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# Content July 2020

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### Upper extremity

Arthroscopy, Volume 36, Issue 9

- The Effect of Patient Characteristics and Comorbidities on the Rate of Revision Rotator Cuff Repair
- Proximal Humerus and Ilium are Reliable Sources of Bone Marrow Aspirates for Biologic Augmentation during Arthroscopic Surgery
- What Is the Effect of the Ulnar-Plus Variance on the Outcomes of Arthroscopic Repair of the Peripheral Ulnar-Side Triangular Fibrocartilage Complex Tear?
- Arthroscopic Bankart Repair Versus Conservative Management for First-Time Traumatic Anterior Shoulder Instability: A Systematic Review and Meta-analysis

Journal of Shoulder and Elbow Surgery (JSES), Volume 29, issue 9

- The effect of preoperative education on opioid consumption in patients undergoing arthroscopic rotator cuff repair: a prospective, randomized clinical trial—2-year follow-up
- Dexamethasone added to levobupivacaine prolongs the duration of interscalene brachial plexus block and decreases rebound pain after arthroscopic rotator cuff repair.
- Effectiveness of supervised physiotherapy after arthroscopic rotator cuff reconstruction: a randomized controlled trial.
- The impact of workers' compensation on recovery after biceps tenodesis.
- Interobserver reliability of the rotator cable and its relationship to rotator cuff congruity.
- Clinical midterm results of arthroscopic rotator cuff repair in patients older than 75 years.

American Journal of Sports Medicine, Volume 48, Issue 11

- Effect of Posterior Glenoid Bone Loss and Retroversion on Arthroscopic Posterior Glenohumeral Stabilization
- Location of the Suture Anchor in Hill-Sachs Lesion Could Influence Glenohumeral Cartilage Quality and Limit Range of Motion After Arthroscopic Bankart Repair and Remplissage
- An Arthroscopic “Inlay” Bristow Procedure With Suture Button Fixation for the Treatment of Recurrent Anterior Glenohumeral Instability: 3-Year Follow-up
- Minimal Clinically Important Difference, Substantial Clinical Benefit, and Patient Acceptable Symptomatic State After Arthroscopic Rotator Cuff Repair
- Effects of a Thermosensitive Antiadhesive Agent on Single-Row Arthroscopic Rotator Cuff Repair
- Quantitative Magnetic Resonance Imaging UTE-T2\* Mapping of Tendon Healing After Arthroscopic Rotator Cuff Repair: A Longitudinal Study

Bone and Joint Journal, Volume 102 - Issue 9

- What happens to the long head of the biceps tendon after arthroscopic rotator cuff repair?

## **Lower Extremity**

Arthroscopy, Volume 36, Issue 9

- Return to Sport and Patient Satisfaction After Meniscal Allograft Transplantation
- Preoperative Opioid Usage, Male Sex, and Preexisting Knee Osteoarthritis Impacts Opioid Refills After Isolated Arthroscopic Meniscectomy: A Population-Based Study`
- Clinical Outcomes and the Failure Rate of Revision Anterior Cruciate Ligament Reconstruction Were Comparable Between Patients Younger Than 40 Years and Patients Older Than 40 Years: A Minimum 2-Year Follow-Up Study
- Supplement Use in Patients Undergoing Anterior Cruciate Ligament Reconstruction: A Systematic Review
- Hip Arthroscopy and Borderline Developmental Dysplasia of the Hip: A Systematic Review

Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA), Volume 28, Issue 9

- Subspinal impingement: clinical outcomes of arthroscopic decompression with one year minimum follow up.
- Arthroscopic anterior inferior iliac spine decompression does not alter postoperative muscle strength.
- Treatment strategies for ischiofemoral impingement: a systematic review.

American Journal of Sports Medicine (AJSM), Volume 48, Issue 11

- Early Surgical Repair of Medial Meniscus Posterior Root Tear Minimizes the Progression of Meniscal Extrusion: 2-Year Follow-up of Clinical and Radiographic Parameters After Arthroscopic Transtibial Pull-out Repair
- Can We Eliminate Opioid Medications for Postoperative Pain Control? A Prospective, Surgeon-Blinded, Randomized Controlled Trial in Knee Arthroscopic Surgery
- Prospective Single-Blinded Randomized Controlled Trial Comparing Pericapsular Injection Versus Lumbar Plexus Peripheral Nerve Block for Hip Arthroscopy

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## Upper extremity

[Arthroscopy, Volume 36, Issue 9, p2380-2388](#)

### **The Effect of Patient Characteristics and Comorbidities on the Rate of Revision Rotator Cuff Repair**

O'Donnell, E. A., Fu, M. C., White, A. E., Taylor, S. A., Dines, J. S., Dines, D. M., ... Gulotta, L. V.

<https://doi.org/10.1016/j.arthro.2020.05.022>

#### **Purpose**

To describe the national rates of failed primary rotator cuff repair (RCR) requiring revision repair, using numerous patient characteristics previously defined in orthopaedic literature, including smoking history, diabetes mellitus (DM), hyperlipidemia (HLD), vitamin D deficiency, and osteoporosis to determine which factors independently affect the success of primary RCR.

#### **Methods**

A combined public and private national insurance database was searched from 2007 to 2016 for all patients who underwent RCR. Current Procedural Terminology codes were used to identify RCRs. Laterality modifiers for the primary surgery were used to identify subsequent revision RCRs. All patients who did not have a linked laterality modifier for the RCR Current Procedural Terminology code were excluded from the study. Basic demographics were recorded. International Classification of Diseases Ninth Revision codes were used to identify patient characteristics including Charlson Comorbidity Index, smoking status, DM, obesity, HLD, vitamin D deficiency, and osteoporosis. Patient age categorized as <60, 60-69, 70-74, or 75+ years old. Dichotomous data were analyzed with  $\chi^2$  testing. Multivariable logistic regression was used to characterize independent associations with revision RCR.

#### **Results**

Included in the study were 41,467 patients (41,844 shoulders, 52.7% male patients) who underwent primary arthroscopic RCR. Of all arthroscopic RCRs, 3072 patients (3463 shoulders, 53.5% male patients) underwent revision RCR (8.38%). In both primary and revision RCR, patients age 60 to 69 years were most prevalent, accounting for 38.4% and 37.6% of the cohorts, respectively. The average time from primary RCR to revision was 414.9 days (median 214.0 days). Increasing age and male sex (odds ratio [OR] 1.10,  $P = .019$ , 95% confidence interval [CI] 1.02-1.19) were significantly predictive of revision RCR. Of the remaining patient characteristics, smoking most strongly predicted revision RCR (OR 1.36,  $P < .001$ , CI 1.23-1.49). Obesity (OR 1.32,  $P < .001$ , CI 1.21-1.43), hyperlipidemia (OR 1.09,  $P = .032$ , CI 1.01-1.18), and vitamin D deficiency (OR 1.18,  $P < .001$ , CI 1.08-1.28) also increased risk of revision RCR significantly. DM was found to be protective against revision surgery (OR 0.84,  $P < .001$ , CI 0.76-0.92). Overall comorbidity burden as measured by the Charlson Comorbidity Index was not predictive of revision RCR.

#### **Conclusions**

Smoking, obesity, vitamin D deficiency, and HLD are shown to be independent risk factors for failure of primary RCR requiring revision RCR. However, despite the suggestions of previous studies, DM, osteoporosis, and overall comorbidity burden did not demonstrate independent associations in this study.

#### **Level of Evidence**

IV, Case Series

[BACK](#)

## **Proximal Humerus and Ilium are Reliable Sources of Bone Marrow Aspirates for Biologic Augmentation during Arthroscopic Surgery**

Otto, A., Muench, L. N., Kia, C., Baldino, J. B., Mehl, J., Dyrna, F., ... Mazzocca, A. D.

<https://doi.org/10.1016/j.arthro.2020.06.009>

### **Purpose**

The purpose of this study was to evaluate the number of colony-forming units (CFUs) derived from concentrated bone marrow aspirates (BMAs) that were processed following arthroscopic harvest from either the proximal humerus or the body of the ilium during biologic augmentation of the rotator cuff and acetabular labral repairs.

### **Methods**

Between November 2014 and January 2019, BMA was harvested from the proximal humerus (n = 89) and the body of the ilium (n = 30) during arthroscopic surgery. Following concentration of the aspirate, a 0.5-mL aliquot was further processed and the number of nucleated cells (NC) was counted. Each aliquot was cultured until CFUs were quantifiable. Fluorescence-activated cell sorting analysis and quantitative polymerase chain reaction was performed to confirm presence of mesenchymal stem cells. BMA harvest sites were prospectively assessed and evaluated for differences in age, sex, volume of aspirated BM, and CFUs per milliliter of BMA.

### **Results**

The prevalence ( $38.57 \pm 27.92$  ilium vs.  $56.00 \pm 25.60$  humerus CFUs per  $10^6$  nucleated cells) and concentration ( $979.17 \pm 740.31$  ilium vs.  $1,516.62 \pm 763.63$  humerus CFUs per 1.0 mL BMA) of CFUs was significantly higher ( $P < .001$ , respectively) for BMA harvested from the proximal humerus. Additionally, the estimated total number of cells was significantly higher ( $P = .013$ ) in BMA from the proximal humerus ( $97,529.00 \pm 91,064.01$  ilium vs.  $130,552.4 \pm 85,294.2$  humerus). There was no significant difference between groups regarding BMA volume ( $91.67 \pm 18.77$  ilium vs.  $85.63 \pm 35.61$  humerus mL;  $P = .286$ ) and NC count ( $24.01 \pm 5.13$  ilium vs.  $27.07 \pm 6.28$  humerus  $\times 10^6$  per mL BMA;  $P = .061$ ). The mean age was significantly lower ( $P < .001$ ) in patients with BMA being harvested from the ilium ( $30.18 \pm 7.63$  ilium vs.  $56.82 \pm 7.08$  humerus years). Patient sex and age had no significant influence on cellular measures within groups ( $P > .05$ , respectively).

### **Conclusion**

Both proximal humerus and the body of the ilium can be considered reliable sources of bone marrow aspirate for the use in biologic augmentation during their respective arthroscopic surgery. Samples of bone marrow aspirate from the proximal humerus yielded a significantly higher amount of CFUs when compared with samples of BMA obtained from the ilium.

### **Level of Evidence:**

Level II- prospective laboratorial study.

## **What Is the Effect of the Ulnar-Plus Variance on the Outcomes of Arthroscopic Repair of the Peripheral Ulnar-Side Triangular Fibrocartilage Complex Tear?**

Kwon, B. C., Lee, J. H., & Lee, S. Y.

doi:10.1016/j.arthro.2020.05.012

### **Purpose:**

To compare the outcomes of arthroscopic repair of peripheral ulnar-side triangular fibrocartilage complex (TFCC) tears between patients with and without ulnar-plus variance (UPV) and to identify factors associated with index surgery failure in these patients.

### **Methods:**

We retrospectively analyzed 50 consecutive patients who underwent arthroscopic repair of peripheral ulnar-side TFCC tears from June 2014 to February 2018. We selected patients who were aged at least 18 years and underwent arthroscopic repair of peripheral ulnar-side TFCC tears. We excluded those with a fractured or dislocated wrist, ulnar impaction syndrome, degenerative or inflammatory arthritis of the wrist, or neurologic conditions that affect upper-extremity function, as well as those who received less than 12 months' follow-up. We evaluated the patients with a visual analog scale for pain in 3 domains (overall, with hard work, and at rest), the Patient-rated Wrist Evaluation, range of motion, and grip strength. Clinical outcomes and arthroscopic findings were compared between patients with and without UPV (UPV group and non-UPV group, respectively). We calculated the relative risk and 95% confidence interval for younger age (<30 years), sex, UPV, and coexisting degenerative central TFCC tear (type 2 tear) to determine the risk factors for arthroscopic repair failure.

### **Results:**

No significant differences were noted between the 2 groups regarding visual analog scale pain and Patient-rated Wrist Evaluation scores and rates of excellent or improved outcomes ( $P > .05$ ). Arthroscopic repair failure was found in 4 patients. A coexisting type 2 TFCC tear was the only significant risk factor (relative risk, 49.5; 95% confidence interval, 2.94-83.96;  $P = .007$ ) for arthroscopic repair failure.

### **Conclusions:**

UPV did not significantly affect the outcomes of arthroscopic repair of peripheral ulnar-side TFCC tears. However, coexisting type 2 TFCC tears significantly increased the risk of index surgery failure in these patients.

### **Level of Evidence:**

Level IV, prognostic study.

## **Arthroscopic Bankart Repair Versus Conservative Management for First-Time Traumatic Anterior Shoulder Instability: A Systematic Review and Meta-analysis**

Hurley, E. T., Manjunath, A. K., Bloom, D. A., Pauzenberger, L., Mullett, H., Alaia, M. J., & Strauss, E. J.

<https://doi.org/10.1016/j.arthro.2020.04.046>

### **Purpose**

To perform a meta-analysis of the current evidence in the literature comparing arthroscopic Bankart repair versus conservative management for first-time anterior shoulder dislocation.

### **Methods**

A literature search of the MEDLINE, Embase, and Cochrane Library databases was performed based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) guidelines. Prospective studies comparing arthroscopic Bankart repair versus conservative management as treatment for first-time anterior shoulder dislocation were included. Recurrence, further treatment, and return to play were compared, with all statistical analysis performed using Review Manager, version 5.3.  $P < .05$  was considered statistically significant.

### **Results**

Ten prospective studies with 569 patients were included. Arthroscopic Bankart repair resulted in a lower rate of total recurrent instability (9.7% vs 67.4,  $I^2 = 0$ ,  $P < .0001$ ) and further surgical treatment for anterior shoulder instability (5.9% vs 46.7%,  $I^2 = 0$ ,  $P < .0001$ ). Additionally, arthroscopic Bankart repair resulted in a higher rate of return to play (92.8% vs 80.8%,  $I^2 = 0$ ,  $P = .002$ ).

### **Conclusions**

Arthroscopic Bankart repair resulted in a 7-fold lower recurrence rate and a higher rate of return to play than conservative management. Thus, arthroscopic Bankart repair may be advisable to perform routinely in patients with first-time dislocation who participate in sports.

### **Level of Evidence**

Level II, systematic review of Level I and II studies

**The effect of preoperative education on opioid consumption in patients undergoing arthroscopic rotator cuff repair: a prospective, randomized clinical trial—2-year follow-up**

Cheesman, Q., DeFrance, M., Stenson, J. et al.

DOI: <https://doi.org/10.1016/j.jse.2020.04.036>

**Background**

With the recent opioid epidemic in the United States, measures by both government and medical providers are being taken to decrease the opioid dependence rate. Different methods have been proposed, including patient education and multimodal pain therapies. The purpose of this study was to determine whether preoperative opioid education reduces the risk of opioid dependence at 2 years following arthroscopic rotator cuff repair (ARCR).

**Methods**

This study was a 2-year follow-up of the 2018 Neer Award study that demonstrated the use of preoperative opioid education as a means to reduce postoperative opioid consumption after ARCR at 3-month follow-up. This was a prospective, single-center, single-blinded, parallel-group, 2-arm, randomized clinical trial with a 1:1 allocation ratio. To study the effect of preoperative opioid education on opioid dependence at 2 years, we randomized patients into 2 cohorts, a study cohort and a control cohort. Data were obtained with a review of prescription data—monitoring software and a patient telephone interview.

**Results**

Opioid education ( $P = .03$ ; odds ratio, 0.37; 95% confidence interval, 0.14-0.90) was found to be an independent factor that is protective against opioid dependence. Study patients had a lower rate of opioid dependence (11.4%, 8 of 50) than control patients (25.7%, 18 of 50) ( $P = .05$ ). Significantly fewer prescriptions were filled by study patients (mean, 2.9) than by control patients (mean, 6.3) ( $P = .03$ ). Additionally, fewer pills were consumed by study patients (median, 60; interquartile range [IQR], 30, 132) than by control patients (median, 120; IQR, 30, 340) ( $P = .10$ ). Finally, fewer morphine milligram equivalents were consumed by study patients (median, 375; IQR, 199, 1496) than by control patients (median, 725; IQR, 150, 2190) ( $P = .27$ ).

**Conclusion**

Our study found that patients who were preoperatively educated on opioid use were less likely to become opioid dependent at 2-year follow-up. Therefore, we demonstrated that opioid education does impart significant long-term benefits to patients undergoing ARCR.

**Level of evidence**

Level I, Randomized Controlled Trial



## **Dexamethasone added to levobupivacaine prolongs the duration of interscalene brachial plexus block and decreases rebound pain after arthroscopic rotator cuff repair.**

Morita, S., Oizumi, N., Suenaga, N., et al.

DOI: <https://doi.org/10.1016/j.jse.2020.04.019>

### **Background**

It has been reported that the addition of dexamethasone to interscalene brachial plexus block (ISBPB) prolongs the duration of the block effect. However, there have been no studies focusing on the effects of dexamethasone on rebound pain after the block effect has worn off. The aim of this study was to investigate the effect on postoperative pain when dexamethasone was added to ISBPB for arthroscopic rotator cuff repair (ARCR).

### **Methods**

In this multicenter, single-blinded, and randomized controlled study, 54 patients (33 males, 21 females) who received ARCR were randomly assigned to group L (ISBPB with 20 cc of 0.25% levobupivacaine; 21 patients) or group LD (ISBPB with 20 cc of 0.25% levobupivacaine + 3.3 mg dexamethasone; 33 patients). The primary outcome was the visual analog scale (VAS) for pain after the block effect had worn off. Secondary outcomes were the duration of analgesia, the time to the first request for additional analgesic, the number of additional doses of analgesic, and complications.

### **Results**

The VAS scores on postoperative days 0 and 1 were significantly lower in group LD than group L ( $P = .005, .035$ ). This indicated that the rebound pain was relieved in group LD. After postoperative day 1, there was no significant difference in VAS score ( $P = .43$  and  $.19$  for days 2 and 3, respectively). The duration of analgesia was significantly longer in group LD than group L ( $P < .001$ ). The time to the first request for additional analgesic was significantly longer in group LD than group L ( $P < .001$ ). The number of additional doses of analgesic was significantly lower in group LD ( $P < .001$ ).

### **Conclusion**

In ARCR, the addition of dexamethasone to levobupivacaine not only prolongs the duration of ISBPB but also relieves rebound pain after the block effect wears off.

### **Level of evidence**

Level I , Randomized Controlled Trial

## **Effectiveness of supervised physiotherapy after arthroscopic rotator cuff reconstruction: a randomized controlled trial.**

Karppi, P., Ryösa, A., Kukkonen, J., et al.

DOI: <https://doi.org/10.1016/j.jse.2020.04.034>

### **Background**

The benefit of supervised physiotherapy after rotator cuff surgery is unclear. The aim of this randomized controlled trial was to assess the effectiveness of supervised physiotherapy after arthroscopic rotator cuff reconstruction.

### **Methods**

Eighty patients with full-thickness supraspinatus tendon tears were randomly assigned to either supervised physiotherapy or home exercises only. The primary outcome measure was the Constant score at 12 months after surgery.

### **Results**

A total of 70 patients were available for analyses at 1-year follow-up. There were no statistically significant differences in the primary outcome between the treatment groups.

### **Conclusion**

Supervised physiotherapy after arthroscopic rotator cuff reconstruction does not provide additional benefit compared with home exercises alone at 1-year follow-up.

### **Level of evidence**

Level II, Randomized Controlled Trial

## **The impact of workers' compensation on recovery after biceps tenodesis.**

Wagner, E.R., Woodmass, J.M., Chang, M.J., et al.

DOI: <https://doi.org/10.1016/j.jse.2020.01.095>

### **Background**

There remains a paucity of studies examining the impact of workers' compensation (WC) on a variety of outcomes after biceps tenodesis. The purpose of this study was to compare the postoperative recovery curves after biceps tenodesis in patients with and without WC claims.

### **Methods**

Using the Surgical Outcomes System database, we assessed the postoperative recovery outcomes of all patients who had outcomes recorded at least 6 months after isolated biceps tenodesis for the treatment of a diagnosis of biceps tendinitis, stratified by WC status. The outcomes analyzed included visual analog scale, American Shoulder and Elbow Surgeons, VR-12 (Veterans RAND 12 Item Health Survey) mental and physical, Simple Shoulder Test, and Single Assessment Numeric Evaluation scores.

### **Results**

Overall, 139 patients with WC claims underwent isolated biceps tenodesis vs. 786 patients without WC claims. Demographic characteristics and comorbidities were similar in the 2 groups. Patients without WC claims had significantly improved visual analog scale, VR-12, American Shoulder and Elbow Surgeons, Single Assessment Numeric Evaluation, and Simple Shoulder Test scores at all time points after 3 months and 1 year compared with patients with WC claims.

### **Conclusions**

On analysis of patients' recovery after isolated biceps tenodesis, WC claims led to significantly worse pain and functional outcomes at every time point of analysis (3, 6, 12, and 24 months). Furthermore, patients with WC claims had worse preoperative-to-postoperative improvements in most outcomes. This information can be used to educate surgeons and patients on postoperative expectations, as well as to perform analyses focused on health economics, value, and policy.

### **Level of evidence**

Level III

## **Interobserver reliability of the rotator cable and its relationship to rotator cuff congruity.**

Davis, D.E., Lee, B., Aleem, A., et al.

DOI: <https://doi.org/10.1016/j.jse.2020.01.096>

### **Background**

This study evaluated the presence of the rotator cable intraoperatively and compared its prevalence according to both patient age and rotator cuff integrity. The study hypothesis was that the cable would be more prevalent in older patients and patients with partial-thickness tears.

### **Methods**

Patients who were undergoing shoulder arthroscopy and were aged at least 16 years were included in this study, whereas those who had a cuff tear of more than 1 tendon or who had a video with poor visualization of the rotator cuff insertion were excluded. Intraoperative videos were collected, deidentified, and distributed to 7 orthopedic surgeons to define rotator cable and cuff tear characteristics.

### **Results**

A total of 58 arthroscopic videos (average patient age, 46 years; range, 16-75 years) were evaluated. The observers were in the most agreement on identifying the presence of a cable, with a  $\kappa$  coefficient of 0.276. Patients with the rotator cable were significantly older than those without it (mean age, 52.1 years vs. 42.5 years;  $P = .008$ ), and a positive and significant correlation was found between rotator cable presence and increasing patient age ( $r = 0.27$ ,  $P = .04$ ). A significant association was noted between tear degree and cable presence ( $P = .002$ ). There was no significant association with cable presence in patients with a full-thickness tear.

### **Conclusions**

In this study, an intraoperative analysis was performed to define the presence of the rotator cable and correlate this with both patient age and rotator cuff integrity. The hypothesis was confirmed in that patients older than 40 years had a significantly higher rotator cable prevalence.

### **Level of evidence**

Level III

## **Clinical midterm results of arthroscopic rotator cuff repair in patients older than 75 years.**

Plachel, F., Siegert, P., Rüttershoff, K., et al.

DOI: <https://doi.org/10.1016/j.jse.2020.01.093>

### **Background**

The effect of patient age on functional improvement after arthroscopic rotator cuff repair (ARCR) is still a matter of debate. The purpose of this study was to evaluate the clinical midterm results after ARCR in patients who were 75 years or older at the time of surgery.

### **Methods**

A total of 31 shoulders in 30 patients older than 75 years at the time of surgery underwent ARCR for a degenerative full-thickness rotator cuff tear (RCT) between 2010 and 2016. Among those, 23 shoulders in 22 patients (74%) with a mean age at time of surgery of  $77 \pm 2$  years (range, 75-82 years) were followed up after a mean of  $7 \pm 2$  years (range, 3-9 years). Clinical assessment included the Western Ontario Rotator Cuff (WORC) index as well as patient satisfaction, the Subjective Shoulder Value (SSV), Simple Shoulder Test (SST), and the American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES) score.

### **Results**

Overall, patient satisfaction was excellent, as everybody stated to be very satisfied with the surgery. Neither any complication nor revision surgery occurred during the study period. At final follow-up, the mean WORC index was  $88\% \pm 15\%$ . The mean SSV was comparable between the affected shoulder ( $90\% \pm 15\%$ ) and the contralateral side ( $87\% \pm 15\%$ ) ( $P = .235$ ). The mean SST score was  $10 \pm 2$  points and the mean ASES score was  $89 \pm 17$  points.

### **Conclusion**

ARCR for symptomatic RCTs without advanced muscle degeneration in patients older than 75 years at the time of surgery provided good clinical results and high patient satisfaction at midterm follow-up.

### **Level of evidence**

Level IV

## **Effect of Posterior Glenoid Bone Loss and Retroversion on Arthroscopic Posterior Glenohumeral Stabilization**

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**Background:** Posterior glenohumeral instability is an increasingly recognized cause of shoulder instability, but little is known about the incidence or effect of posterior glenoid bone loss.

**Purpose:** To determine the incidence, characteristics, and failure rate of posterior glenoid deficiency in shoulders undergoing isolated arthroscopic posterior shoulder stabilization.

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

**Methods:** All patients undergoing isolated posterior labral repair and glenoid-based capsulorrhaphy with suture anchors between 2008 and 2016 at a single institution were identified. Posterior bone deficiency was calculated per the best-fit circle method along the inferior two-thirds of the glenoid by 2 independent observers. Patients were divided into 2 groups: minimal (0%-13.5%) and moderate (>13.5%) posterior bone loss. The primary outcome was reoperation for any reason. The secondary outcomes were military separation and placement on permanent restricted duty attributed to the operative shoulder.

**Results:** A total of 66 shoulders met the inclusion criteria, with 10 going on to reoperation after a median follow-up of 16 months (range, 14-144 months). Of the total shoulders, 86% (57/66) had ≤13.5% bone loss and 14% (9/66) had >13.5%. Patients with moderate posterior glenoid bone loss had significantly greater retroversion ( $-11.5^\circ$  vs  $-4.3^\circ$ ;  $P = .01$ ). Clinical failure requiring reoperation was seen in 10.5% of patients in the minimal bone deficiency group and 44.4% in the moderate group ( $P = .024$ ). There was no difference between groups in rate of military separation or restricted duty. Patients with moderate posterior glenoid bone deficiency were more likely to be experiencing instability instead of pain on initial presentation ( $P < .001$ ), were more likely to have a positive Jerk test result ( $P = .05$ ), and had increased glenoid retroversion ( $P = .01$ ).

**Conclusion:** In shoulders with moderate glenoid bone deficiency (>13.5%) and increased glenoid retroversion, posterior capsulolabral repair alone may result in higher reoperation rates than in shoulders without bone deficiency.

## Location of the Suture Anchor in Hill-Sachs Lesion Could Influence Glenohumeral Cartilage Quality and Limit Range of Motion After Arthroscopic Bankart Repair and Remplissage

Zheci Ding, MBBS, Shuang Cong, MD, Yuxue Xie, MD, Sijia Feng, MD, Shiyi Chen, MD, PhD, Jiwu Chen, MD, PhD†

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**Background:** No study has reported clinical evidence for cartilage change in the glenohumeral joint or the cause of loss in range of motion (ROM) after arthroscopic Bankart repair with remplissage technique (BR).

**Purpose:** To investigate the postoperative features of glenohumeral joint cartilage, ROM, and anchor placement for remplissage at a minimum of 2 years of follow-up after BR and to analyze the correlations.

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

**Methods:** A total of 21 patients who underwent BR received follow-up for a minimum of 2 years. At both preoperative assessment and final follow-up, passive shoulder ROM, Oxford Shoulder Instability Score, Simple Shoulder Test score, and Single Assessment Numerical Evaluation score were assessed. All patients underwent 3.0-T magnetic resonance imaging (MRI) examination at final follow-up. The clinical outcomes, glenohumeral cartilage or Hill-Sachs lesion-related MRI parameters, and their potential correlations were analyzed.

**Results:** The mean follow-up was 55.0 months (range, 24-119 months). Compared with preoperative assessment, all functional scores significantly improved ( $P < .001$ ). At the final follow-up, a significant ROM loss ( $>15^\circ$ ) of external rotation (ER) at the side (ER0) was found in 12 patients, among whom 8 patients had significant ROM loss of ER at  $90^\circ$  of abduction as well. Further, 12 patients with decreased ER had significantly higher signal intensity of cartilage on the anterior, middle, and posterior humeral head (anterior,  $P = .002$ ; middle,  $P < .001$ ; posterior,  $P < .001$ ) than 9 patients with normal ER. The ratio of the width of the remplissage anchor to the diameter of the humeral head (w:d ratio) was significantly greater ( $P = .031$ ) in the decreased ER group than in the normal ER group. Correlation analysis showed that signal intensity on the posterior humeral head and ER0 loss ( $\Delta ER0$ ) had a significantly positive correlation ( $r = 0.516$ ;  $P = .034$ ), while the w:d ratio and  $\Delta ER0$  had a significantly positive correlation ( $r = 0.519$ ;  $P = .039$ ).

**Conclusion:** At a minimum of 2 years of follow-up, patients who underwent BR showed significant clinical improvement compared with preoperative assessment, except for limitations in ER. The glenohumeral cartilage degeneration (higher signal intensity) after BR had a significantly positive correlation with the postoperative ER loss, which was found to be associated with a relatively medial placement of the remplissage anchor.

## **An Arthroscopic “Inlay” Bristow Procedure With Suture Button Fixation for the Treatment of Recurrent Anterior Glenohumeral Instability: 3-Year Follow-up**

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**Background:** Coracoid graft positioning, fixation, and bone union are key factors affecting the clinical outcomes of Bristow and Latarjet procedures. We developed an arthroscopic “inlay” Bristow procedure based on the “mortise-tenon” joint structure concept using suture button fixation to achieve more stable fixation and better bone union of the graft.

**Purpose:** To evaluate the positioning of the coracoid graft, bone union rate, and clinical outcomes of this arthroscopic inlay Bristow procedure with suture button fixation.

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

**Methods:** A total of 62 patients who received the arthroscopic inlay Bristow procedure with suture button fixation between June 2015 to June 2016 were eligible for inclusion, and 56 patients who met the inclusion criteria were enrolled in this study. Radiological assessment on 3-dimensional computed tomography scan was performed preoperatively, immediately after the operation, and postoperatively at 3 months, 6 months, 1 year, and the final follow-up. Pre- and postoperative clinical results were also assessed.

**Results:** A total of 56 patients were included in this study. The mean  $\pm$  SD follow-up time was  $36.1 \pm 3.7$  months. Coracoid grafts (middle point) were positioned at 4 o'clock (range,  $123.8^\circ \pm 12.3^\circ$ ) in the sagittal view. In the axial view, 94.6% (53/56) of the graft positioning was measured as flush and 5.4% (3/56) as medial. Neither lateral nor too medial positioning was noted. The bone union rate was 96.4% at final follow-up. The mean visual analog scale score for pain during motion, American Shoulder and Elbow Surgeons score, and Rowe score all improved significantly after surgery—from  $4.8 \pm 2.6$  to  $1.1 \pm 1.0$ ,  $69.2 \pm 12.5$  to  $92.5 \pm 7.0$ , and  $33.5 \pm 12.1$  to  $96.0 \pm 4.9$  at last follow-up, respectively. Almost all patients (98%; 55/56) returned to sports within 1 year after surgery at the same or higher level as compared with their preinjury performance. The mean subjective value for sports participation was  $90.3\% \pm 7.1\%$  (range, 70%-100%) as compared with the normal shoulder. The overall complication rate was 3.6%. No degenerative changes were noted in any patients.

**Conclusion:** This study reported the first series of an inlay Bristow procedure with suture button fixation for recurrent shoulder dislocation, providing a satisfactory union rate and excellent graft positioning with a low complication rate. The mortise-tenon joint structure can provide excellent graft fixation and healing, while using suture button fixation instead of screw fixation could reduce osteolysis and complications related to hardware implantation.



## Minimal Clinically Important Difference, Substantial Clinical Benefit, and Patient Acceptable Symptomatic State After Arthroscopic Rotator Cuff Repair

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**Background:** Minimal clinically important difference (MCID), substantial clinical benefit (SCB), and patient acceptable symptomatic state (PASS) are emerging criteria for patient-based treatment assessments. However, few studies have investigated these measures after rotator cuff repair.

**Purpose:** (1) To determine MCID, SCB, and PASS values for pain visual analog scale (pVAS), Single Assessment Numeric Evaluation (SANE), American Shoulder and Elbow Surgeons (ASES) score, and University of California, Los Angeles (UCLA) score after arthroscopic rotator cuff repair. (2) To determine factors for achieving the MCID, SCB, and PASS.

**Study Design:** Cohort study (diagnosis); Level of evidence, 2.

**Methods:** We analyzed prospectively collected data from a rotator cuff surgery registry between March 2018 and February 2019. Eighty-two patients were included, and anchor questions for deriving MCID, SCB, and PASS values were applied at 1-year follow-up after the surgery. The MCID and SCB for the pVAS, ASES, SANE, and UCLA scores were then derived via 2 methods: a sensitivity- and specificity-based approach, which was used alone to derive PASS values, and a between-patients approach. Additionally, univariable and multivariable logistic regression analyses were performed to determine factors for achieving the MCID, SCB, and PASS.

**Results:** All 4 scores showed acceptable areas under the curve. MCID, SCB, and PASS values for the pVAS were 1.5, 2.5, and 1.7; for ASES scores, 21.0, 26.0, and 78.0; for SANE, 13.0, 20.0, and 71.0; and for UCLA scores, 6.0, 8.0, and 23.0, respectively. Poor preoperative scores demonstrated significantly higher odds ratios (ORs) for achieving the MCID and SCB and lower ORs for achieving the PASS. Retear, large to massive tear, and older age showed lower ORs for achieving the MCID or SCB. For PASS items, male sex and biceps tenodesis had higher ORs, and older age had lower ORs. MCID, SCB, and PASS values per the sensitivity- and specificity-based approach were applied in factor analyses.

**Conclusion:** Reliable MCID, SCB, and PASS values were obtained from patient evaluations 1 year after arthroscopic rotator cuff surgery. Poor preoperative score (MCID and SCB), male sex, and biceps tenodesis showed higher ORs, whereas poor preoperative score (PASS), re-tear, large to massive tear, and older age demonstrated lower ORs.

## Effects of a Thermosensitive Antiadhesive Agent on Single-Row Arthroscopic Rotator Cuff Repair

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<https://doi.org/10.1177/0363546520946088>

**Background:** Postoperative stiffness after rotator cuff repair is a common complication that can lead to poor outcomes and patient discomfort. The application of an antiadhesive agent at the time of repair recently became an option for clinicians, but little information is available on its effects.

**Purpose:** To evaluate and compare retear rates, the incidence of postoperative stiffness, and the clinical outcomes of patients who underwent cuff repair with or without the application of an antiadhesive agent.

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

**Methods:** Among 296 patients who underwent arthroscopic rotator cuff repair surgery, we compared the outcomes of those injected with a thermosensitive gel antiadhesive agent into the subacromial space (112 cases) versus noninjected controls (184 cases). Retear rates in the 2 groups were determined by magnetic resonance imaging at 1 year after surgery. Shoulder joint range of motion and functional scores were evaluated serially.

**Results:** The rate of retear was significantly lower in the injection group (20/112 cases; 17.9%) than the control group (53/184 cases; 28.8%) ( $P = .034$ ). Postoperative stiffness was not significantly different between the 2 groups ( $P = .710$ ). Among the data regarding range of motion, only forward flexion at 6 months after surgery showed superior results in the injection group. Functional scores showed conflicting results: The control group had better visual analog scale scores for pain (injection vs control: 2.17 vs 1.68 at 6 months; 1.82 vs 1.28 at 12 months), American Shoulder and Elbow Surgeons scores (79.89 vs 89.64 at 12 months), and simple shoulder test scores (8.70 vs 10.06 at 12 months), whereas the injection group had better Constant-Murley scores (injection vs control: 59.49 vs 55.60 at 3 months; 77.35 vs 71.98 at 6 months; 87.28 vs 81.56 at 12 months).

**Conclusion:** The tendon healing rate was significantly higher in the group receiving an antiadhesive agent than in the control group. No intergroup difference was seen in the occurrence of postoperative stiffness. However, the pain-related functional score showed inferior results in the injection group at 12 months. The biological action of antiadhesive agents in rotator cuff repair should be further evaluated.

## Quantitative Magnetic Resonance Imaging UTE-T2\* Mapping of Tendon Healing After Arthroscopic Rotator Cuff Repair: A Longitudinal Study

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**Background:** Quantitative ultrashort echo time–T2\* (UTE-T2\*) mapping shows promise for the detection of potential tendon biochemical conditions, while validation against established clinical studies in the shoulder is needed.

**Purpose:** To evaluate and characterize the healing process of the repaired rotator cuff based on longitudinal changes in UTE-T2\* values, clinical outcomes, and repair status in patients after arthroscopic rotator cuff repair (ARCR).

**Study Design:** Cohort study; Level of evidence, 2.

**Methods:** Patients with ARCR ( $n = 25$ ) underwent quantitative MRI and clinical examinations at serial follow-up time points: 3, 6, 12, and 24 months postoperatively. Age-matched healthy controls ( $n = 15$ ) were evaluated at 3 and 12 months after enrollment. Clinical scores included the Constant, American Shoulder and Elbow Surgeons, and Fudan University Shoulder score, and visual analog scale for pain. The MRI examination included UTE-T2\* mapping. UTE-T2\* maps were generated for T2\* values at the healing site. Sugaya classification was adopted to evaluate the repair status. Longitudinal analyses of clinical outcomes, UTE-T2\* changes, and Sugaya classification were conducted.

**Results:** The overall retear rate was 8% (2/25, all Sugaya type IV). All patients (including the ones with retear) achieved satisfactory outcomes at 12 months that lasted to 24 months on the basis of clinical scores. The mean UTE-T2\* values at the healing site showed an increase from 3 to 6 months ( $P = .03$ ) and then decreased to a level similar to that observed in age-matched healthy tendons at 12 months ( $P = .1$ ). No significant differences were found between UTE-T2\* values at 12 and 24 months ( $P = .6$ ). UTE-T2\* values at the healing site significantly varied with the repair status according to Sugaya classification ( $P < .05$ ). Moreover, significant correlations were noted between clinical scores and UTE-T2\* values at 6 months ( $r = -0.6$  to  $-0.3$ ; all  $P < .05$ ) and 12 months ( $r = -0.6$  to  $-0.2$ ; all  $P < .05$ ).

**Conclusion:** This study indicated a healing-related relationship between clinical outcomes and quantitative UTE-T2\* values, which highlights the potential of using UTE-T2\* mapping to track the tendon-healing process noninvasively. Moreover, the repaired tendon was comparable to age-matched healthy controls at 12-month follow-up based on UTE-T2\* values.

**What happens to the long head of the biceps tendon after arthroscopic rotator cuff repair?**

Hyo-Jin Lee, Eung-Sic Kim, Yang-Soo Kim

<https://doi.org/10.1302/0301-620X.102B9.BJJ-2020-0076.R1>

**Aims**

The purpose of this study was to identify the changes in untreated long head of the biceps brachii tendon (LHBT) after a rotator cuff tear and to evaluate the factors related to the changes.

**Methods**

A cohort of 162 patients who underwent isolated supraspinatus with the preservation of LHBT was enrolled and evaluated. The cross-sectional area (CSA) of the LHBT on MRI was measured in the bicipital groove, and preoperative to postoperative difference was calculated at least 12 months postoperatively. Second, postoperative changes in the LHBT including intratendinous signal change, rupture, dislocation, or superior labral lesions were evaluated with seeking of factors that were correlated with the changes or newly developed lesions after rotator cuff repair.

**Results**

The postoperative CSA (12.5 mm<sup>2</sup> (SD 8.3)) was significantly larger than preoperative CSA (11.5 mm<sup>2</sup> (SD 7.5);  $p = 0.005$ ). In total, 32 patients (19.8%) showed morphological changes in the untreated LHBT 24 months after rotator cuff repair. Univariate regression analysis revealed that the factor chiefly related to the change in LHBT status was an eccentric LHBT position within the groove found on preoperative MRI ( $p = 0.011$ ). Multivariate analysis using logistic regression also revealed that an eccentric LHBT position was a factor related to postoperative change in untreated LHBTs ( $p = 0.011$ ).

**Conclusion**

The CSA of the LHBT inside the biceps groove increased after rotator cuff repair. The preoperative presence of an eccentrically positioned LHBT was associated with further changes of the tendon itself after rotator cuff repair.

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## Lower Extremity

Arthroscopy, Volume 36, Issue 9, pages 2456-2463

### Return to Sport and Patient Satisfaction After Meniscal Allograft Transplantation

Cvetanovich, G. L., Christian, D. R., Garcia, G. H., Liu, J. N., Redondo, M. L., Yanke, A. B., & Cole, B. J.

<https://doi.org/10.1016/j.arthro.2020.04.034>

#### Purpose

To investigate patient return to sport and satisfaction after meniscal allograft transplantation (MAT).

#### Methods

Patients undergoing MAT using a bone bridge technique between 2013 and 2015 with minimum 2-year follow-up were retrospectively reviewed. They completed a survey regarding return to sport, satisfaction, and subsequent surgery in addition to patient-reported outcome measures.

#### Results

Of 117 patients, 87 (74.4%) were available at an average follow-up of 3.64 years (range, 2.01-5.13 years). The mean age at the time of surgery was  $28.99 \pm 8.26$  years. Lateral MAT was performed in 44 cases (50.6%); medial MAT, 42 (48.3%); and combined medial and lateral MAT, 1 (1.1%). Concomitant procedures were performed in 72 patients (82.7%) including cartilage restoration ( $n = 65$ , 74.7%), realignment ( $n = 9$ , 10.3%), and anterior cruciate ligament reconstruction ( $n = 9$ , 10.3%). Patients experienced significant improvement in the Lysholm score ( $P < .001$ ), International Knee Documentation Committee score ( $P < .001$ ), Knee Injury and Osteoarthritis Outcome Score (KOOS)—Quality of Life ( $P < .001$ ), KOOS—Activities of Daily Living (ADL) ( $P < .001$ ), KOOS—Pain ( $P < .001$ ), KOOS—Sports ( $P = .001$ ), KOOS—Symptoms ( $P = .003$ ), Short Form 12 physical score ( $P < .001$ ), and Veterans Rand-12 physical score ( $P < .001$ ). Reoperation was performed in 26 patients (29.9%); failure occurred in 12 patients (13.8%); total knee arthroplasty in 1, unicompartmental arthroplasty in 2, and total meniscectomy in 9). Overall, 77.0% of patients were satisfied with their outcome. Prior to MAT, 82 patients (94.3%) participated in sporting activities; 62 patients (75.6%) returned to at least one sport at  $12.58 \pm 6.20$  months postoperatively, with 30 (48.4%) reaching their preoperative level of intensity and 72 (87.8%) discontinuing at least one of their preoperative sports. The most common reasons for sports discontinuation postoperatively were prevention of further damage (73.6%), pain with activity (51.4%), fear of further injury (48.6%), surgeon recommendation (33.3%), and swelling with activity (30.6%). Patients were satisfied with their sports participation at a rate of 62.1%.

#### Conclusions

In a complex patient population undergoing arthroscopic MAT, 75.6% of patients were able to return to at least one sport at an average of  $12.58 \pm 6.20$  months postoperatively. The level of sport declined, with 93.5% of patients restricting involvement to recreational sports after MAT and 48.4% returning to their preoperative level of activity intensity. In addition, 87.8% of patients reported discontinuing a sport in which they had participated preoperatively. The most common reasons for decreasing level of sport were prevention of further damage, pain or swelling with sports, and fear of further injury. The reoperation rate after MAT was 29.9%. Most patients were satisfied with the outcome of surgery, with 77.0% satisfied in general and 62.1% satisfied with their ability to play sports.

#### Level of Evidence

Level IV, retrospective case series

[BACK](#)

## **Preoperative Opioid Usage, Male Sex, and Preexisting Knee Osteoarthritis Impacts Opioid Refills After Isolated Arthroscopic Meniscectomy: A Population-Based Study**

Khazi, Z. M., Baron, J., Shamrock, A., Gulbrandsen, T., Bedard, N., Wolf, B., ... Westermann, R.

<https://doi.org/10.1016/j.arthro.2020.04.039>

### **Purpose**

To identify risk factors for opioid consumption after arthroscopic meniscectomy using a large national database.

### **Methods**

Patients undergoing primary arthroscopic meniscectomy from 2007 to 2016 were retrospectively accessed from the Humana database. Patients were categorized as those who filled opioid prescriptions within 3 months (OU), within 1 month (A-OU), between 1 and 3 months (C-OU), and never filled opioid prescriptions (N-OU) before surgery. Rates of opioid use were evaluated preoperatively and longitudinally tracked for each cohort. Prolonged opioid use was defined as continued opioid prescription filling at  $\geq 3$  months after surgery. Multiple logistic regression analysis was used to identify factors associated with opioid refills at 12 months after surgery.

### **Results**

There were 88,120 patients (53.7% female) who underwent arthroscopic meniscectomy, of whom 46.1% ( $n = 39,078$ ) were N-OU. About a quarter (25.3%) of patients continued filling opioid prescriptions at 1 year postoperatively. In addition, opioid fill rate at 1 year was significantly greater in the OU group compared with the N-OU group with a relative risk of 2.89 (40.7% vs 14.1%; 95% confidence interval 2.81-2.98;  $P < .0001$ ). Multiple logistic regression model identified C-OU (odds ratio 3.67; 95% confidence interval 3.53-3.82;  $P < .0001$ ) as the strongest predictor of opioid use at 12 months postoperatively. Furthermore, male sex, A-OU, knee osteoarthritis, diabetes mellitus, hypertension, chronic obstructive pulmonary disease, fibromyalgia, anxiety or depression, alcohol use disorder, and tobacco use ( $P < .02$  for all) had significantly increased odds of opioid use at 12 months postoperatively. However, patients  $< 40$  years ( $P < .0001$ ) had significantly decreased odds of opioid use 12 months postoperatively.

### **Conclusions**

Preoperative opioid filling is a significant risk factor for opioid use at 12 months postoperatively. Male sex, preexisting knee osteoarthritis, and diagnosis of anxiety or depression were independent risk factors for opioid use 12 months following arthroscopic meniscectomy.

### **Level of Evidence**

Level-III, Retrospective Cohort Study

## **Clinical Outcomes and the Failure Rate of Revision Anterior Cruciate Ligament Reconstruction Were Comparable Between Patients Younger Than 40 Years and Patients Older Than 40 Years: A Minimum 2-Year Follow-Up Study**

Yoon, K. H., Lee, H. W., Lee, H. W., Park, J.-Y., Kim, S. J., & Kim, S.-G.

<https://doi.org/10.1016/j.arthro.2020.06.012>

### **Purpose**

To compare the clinical outcomes and failure rates of revision anterior cruciate ligament reconstruction (ACLR) between young and middle-aged surgery patients.

### **Methods**

Patients who underwent revision ACLRs between January 2008 and June 2017 with a minimum 2-year follow-up were retrospectively evaluated. Patients were divided into 2 groups according to age:  $\geq 40$  years (group A) and  $< 40$  years (group B). Detailed patient demographic data, preoperative radiographic data, and concurrent meniscal and chondral lesion were reviewed. Clinical scores, laxity tests results, and graft failures were compared between groups at the final follow-up.

### **Results**

Eighty-six patients (group A,  $n = 24$ ,  $46.6 \pm 4.5$  years; group B,  $n = 62$ ,  $26.2 \pm 6.3$  years) were included in this study. Demographic data showed that the time interval from primary to revision ACLR was longer in group A than in group B ( $96.2 \pm 80.9$  vs.  $52.0 \pm 42.1$  months,  $P = .011$ ). Group A had a higher prevalence of chondral defects of the trochlea ( $P = .016$ ). No significant differences were identified in the prevalence and severity of meniscal lesions. At the final follow-up, all clinical scores were improved postoperatively but did not differ significantly between the groups. No significant differences were identified in side-to-side difference on Telos stress radiographs (group A,  $6.3 \pm 5.0$  mm; group B,  $5.6 \pm 3.8$  mm;  $P = .403$ ) and graft failure rate (group A, 33.3%; group B, 30.6%;  $P = .358$ ) at the final follow-up.

### **Conclusions**

The current study showed that the clinical outcomes of revision ACLRs in patients improved significantly in patients younger than 40 years and were comparable to those observed in patients older than 40 years at a minimum 2-year follow-up.

### **Level of Evidence**

III.

## **Supplement Use in Patients Undergoing Anterior Cruciate Ligament Reconstruction: A Systematic Review**

Greif, D. N., Emerson, C. P., Allegra, P., Arizpe, A., Mansour, K. L., Cade, W. H., & Baraga, M. G.

<https://doi.org/10.1016/j.arthro.2020.04.047>

### **Purpose**

To assess whether a standardized dietary supplementation can help to decrease postoperative muscle atrophy and/or improve rehabilitation outcomes in patients who underwent anterior cruciate ligament reconstruction (ACLR).

### **Methods**

A systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA). MEDLINE, Scopus, and Cochrane Library databases were searched, and articles that examined protein or amino acid, vitamin, or any other type of supplementation in ACLR were reviewed. Two independent reviewers conducted the search using pertinent Boolean operations.

### **Results**

A total of 1818 articles were found after our database search. Ten studies fulfilled our inclusion criteria and only assessed patients undergoing ACLR. Four studies assessed protein-based supplementation. One study assessed creatine as a supplement. Four studies assessed vitamin-based supplementation. One study assessed testosterone supplementation. Protein and amino acid supplementation showed potential benefits; multiple authors demonstrated a combination of improved achievement of rehabilitation benchmarks, graft maturation, muscular hypertrophic response, and peak dynamic muscle strength. When we examined creatine, vitamin, or hormone-based protocols, none demonstrated results, suggesting these factors may attenuate muscle atrophy after surgery. Vitamin C and E demonstrated potentially increased local inflammation in skeletal muscle, which runs contrary to the belief that antioxidant vitamin-based supplementation may decrease the inflammatory response that plays a role in the post injury/operative period.

### **Conclusions**

Protein-based supplementation may play a role in mitigating muscle atrophy associated with ACLR, as multiple authors demonstrated a combination of improved achievement of rehabilitation benchmarks, high hypertrophic response, and peak dynamic muscle strength. However, based on current literature, it is not possible to recommend a specific protein-based supplementation protocol at this time for patients undergoing ACLR. Limited evidence suggests no benefit for creatine, vitamin, or hormone-based protocols.

### **Level of Evidence**

II, a systematic review of level I-II studies.



## **Hip Arthroscopy and Borderline Developmental Dysplasia of the Hip: A Systematic Review**

Kuroda, Y., Saito, M., Sunil Kumar, K. H., Malviya, A., & Khanduja, V.

<https://doi.org/10.1016/j.arthro.2020.05.035>

### **Purpose**

To provide an up-to-date evidence-based review of hip arthroscopy for patients with borderline developmental dysplasia of the hip (BDDH).

### **Methods**

Literature describing hip arthroscopy in patients with BDDH was systematically identified from PubMed, EMBASE, and Cochrane Library using the Preferred Reporting Items for Systematic Reviews and Meta-analyses guidelines. All studies that involved BDDH and not just those reporting their clinical outcomes were included. Methodological Index for Non Randomized Studies criteria and Newcastle–Ottawa Scale were used to assess the quality of studies. The definition of BDDH, operative technique, correlation with labrum and/or cartilage lesions, outcome, and factors associated with poor outcome were collected and analyzed.

### **Results**

Assessment of the articles yielded 28 studies involving 1502 hips that were included for final analysis. There were no studies with a high risk of bias. BDDH was defined as lateral center-edge angle of 20° to 25° in most studies. Hip arthroscopy for BDDH showed an improvement in the weighted mean postoperative modified Harris Hip Score, from 60.2 to 81.7, a relatively high rate of acquisition of minimal clinically important difference of 79.5% to 87%, and had 1.0% rate of complications. Eleven studies reported on all the patients undergoing a capsular plication. Four studies reported that BDDH was associated with cartilage damage on the femoral head. Age older than 35 or 42 years and  $\geq 20^\circ$  of femoral anteversion were reported as risk factors for poor outcomes.

### **Conclusions**

Hip arthroscopy for BDDH with capsular plication provides improvement in patient-reported outcome measures and a relatively high rate of acquisition of minimal clinically important difference with a low rate of complications in the shorter term. BDDH may be associated with cartilage damage on the femoral head. Female sex is a factor related to good outcomes, whereas older age, excessive femoral anteversion, and anterior undercoverage of acetabulum are risk factors related to poorer outcomes.

### **Level of Evidence**

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

**Subspinal impingement: clinical outcomes of arthroscopic decompression with one year minimum follow up.**

Michal, F., Amar, E., Atzmon, R. et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-018-4923-5>

**Purpose**

This study was designed to (1) evaluate the clinical outcomes after arthroscopic subspinal decompression in patients with hip impingement symptoms and low AIIS, and to (2) assess the presence of low anterior inferior iliac spine on the pre-operative radiographs of patients with established subspinal impingement diagnosed intra-operatively.

**Methods**

Retrospective analysis of patients who underwent arthroscopic subspinal decompression has been performed. The indications for surgery were femoroacetabular impingement (FAI), or subspinal impingement. Pre-operative radiographs were assessed for anterior inferior iliac spine type. Intra-operative diagnosis of low anterior inferior iliac spine was based on the level of anterior inferior iliac spine extension relative to the acetabulum and the presence of reciprocal labral and chondral lesions. In patients where low anterior inferior iliac spine was not diagnosed on pre-operative radiographs, the pre-operative radiographs were re-read retrospectively to assess missed signs of low anterior inferior iliac spine.

**Results**

Thirty-four patients underwent arthroscopic subspinal decompression between 2012 and 2015. The patients were followed for a median of 25 months (13–37 months). Intra-operatively, grade 2 anterior inferior iliac spine was found in 27 patients and grade 3 anterior inferior iliac spine was found in 7 patients. MHHS, HOS, and HOSS scores increased from median (range) pre-operative scores of 55 (11–90), 48 (20–91) and 20 (0–80) to 95 (27–100), 94 (30–100) and 91 (5–100), respectively ( $p < 0.0001$ ,  $p = 0.001$ ,  $p < 0.0001$ , respectively). Pre-operative diagnosis of low AIIS was made in 6/34 patients via AP radiographs. On retrospective analysis of pre-operative radiographs, signs of low AIIS were still not observed in 21/34 (61.8%) patients.

**Conclusions**

Arthroscopic subspinal decompression of low AIIS yielded significantly improved outcome measures and high patient satisfaction at a minimum of 13 months follow-up. Low AIIS is often under-diagnosed on AP pelvis and lateral frog radiographs and if left untreated, may result in unresolved symptoms and failed procedure.

**Level of evidence**

IV.

## **Arthroscopic anterior inferior iliac spine decompression does not alter postoperative muscle strength.**

Tateishi, S., Onishi, Y., Suzuki, H. et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-018-5026-z>

### **Purpose**

The purpose of this study was to assess the additional effect of anterior inferior iliac spine (AIIS) decompression on knee extensor and hip flexor strength and compare functional outcomes after arthroscopic FAI correction with and without AIIS decompression.

### **Methods**

Sixty patients who underwent arthroscopic FAI correction surgery were divided into two groups matched for AIIS morphology: 31 patients who underwent arthroscopic FAI surgery only (without AIIS decompression) (FAI group) (AIIS Type I;  $n = 5$ , Type II;  $n = 26$ , Type III;  $n = 0$ ) and 29 patients who underwent arthroscopic FAI surgery with AIIS decompression (AIIS group) (AIIS Type I;  $n = 5$ , Type II;  $n = 24$ , Type III;  $n = 0$ ). Knee extensor and hip flexor strength were evaluated preoperatively and at 6 months after surgery. Patient-reported outcome (PRO) scores using the modified Harris hip score (MHHS), the nonarthritic hip score (NAHS) and iHOT-12 were obtained preoperatively and at 6 months after surgery.

### **Results**

In the AIIS group, there was no significant difference between knee extensor strength pre- and postoperatively (n.s.). In the AIIS group, hip flexor strength was significantly improved postoperatively compared to preoperative measures ( $p < 0.05$ ). In the FAI group, there were no significant improvements regarding muscle strength (n.s.). While there were no significant differences of preoperative and postoperative MHHS and NAHS between both groups (MHHS; n.s., NAHS; n.s.), the mean postoperative iHOT-12 in the FAI group was inferior to that in the AIIS group. ( $p < 0.01$ ). The revision surgery rate for the AIIS group was significantly lower compared with that in the FAI group ( $p < 0.05$ ).

### **Conclusion**

Anterior inferior iliac spine decompression, as a part of an arthroscopic FAI corrective procedure, had a lower revision surgery rate and did not compromise knee extensor and hip flexor strength, and it improved clinical outcomes comparable to FAI correction without AIIS decompression. AIIS decompression for FAI correction improved postoperative PRO scores without altering the muscle strength of hip flexor and knee extensor.

### **Level of evidence**

III.

## **Treatment strategies for ischiofemoral impingement: a systematic review.**

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### **Purpose**

There has been relatively little information about the treatment for ischiofemoral impingement (IFI) because of its rarity as well as the uncertainty of diagnosis. The aim of this study was to provide the reader with the available treatment strategies and their related outcomes for IFI based on the best available evidence, whilst highlighting classically accepted ways of treatment as well as relatively new surgical and non-surgical techniques.

### **Methods**

A systematic review of the literature from Medline, Embase, AMED, Cochrane and Google Scholar was undertaken since inception to December 2017 following the PRISMA guidelines. Clinical outcome studies, prospective/retrospective case series and case reports that described the treatment outcome for IFI were included. Animal or cadaveric studies, trial protocols, diagnostic studies without any description of treatments, technical notes without any results, and review articles were excluded.

### **Results**

This systematic review found 17 relevant papers. No comparative studies were included in the final records for qualitative assessment, which means all the studies were case series and case reports. Eight studies (47.1%) utilised non-surgical treatment including injection and prolotherapy, followed by endoscopic surgery (5 studies, 29.4%) then open surgery (4 studies, 23.5%). Mean age of the participants was 41 years (11–72 years). The mean follow-up was 8.4 months distributed from 2 weeks to 2.3 years. No complications or adverse effects were found from the systematic review.

### **Conclusion**

Several treatment strategies have been reported for IFI, and most of them have good short- to medium-term outcomes with a low rate of complications. However, there are no comparative studies to assess the superiority of one technique over another, thus further research with randomised controlled trials is required in this arena. This study explores the wide variety and categories of different treatments used for IFI to guide physicians and shed light on what can be done for this challenging cohort of patients.

### **Level of evidence**

III.

**Early Surgical Repair of Medial Meniscus Posterior Root Tear Minimizes the Progression of Meniscal Extrusion: 2-Year Follow-up of Clinical and Radiographic Parameters After Arthroscopic Transtibial Pull-out Repair**

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**Background:** Conflicting results have been reported concerning the progression of medial meniscal extrusion (MME) after arthroscopic transtibial pull-out repair of medial meniscus posterior root tear (MMRT), and no study has evaluated the relevant factors affecting the progression of MME.

**Purpose:** To (1) evaluate the subjective and objective surgical outcomes of arthroscopic transtibial pull-out repair of MMRT and (2) identify relevant factors affecting the progression of MME after surgery.

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

**Methods:** A total of 63 patients who underwent isolated arthroscopic transtibial pull-out repair of MMRT between January 2010 and June 2017 were evaluated retrospectively. Clinical scores and various radiographic parameters were evaluated to assess the surgical outcomes. The patients were classified into 2 groups according to the change in medial meniscal extrusion ratio (MMER) at 1 year after surgery compared with before surgery (group 1 consisted of 21 patients with reduced or maintained MMER; group 2 consisted of 42 patients with increased MMER). Variables including baseline demographics, radiographic parameters, and arthroscopic findings were compared to identify relevant factors affecting the progression of MME after surgery.

**Results:** In the overall cohort, clinical outcomes at postoperative 2 years improved significantly ( $P < .001$  for visual analog scale score, International Knee Documentation Committee subjective score, and Lysholm score), whereas radiographic parameters showed an overall deterioration compared with the preoperative level. In subgroup comparisons, a significant difference was seen in the time from the onset of symptoms until surgery ( $P < .001$ ), defined as preoperative symptom duration, which a subsequent logistic regression analysis revealed to be a relevant factor associated with the progression of MMER ( $P = .015$ ). Both groups showed progression of radiographic osteoarthritis, but the progression was significantly higher in group 2 compared with group 1 at postoperative 2 years ( $P = .032$ ). On receiver operating characteristic curve analysis, the cutoff point for preoperative symptom duration associated with the progression of MMER was 13 weeks (sensitivity, 52.4%; specificity, 76.2%; accuracy, 72.4%).

**Conclusion:** The arthroscopic transtibial pull-out repair of MMRT showed clinical improvement but did not prevent the progression of knee osteoarthritis, MME, or MMER. Although the preservation of MMER was not capable of completely preventing the progression of knee degeneration, MMER still has a potential clinical value in delaying the rate of progression of knee degeneration. Early surgical repair of MMRT, within 13 weeks from the onset of symptoms, might be helpful to prevent the progression of MME.

## Can We Eliminate Opioid Medications for Postoperative Pain Control? A Prospective, Surgeon-Blinded, Randomized Controlled Trial in Knee Arthroscopic Surgery

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**Background:** Orthopaedic surgeons have a responsibility to develop responsible opioid practices. Growing evidence has helped define an optimal number of opioids to prescribe after surgical procedures, but little evidence-based guidance exists to support specific practice patterns to decrease opioid utilization.

**Hypothesis:** After knee arthroscopic surgery with partial meniscectomy, patients who were provided a prescription for opioids and instructed to only fill the prescription if absolutely necessary for pain control would take fewer opioids than patients with opioids automatically included as part of a multimodal approach to pain control prescribed at discharge.

**Study Design:** Randomized controlled trial; Level of evidence, 2.

**Methods:** Patients undergoing arthroscopic partial meniscectomy were provided multimodal pain control with aspirin, acetaminophen, and naproxen and randomized to receive oxycodone as either included with their multimodal pain medications (group 1) or given an optional prescription to fill (group 2). Patients were contacted at time points up to 1 month after surgery to assess opioid utilization and medication side effects. The mean number of tablets utilized was the primary outcome measure, with a 50% reduction defined as a successful outcome.

**Results:** A total of 105 patients were initially enrolled, and 95 (91%; 48 in group 1 and 47 in group 2) successfully completed the study. There was no significant reduction in the number of tablets utilized between groups 1 and 2 (3.5 vs 4.5, respectively;  $P = .45$ ), days that opioids were required (2.2 vs 3.2, respectively;  $P = .20$ ), or postoperative pain at any time point. The group with the option to fill their prescription had significantly fewer unused tablets remaining than the group with opioids included as part of the multimodal pain control regimen (75% of potentially prescribed tablets vs 82% of prescribed tablets;  $P < .001$ ). Overall, 37% of patients did not require any opioids after surgery, and 86% used  $\leq 8$  tablets.

**Conclusion:** Patients required a minimal number of opioids after knee arthroscopic surgery with partial meniscectomy. There was no difference in the number of tablets utilized whether the opioid prescription was included in a multimodal pain control regimen or patients were given an option to fill the prescription. Offering optional opioid prescriptions in the setting of a multimodal approach to pain control can significantly reduce the number of unused opioids circulating in the community.

## Prospective Single-Blinded Randomized Controlled Trial Comparing Pericapsular Injection Versus Lumbar Plexus Peripheral Nerve Block for Hip Arthroscopy

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**Background:** Hip arthroscopy has become the standard for the operative treatment of symptomatic femoroacetabular impingement. Given the high levels of postoperative pain associated with hip arthroscopy, optimal analgesia is critical to ensure patient comfort and safety after discharge.

**Purpose/Hypothesis:** Our purpose was to perform a single-blinded randomized controlled trial comparing the use of pericapsular injection versus lumbar plexus blockade for postoperative pain control after arthroscopic surgery on the hip. We hypothesized that pericapsular injection would provide equivalent pain relief to that of lumbar plexus blockade while minimizing adverse effects and alleviating the dependence on a qualified individual to administer.

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

**Methods:** A total of 64 consecutive patients undergoing hip arthroscopy were prospectively assessed over a 6-month period between 2017 and 2018. Patients were randomly allocated to 1 of 2 groups: 32 patients received a lumbar plexus blockade by a single anesthesiologist, while 32 patients received a pericapsular injection of 30 mL of ropivacaine and 12 mg of morphine. Postoperative pain in the postanesthesia care unit (PACU) as measured using the numeric rating scale, time to discharge, PACU morphine equivalents, and adverse effects were collected by PACU staff. Postoperative day 1 and 2 narcotic use was obtained through a telephone call with the patient on postoperative day 3.

**Results:** We found no statistically significant difference in PACU pain scores at all time points, although there was a trend toward lower pain for patients receiving a pericapsular injection. PACU and short-term narcotic demand did not vary across the 2 arms. Time to discharge from the PACU did not differ. There were no major adverse events reported for either intervention.

**Conclusion:** Pericapsular injection provides equivalent analgesia when compared with lumbar plexus blockade. It is a safe intervention that allows for efficient postoperative analgesia for patients undergoing hip arthroscopy.