach for recalcitrant plantar fasciitis.

Methods

Twenty-four feet of twenty-three patients who underwent EPFR using a suprafascial approach were followed up for more than 2 years using the American Orthopedic Foot and Ankle Society (AOFAS) score. The AOFAS score at final follow-up was compared between patients who participated in athletic activity (group A) and those who were sedentary (group S) and between those with and those without calcaneal spur (group with CS and group without CS, respectively). The ability of patients to return to athletic activity, and if so, the time interval between surgery and return to athletic activity, were investigated in group A. Complications were recorded.

Results

The median follow-up duration was 48 months. The mean AOFAS score in all patients increased significantly between before surgery and final follow-up ($P < 0.001$). The mean score in group A at final follow-up was significantly higher than that in group S ($P < 0.05$). However, there was no significant difference in the mean score at final follow-up between the groups with and without CS. In group A, all patients could return to athletic activity after a median 8 weeks. Injury to the first branch of the lateral plantar nerve occurred in three feet.

Conclusion

EPFR using a suprafascial approach was effective for recalcitrant plantar fasciitis. However, the prognosis of sedentary patients was inferior to that of patients engaged in athletic activity.

Level of evidence

IV.

Concurrent arthroscopic osteochondral lesion treatment and lateral ankle ligament repair has no substantial effect on the outcome of chronic lateral ankle instability

Dong Jiang, Yin-fang Ao, Chen Jiao, Xing Xie, Lin-xin Chen, Qin-wei Guo, Yue-lin Hu

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Purpose

The purpose of the study was to evaluate the effect of concurrent arthroscopic osteochondral lesion (OCL) treatment and lateral ankle ligament repair on the outcome of chronic lateral ankle instability. It was hypothesized that the arthroscopic OCL treatment might have some negative effect on the outcome of chronic lateral ankle instability (CLAI) by compromising the rehabilitation program.

Methods

Ankle arthroscopy and anatomic lateral ankle ligament repair with suture anchors were performed for 70 patients with CLAI between 2010 and 2012. Thirty-four patients (group A), 20 males and 14 females with a median age of 30(14–54) years, received arthroscopic abrasion, curettage, drilling, or microfracture for OCLs. The splint was removed daily for joint motion exercises beginning at post-operative 2 weeks and full weight bearing was allowed between post-operative week 8 and 12. The other 36 patients (group B) with no combined OCL were followed up as controls. Pre-operative and post-operative visual analog scale (VAS) scores, American Orthopaedic Foot and Ankle Society (AOFAS) scores, Tegner scores, sprain recurrence, ankle stability, and range of motion (ROM) were evaluated and compared.

Results

The median follow-up was 46.5 (38–55) months and 44.5 (38–56) months for group A and group B, respectively. The median post-operative VAS score, AOFAS score, and Tegner score were improved from the pre-operative level for both groups with good-to-excellent results for more than 90% patients. No significant difference was found between the two groups for the subjective scores and satisfaction rate (n.s.). Recurrent sprain was found among nine patients(26.5%) of the group A and five patients (13.9%) of the group B (n.s.). The incidence of the ROM restriction of group A was significantly higher than in group B (23.5 vs 5.6%, $P = 0.043$).

Conclusions

The concurrent arthroscopic treatment of OCL with lateral ankle ligament repair demonstrated no substantial negative effect on the overall mid-term outcome of the patients with CLAI except for a potential risk of ROM restriction.

Level of evidence

III.

Arthroscopic treatment combined with the ankle stabilization procedure is effective for sinus tarsi syndrome in patients with chronic ankle instability

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Purpose

This study aimed to investigate the results of arthroscopic treatment combined with ankle stabilization procedure for sinus tarsi syndrome (STS) in patients with chronic ankle instability (CAI).

Methods

A total of 57 patients (31 males and 26 females, average age 29.9 ± 8.4 years ranging from 15 to 52 years) with STS and CAI who accepted operation from 2013 to 2015 were included in this retrospective study. Surgical procedures included thorough tarsal sinus debridement and repair or reconstruction of lateral ankle ligaments according to the quality of ligaments. American Orthopedic Foot and Ankle Society (AOFAS) score, Karlsson score, and Tegner score were evaluated preoperatively and at final follow-up.

Results

All the patients accepted thorough debridement of tarsal sinus. Of these, 53 patients (93.0%) had an arch structure between the posterior subtalar joint and the middle subtalar joint. Further, 54 patients accepted lateral ankle ligament repair, and 3 patients accepted ligament reconstruction. A total of 40 patients were followed up with an average time of 30.7 months. The modified AOFAS score increased from 62.5 (27–90) to 93 (67–100), the Karlsson score increased from 57 (30–82) to 90 (55–100), and the Tegner score increased from 1 (1–3) to 5 (1–8).

Conclusions

Arthroscopic treatment combined with the ankle stabilization procedure could get satisfactory results for STS in patients with CAI. The arch structure composed by medial calcaneal component of the medial root of the inferior extensor retinaculum (MCC) might contribute to the pathological mechanism of STS.

Level of evidence

IV.

Endoscopic shelf acetabuloplasty can improve clinical outcomes and achieve return to sports-related activity in active patients with hip dysplasia

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Purpose

To investigate clinical outcomes and return to sports-related activity following endoscopic shelf acetabuloplasty combined with labral repair in the treatment of the active patients with developmental dysplasia of the hip (DDH).

Methods

Between 2011 and 2013, 32 patients (36 hips; 11 males and 21 females; 11 right 17 left 4 bilateral; median age 28.5, range 12–51 years), who underwent endoscopic shelf acetabuloplasty combined with labral repair and met the inclusion criteria were enrolled in this study. There was a minimum follow-up of 2 years (average 32.3 ± 3 months, range 24–48 months). Patient-reported outcome (PRO) scores including the modified Harris Hip Score (MHHS) and Non-Arthritis Hip Score (NAHS) were obtained preoperatively and at final follow-up for the assessment of surgical outcomes.

Results

The mean MHHS significantly improved from 68.4 ± 14.3 (range 23.1–95.7) preoperatively to 94.5 ± 8.5 (range 66–100) at final follow-up ($p = 0.001$). Similarly, the NAHS also significantly improved from 51.3 ± 11.9 (range 23–76) preoperatively to 73.0 ± 7.4 (range 44–80) at final follow-up ($p = 0.001$). The mean LCE angle significantly increased postoperatively but partially decreased at final follow-up (mean preoperative versus postoperative versus final follow-up: 16.0 range 5–24, versus 40.1 range 27–58, versus 30.1 range 20–41. $p = 0.001$, respectively). There were 3 patients who returned to a higher activity level, 20 patients who returned to the same activity level, and 6 patients who returned to a lower activity level. The mean period from surgery to return to play was 9.0 ± 3.5 months (range 5–18).

Conclusion

Endoscopic shelf acetabuloplasty provides promising clinical outcomes and return to sports-related activity for active patients with DDH.

Level of evidence

Level IV.

Hip capsular thickness correlates with range of motion limitations in femoroacetabular impingement

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Purpose

Femoroacetabular impingement (FAI) is a clinical entity of the hip causing derangements in range of motion, pain, gait, and function. Computer-assisted modeling and clinical studies suggest that patients with FAI have increased capsular thickness compared to those without. A retrospective chart review was performed to assess relationships between capsular thickness, hip range of motion, and demographic factors in patients with FAI.

Methods

Local Research Ethics Board approval was obtained to extract electronic medical records for 188 patients at a single institution who had undergone hip arthroscopy. Procedures were performed from 2009 to 2017 by a single, fellowship-trained, board-certified sports medicine orthopaedic surgeon. Inclusion criteria were preoperative hip range of motion testing, positive clinical impingement testing, and magnetic resonance imaging (MRI) of the affected hip. Patient demographics, hip range of motion, and time to surgery were recorded. MRIs were reviewed by a board-certified musculoskeletal radiologist blinded to clinical data. Maximum thickness of the anterior hip capsule was measured in axial, axial oblique, and sagittal oblique sequences. Anterior capsular thickness was also measured at the level of the femoral head–neck junction in axial sequences (axial midline).

Results

Axial midline capsular thickness was negatively correlated with hip flexion ($r = -0.196$, $p = 0.0042$) and internal rotation ($r = -0.143$, $p = 0.0278$). Significant differences were seen between genders in axial midline thickness (5.3 ± 1.4 mm males/ 4.8 ± 1.3 mm females, $p = 0.0079$), flexion ($113^\circ \pm 18^\circ$ males/ $120^\circ \pm 17^\circ$ females, $p = 0.0029$), and internal rotation ($23^\circ \pm 13^\circ$ males/ $29^\circ \pm 12^\circ$ females, $p = 0.0155$). Significant differences also existed between side affected in flexion ($116^\circ \pm 17^\circ$ right/ $119^\circ \pm 17^\circ$ left, $p = 0.0396$) and internal rotation ($26^\circ \pm 12^\circ$ right/ $29^\circ \pm 13^\circ$ left, $p = 0.0029$). Positive correlation was observed between axial oblique capsular thickness and flexion ($r = 0.2345$) ($p = 0.0229$).

Conclusions

Increased anterior hip capsular thickness at the femoral head–neck correlates with limitations in hip range of motion in FAI. The strength of this relationship may be affected between pathologies, genders, and affected side. Pathologic thickening of the hip capsule may contribute to restricted hip mobility on clinical examination, and elucidation of this relationship may provide guidance into capsular management during hip arthroscopy.

Level of evidence

4, retrospective case series.

High Degree of Variability in Reporting of Clinical and Patient-Reported Outcomes After Hip Arthroscopy

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Background Hip arthroscopy for the treatment of intra-articular pathology is a rapidly expanding field. Outcome measures should be reported to document the efficacy of arthroscopic procedures; however, the most effective outcome measures are not established.

Purpose To evaluate the variability in outcomes reported after hip arthroscopy and to compare the responsiveness of patient-reported outcome (PRO) instruments.

Study Design Systematic review.

Methods We reviewed primary hip arthroscopy literature between January 2011 and September 2016 using the Preferred Reporting Items for Systematic Reviews and Meta-analyses guidelines. Patient and study characteristics were recorded. Pre- and postoperative means and SDs of PROs were recorded from articles that used 2 or more PROs with a 1-year minimum follow-up. From this subset of articles, we compared the responsiveness between PRO instruments using the effect size, standard response mean, and relative efficiency.

Results We identified 130 studies that met our inclusion/exclusion criteria, which totaled 16,970 patients (17,511 hips, mean age = 37.0 years, mean body mass index = 25.9 kg/m²). Radiographic measures were reported in 100 studies. The alpha angle and center-edge angle were the most common measures. Range of motion was reported in 81 of 130 articles. PROs were reported in 129 of 130 articles, and 21 different PRO instruments were identified. The mean number of PROs per article was 3.2, and 78% used 2 or more PROs. The most commonly used PRO was the modified Harris Hip Score, followed by the Hip Outcome Score (HOS)—Activities of Daily Living, HOS-Sport, visual analog scale, and Nonarthritic Hip Score (NAHS). The 2 most responsive PRO tools were the International Hip Outcome Tool (iHOT)—12 and the NAHS.

Conclusion Outcomes reporting is highly variable in the hip arthroscopy literature. More than 20 different PRO instruments have been used, which makes comparison across studies difficult. A uniform set of outcome measures would allow for clearer interpretation of the hip arthroscopy literature and offer potential conclusions from pooled data. On the basis of our comparative responsiveness results and previously reported psychometric properties of the different PRO instruments, we recommend more widespread adoption of the iHOT PROs instruments to assess hip arthroscopy outcomes.

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19 Opioid Consumption After Knee Arthroscopy

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https://journals.lww.com/jbjsjournal/Abstract/2018/10030/Opioid_Consumption_After_Knee_Arthroscopy.1.aspx

Background

The opioid epidemic in the United States has placed increased pressure on physicians to engage in responsible opioid prescribing practices. However, surgeons currently have little information to guide their postoperative prescription decision-making. The purpose of this study was to assess opioid consumption after knee arthroscopy and identify preoperative factors that may predict higher opioid usage.

Methods

A prospective observational study of 221 patients was conducted in patients undergoing outpatient knee arthroscopy for meniscal repair, partial meniscectomy, debridement, chondroplasty, or loose body removal. Participants recorded their daily opioid consumption in a postoperative pain diary. Total opioid consumption was calculated from counts of remaining pills at the 2-week and 6-week postoperative office visits. Variables, including age, sex, body mass index, smoking status, alcohol consumption, preoperative pain severity and duration, preoperative opioid usage, Patient-Reported Outcomes Measurement Information System (PROMIS) scores, and the Connor-Davidson Resilience Scale, were evaluated for an association with opioid consumption.

Results

Total opioid consumption ranged from 0 to 188 pills, with a median of 7 pills (hydrocodone 5-mg equivalents). Forty-six percent of patients took ≤ 5 pills, 59% took ≤ 10 pills, and 81% took ≤ 20 pills. Fifty-six percent of patients had discontinued opioid usage by the third postoperative day. Eighty-eight percent of patients had surplus opioid medication at the time of the final follow-up. Patients undergoing meniscal repair, smokers, and those taking preoperative opioids were significantly more likely to take ≥ 20 pills ($p < 0.05$).

Conclusions

The median number of pills taken after knee arthroscopy is 7, with the majority of patients consuming ≤ 20 pills. Meniscal repair, smoking, and preoperative opioid usage were associated with higher postoperative opioid consumption.

Level of Evidence

Prognostic Level IV. See Instructions for Authors for a complete description of levels of evidence.

[BACK](#)