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Journal of Shoulder and Elbow Surgery (JSES), Volume 32, issue 9

Scaffold- and graft-based biological augmentation of rotator cuff repair: an updated systematic review and meta-analysis of preclinical and clinical studies for 2010-2022

K. Mandalia, A. Mousad

DOI: https://doi.org/10.1016/j.jse.2023.03.031

Background: Despite advancements in the surgical techniques of rotator cuff repair (RCR), there remains a high retear rate. Biological augmentation of repairs with overlaying grafts and scaffolds may enhance healing and strengthen the repair construct. This study aimed to investigate the efficacy and safety of scaffold-based (nonstructural) and overlay graft–based (structural) biological augmentation in RCR (excluding superior capsule reconstruction and bridging techniques) in both preclinical and clinical studies.

Methods: This systematic review was performed in adherence to the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines, as well as guidelines outlined by The Cochrane Collaboration. A search of the PubMed, Embase, and Cochrane Library databases from 2010 until 2022 was conducted to identify studies reporting the clinical, functional, and/or patient-reported outcomes of ≥1 biological augmentation method in either animal models or humans. The methodologic quality of included primary studies was appraised using the Checklist to Evaluate a Report of a Non-pharmacological Trial (CLEAR-NPT) for randomized controlled trials and using the Methodological Index for Non-randomized Studies (MINORS) for nonrandomized studies.

Results: A total of 62 studies (Level I-IV evidence) were included, comprising 47 studies reporting outcomes in animal models and 15 clinical studies. Of the 47 animal-model studies, 41 (87.2%) demonstrated biomechanical and histologic enhancement with improved RCR load to failure, stiffness, and strength. Of the 15 clinical studies, 10 (66.7%) illustrated improvement in postoperative clinical, functional, and patient-reported outcomes (eg, retear rate, radiographic thickness and footprint, and patient functional scores). No study reported a significant detriment to repair with augmentation, and all studies endorsed low complication rates. A meta-analysis of pooled retear rates demonstrated significantly lower odds of retear after treatment with biological augmentation of RCR compared with treatment with non-augmented RCR (odds ratio, 0.28; $P < .00001$), with low heterogeneity ($I2 = 0.11$).

Conclusions: Graft and scaffold augmentations have shown favorable results in both preclinical and clinical studies. Of the investigated clinical grafts and scaffolds, acellular human dermal allograft and bovine collagen demonstrate the most promising preliminary evidence in the graft and scaffold categories, respectively. With a low risk of bias, meta-analysis revealed that biological augmentation significantly lowered the odds of retear. Although further investigation is warranted, these findings suggest graft and scaffold biological augmentation of RCR to be safe.

Level of evidence: IV, Systematic review.

BACK

Remodeling process and clinical outcomes following all-arthroscopic modified Eden-Hybinette procedure using iliac crest autograft and 1-tunnel double Endobutton fixation system

L. Zhao, C. Fu

DOI: https://doi.org/10.1016/j.jse.2023.01.041

Background: Arthroscopically modified Eden-Hybinette procedures for glenohumeral stabilization have been used for a long time. With the advancement of arthroscopic techniques and the development of sophisticated instruments, a double Endobutton fixation system has been used clinically to secure bone graft to the glenoid rim placed through a specifically designed guide. The purpose of this report was to evaluate clinical outcomes and serial glenoid remodeling process following all-arthroscopic anatomical glenoid reconstruction using autologous iliac crest bone grafting technique through 1-tunnel fixation.

Methods: Forty-six patients with recurrent anterior dislocations and significant glenoid defects greater than 20% underwent arthroscopic surgery with a modified Eden-Hybinette technique. Instead of firm fixation, autologous iliac bone graft was fixed to the glenoid by double Endobutton fixation system through 1-tunnel placed in the glenoid surface. Follow-up examinations were performed at 3, 6, 12, and 24 months. The patients were followed up for a minimum of two years using the Rowe score, the Constant score, the Subjective Shoulder Value, and the Walch-Duplay score; patient satisfaction with the procedure outcome was also rated. Graft positions, healing, and absorption were evaluated postoperatively with computed tomography imaging.

Results: At a mean follow-up of 28 months, all patients were satisfied and had a stable shoulder. The Constant score improved from 82.9 to 88.9 points ($P < .001$), the Rowe score, improved from 25.3 to 89.1 points ($P < .001$), the Subjective Shoulder Value improved from 31% to 87% ($P < .001$), and the Walch-Duplay score improved from 52.5 to 85.7 points ($P < .001$). One donor-site fracture occurred during the follow-up period. All grafts were well-positioned and achieved optimal bone healing with zero excessive absorption. The preoperative glenoid surface (72.6% ± 4.5%) increased significantly immediately after surgery to 116.5% ± 9.6% ($P < .001$). After a physiological remodeling process, the glenoid surface remained significantly increased at the last follow-up (99.2% ± 7.1%) ($P < .001$). The glenoid surface area appeared to decrease serially when compared between the first 6 months and 12 months postoperatively, while there was no significant interval change between 12 and 24 months postoperatively.

Conclusion: Patient outcomes were satisfactory following the all-arthroscopic modified Eden-Hybinette procedure using an autologous iliac crest grafting technique through one-tunnel fixation system with double Endobutton. Graft absorption mostly occurred on the edge and outside the ‘‘best-fit’’ circle of the glenoid. Glenoid remodeling occurred within the first year after all-arthroscopic glenoid reconstruction with an auto iliac bone graft.

Level of Evidence: Level IV, Case Series, Treatment Study.

BACK

Intra-articular soft arthroscopic Latarjet technique as a Bankart-plus procedure for type V superior labrum anterior-posterior lesion: lower rate of instability recurrence and better functional outcomes of a prospective cohort study

A. Kandeel

DOI: https://doi.org/10.1016/j.jse.2023.01.043

Background: Intra-articular soft arthroscopic Latarjet technique (in-SALT) involves augmentation of arthroscopic Bankart repair (ABR) with soft tissue tenodesis of long head of biceps to upper subscapularis. This study was conducted to investigate superiority of outcomes of in-SALT–augmented ABR over those of concurrent ABR and anterosuperior labral repair (ASL-R) in management of type V superior labrum anterior-posterior (SLAP) lesion.

Methods: This prospective cohort study (conducted between January 2015 and January 2022) included 53 patients with arthroscopic diagnosis of type V SLAP lesion. Patients were allocated into 2 consecutive groups: group A of 19 patients managed with concurrent ABR/ASL-R and group B of 34 patients managed with in-SALT–augmented ABR. Outcome measurements included 2-year postoperative pain, range of motion, and American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES) and Rowe instability scores. Failure was defined as frank/subtle postoperative recurrence of glenohumeral instability or objective diagnosis of Popeye deformity.

Results: The statistically matched studied groups showed significant postoperative improvement in outcome measurements. However, group B demonstrated significantly better 3-month postoperative visual analog scale score (3.6 vs. 2.6, P = .006) and 24-month postoperative external rotation at 0° abduction (44° vs. 50°, P = .020) and ASES (84 vs. 92, P < .001) and Rowe (83 vs. 88, P = .032) scores. Rate of postoperative recurrence of glenohumeral instability was relatively lower in group B (10.5% vs. 2.9%, P = .290). No Popeye deformity was reported.

Conclusion: For management of type V SLAP lesion, in-SALT–augmented ABR yielded a relatively lower rate of postoperative recurrence of glenohumeral instability and significantly better functional outcomes compared with concurrent ABR/ASL-R. However, currently reported favorable outcomes of in-SALT should be validated via further biomechanical and clinical studies.

Level of evidence: Level III, Prospective Cohort Comparison, Treatment Study.

BACK

Timing of retears after arthroscopic rotator cuff repair and associated factors: a retrospective analysis

K. Yamaura, I. Fujibayashi

DOI: https://doi.org/10.1016/j.jse.2023.01.026

Background: Retear after arthroscopic rotator cuff repair (ARCR) remains a complication of important concern. Few reports have evaluated retear timing and its associated patient characteristics in large cohorts. This study aimed to investigate retear timing and patient characteristics and factors associated with this parameter.

Methods: Of the 638 consecutive shoulders that underwent ARCR from August 2009 to November 2019, shoulders with retear complication within 1 year of surgery were included. Retears were defined as type IV or V of the Sugaya's classification, and magnetic resonance imaging was performed at 6 weeks, 3 months, 6 months, and 1 year after surgery. The distribution of patients with retears at the timing of retears was investigated. In addition, patients with retears were classified into the following two groups: early group with retears occurring at 6 weeks and 3 months postoperatively or late group with retears occurring between 6 months and 1 year postoperatively. Associated factors such as sex, age, tear size, pre and postoperative range of motion, surgical technique, and clinical outcome between the two groups were investigated.

Results: The 41 shoulders with retears were divided into four groups: 1) within 6 weeks after surgery (n = 9, 22.0%), 2) 6 weeks-to 3 months after surgery (n = 19, 46.3%), 3) 3-6 months after surgery (n = 11, 26.8%), and 4) 6 months-1 year after surgery (n = 2, 4.9%). In addition, there were significantly larger retear sizes in the Sugaya's classification in the early group compared to the late group (P = .013), while there were significantly more males in the late group compared to the early group (P = .030).

Conclusion: The highest retear rate after ARCR was observed from 6 weeks to 3 months after surgery, with equivalent rates within 6 weeks and from 3 months to 6 months after surgery.

Level of evidence: Level III, Retrospective Cohort Comparison, Prognosis Study.

BACK

Arthroscopic scapulothoracic bursectomy with and without superomedial angle scapuloplasty: a comparison of patient-reported outcomes

J. Featherall, G. Christensen

DOI: https://doi.org/10.1016/j.jse.2023.03.020

Background: Operative treatment of scapulothoracic bursitis most commonly comprises arthroscopic scapulothoracic bursectomy with or without partial superomedial angle scapuloplasty. There is currently no consensus regarding whether or when scapuloplasty should be performed. Prior studies are limited to small case series, and optimal surgical indications are not yet established. The purposes of this study were (1) to retrospectively review patient-reported outcomes of arthroscopic treatment of scapulothoracic bursitis and (2) to compare outcomes between scapulothoracic bursectomy alone and bursectomy with scapuloplasty. We hypothesized that bursectomy with scapuloplasty would provide superior pain relief and functional improvement.

Methods: All cases of scapulothoracic débridement with or without scapuloplasty completed at a single academic center from 2007 through August 2020 were reviewed. Patient demographic characteristics, symptomatology data, physical examination findings, and corticosteroid injection response data were collected from the electronic medical record. Visual analog scale pain, American Shoulder and Elbow Surgeons, Simple Shoulder Test, and Single Assessment Numeric Evaluation scores were collected. Comparisons between the group undergoing bursectomy alone and the group undergoing bursectomy with scapuloplasty were made using the Student t test for continuous variables and the Fisher exact test for categorical variables.

Results: Thirty patients underwent scapulothoracic bursectomy alone, and 38 patients underwent bursectomy with scapuloplasty. Final follow-up data were available for 56 of 68 cases (82%). Final postoperative visual analog scale pain scores (3.4 ± 2.2 and 2.8 ± 2.2, respectively; P = .351), American Shoulder and Elbow Surgeons scores (75.8 ± 17.7 and 76.5 ± 22.5, respectively; P = .895), and Simple Shoulder Test scores (8.8 ± 2.3 and 9.5 ± 2.8, respectively; P = .340) were similar between the bursectomy-alone and bursectomy-with-scapuloplasty groups.

Conclusion: Both arthroscopic scapulothoracic bursectomy alone and bursectomy with scapuloplasty are effective treatments for scapulothoracic bursitis. Operative time is shorter without scapuloplasty. In this retrospective series, these procedures showed similar outcomes regarding shoulder function, pain, surgical complications, and rates of subsequent shoulder surgery. Further studies with a focus on 3-dimensional scapular morphology may help optimize patient selection for each of these procedures.

Level of Evidence: Level III, Retrospective Cohort Comparison, Treatment Study.

BACK

Postoperative psychological factors and quality of life but not shoulder brace adherence affect clinical outcomes after arthroscopic rotator cuff repair

M. Mercurio, D. Castioni

DOI: https://doi.org/10.1016/j.jse.2023.02.138

Background: Despite the high prevalence, there is no consensus for postsurgical management after rotator cuff repair. We aimed to assess the impact of psychological well-being on patients who underwent rotator cuff repair. We also investigated correlations and possible predictors between patient demographics and adherence to the use of the shoulder brace and outcomes in terms of shoulder functionality and quality of life.

Methods: We conducted a retrospective study with prospective data collection enrolling 120 consecutive patients who underwent shoulder arthroscopy for rotator cuff tear repair. Each patient was clinically evaluated after a mean follow-up of 24.2 (±9.8) months using (1) the Disability of the Arm, Shoulder and Hand (DASH) scale, (2) the Hospital Anxiety and Depression Scale (HADS), (3) the Rotator Cuff Quality of Life (RC-QoL), (4) the visual analog scale, and (5) the Medical Adherence Measure.

Results: The final sample consisted of 100 patients (45 females, 45%) averaging 60.9 (±8.5) years. The average brace wearing time was 3.4 (±0.6) weeks, with an adherence superior to 80% in 84% of cases, and 96% of patients were living with family members. The mean postoperative DASH scores were 20.1 (±16.7), 23.4 (±25), and 18.9 (±21.5) for the general, work, and sport sections, respectively. The mean Medical Adherence Measure score reached 72.5 (±14.2) points, and the RC-QoL mean score was 30.4% (±20.5). The Hospital Anxiety and Depression Scale–Anxiety and Hospital Anxiety and Depression Scale–Depression scores' continuous mean values were 5.1 (±3.4) and 3.9 (±3.6), respectively. The DASH, Hospital Anxiety and Depression Scale–Anxiety, Hospital Anxiety and Depression Scale–Depression, and RC-QoL scores directly correlated with each other, and all these questionnaires directly correlated with the visual analog scale scores. Moreover, we found a direct correlation ($r = 0.204$, $P = .033$) between the female sex and adherence to the brace and a direct correlation ($r = 0.242$, $P = .015$) between adherence to the brace and the number of weeks it was worn according to the medical recommendation. A correlation between lower educational qualifications and poorer outcomes was found. No correlation emerged between adherence to the brace and functional results. According to the regression analysis, diabetes was found to be a predictor of worse postoperative DASH scores ($\beta = 0.245$, $P = 0.28$).

Conclusion: A lower perceived quality of life was associated with worse functional results, anxiety and depression symptoms, and pain after rotator cuff repair surgery. The adherence to the use of the shoulder brace was associated with the female sex and a longer prognosis, but no correlation emerged between adherence to the brace and functional outcomes.

Level of Evidence: Level IV, Case Series, Prognosis Study.

BACK

Outcome of intraoperative injection of collagen in arthroscopic repair of full-thickness rotator cuff tear: a retrospective cohort study

O. Aldhafian, K-H. Choi

DOI: https://doi.org/10.1016/j.jse.2023.03.002

Background: Rotator cuff (RC) pathologies are considered the most common cause of shoulder disability and pain. Arthroscopic repair of RC tears has proven to be an effective operation. Nonhealing and retear remain significant clinical problems and a challenge to surgeons. In addition, the essential biological augment to enhance RC tendon-bone healing is still under research. The purpose of the study was to assess the safety and efficacy of injection of atelocollagen and acellular dermal matrix (ADM) allograft in arthroscopic repair of full-thickness RC tears.

Methods: From January 2018 to March 2020, a total of 129 patients with full-thickness RC tear were treated by arthroscopic repair only (group 1, n = 36, with a mean age = 63.2 years), arthroscopic repair together with atelocollagen 1-mL injection (group 2, n = 44, with a mean age = 63 years), or RC tears together with ADM allograft 1-mL injection (group 3, n = 49, with a mean age = 64.6 years). They were prospectively studied. This study included patients with a repairable full-thickness tear of the supraspinatus tendon size <5 cm. We excluded patients with isolated tears of the subscapularis tendon, those with a previous shoulder surgery, and those who had any type of injection for less than 6 weeks. American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form score, Constant Shoulder score, visual analog scale pain score, and range of motion were evaluated preoperatively, at 3, 6, and 12 months of the postoperative period and the final follow-up. In addition, magnetic resonance imaging was performed at 2 months and 12 months postoperatively.

Results: The mean follow-up period was 20 months. All groups showed improvement in functional and pain score at the final follow-up; however, there is no superior outcome among the 3 groups (P > .05). After 2 months, the nonhealing rate was 11% (4 of 36) for group 1, 4% (2 of 44) for group 2, and 2% (1 of 49) for group 3 (P > .05). The retear rates after 12 months was 19.4% (7 of 36) for group 1, 13.6% (6 of 44) for group 2, and 20.4% (10 of 49) for group 3 (P > .05). Adverse events were not detected in any groups.

Conclusion: Our study did not show superior clinical or radiologic outcomes of atelocollagen and ADM allograft injections in arthroscopic RC repair over 12 months of follow-up in comparison to the control group. However, adverse events related to atelocollagen and ADM allograft injection were not observed.

Level of Evidence: Level III, Retrospective Cohort Comparison, Treatment Study.

BACK

Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA), Volume 31, Issue 9

Previously failed Bankart repair and the duration from first dislocation to surgery were the risk factors associated with the level of return to sports after coracoid transfer

Q. Song, S. Zhang

DOI: https://doi.org/10.1007/s00167-023-07453-5

Purpose: This study aims to determine the rate of different levels of return to sports (RTS) in athletes undergoing the modified arthroscopic Bristow procedure and the factors associated with the level of RTS.

Methods: The study was performed retrospectively on patients with traumatic anterior shoulder instability who underwent the modified arthroscopic Bristow procedure with a minimum follow-up of 2 years. The RTS rate, the level of return and the timing of return were assessed. Additionally, factors such as preoperative basic information, clinical outcomes, graft position, graft healing and graft absorption were analysed to investigate their correlation with the level of RTS. Multivariate regression models were used to evaluate the factors affecting the level of RTS.

Results: In total, this study included 182 shoulders of 177 athletes undergoing the modified arthroscopic Bristow procedure. Of these patients, 142 (78.0%) shoulders of 137 athletes were enrolled, with a mean of 3.3-year follow-up. At the final follow-up, 134 (94.4%) shoulders were able to RTS, 123 (86.6%) shoulders were able to RTS to the pre-injury level, 52 (36.6%) shoulders could be completely “forgotten” without any psychological barrier during exercise. The multivariate logistic regression analysis identified the variable associated with RTS at the pre-injury level as previously failed arthroscopic Bankart repair ($p < 0.001$). As for the “forgetting” operated shoulder, the duration from first dislocation to surgery was a significant independent predictor ($p = 0.034$).

Conclusion: Although a large majority of athletes were able to RTS at the pre-injury level after the modified arthroscopic Bristow procedure, about two-thirds of the athletes felt difference in shoulders on both sides and could not completely “forget” the operated shoulder during exercise. Previously failed Bankart repair and the duration from first dislocation to surgery were the risk factors associated with the level of RTS after the modified arthroscopic Bristow procedure.

Level of Evidence: Level IV.

BACK

American Journal of Sports Medicine (AJSM), Volume 51, Issue 11

Prospective Randomized Clinical Trial of Arthroscopic Repair Versus Debridement for Partial Subscapularis Tendon Tears More Than Half of the Entire First Facet

J.Y. Jeong, S.C. Kim

DOI: https://doi.org/10.1177/03635465231187033

Background: Most outcome studies on subscapularis (SSC) tendon tears have focused on large SSC tears rather than partial SSC tendon tears. Therefore, the optimal treatment for partial SSC tendon tears more than half of the first facet of the entire SSC footprint has not yet been clearly defined.

Purpose: To prospectively investigate the clinical and radiological results between the arthroscopic repair group and the debridement group in SSC partial tear (Yoo and Rhee classification, type 2B: SSC tendon tears of more than half of the entire first facet).

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

Methods: A total of 65 patients with SSC tendon type 2B tears were randomized to arthroscopic debridement (n = 33) or arthroscopic repair (n = 32). Clinical evaluation of the patients was performed on the day before surgery and 6 months, 1 year, 2 years, and 5 years postoperatively using active range of motion measurements and other validated scores (pain visual analog scale scores, function visual analog scale scores, Constant score, American Shoulder and Elbow Surgeons score). In addition, SSC muscle strength was measured using instruments in the belly-press position. Magnetic resonance imaging (upper and lower SSC muscle diameters, Goutallier grades) was performed on the day before operation as well as 6 months and 2 years postoperatively.

Results: There were no clinically or statistically significant differences between the arthroscopic debridement and arthroscopic repair groups with respect to active range of motion, pain visual analog scale scores, function visual analog scale scores, Constant scores, or American Shoulder and Elbow Surgeons scores. There was a statistically significant increase in SSC muscle strength in the repair group compared with the debridement group at 5 years postoperatively (P = .013). Magnetic resonance imaging assessment was also not significantly different between the 2 groups.

Conclusion: There were no differences in the patient-reported outcomes of patients with partial SSC tears treated with either arthroscopic debridement or repair, although there was an increase in SSC muscle strength associated with repair, the clinical importance of which may warrant further research.

BACK

Use of Area Deprivation Index to Predict Minimal Clinically Important Difference for Patient Reported Outcomes Measurement Information System After Arthroscopic Rotator Cuff Repair

H.J.F. Shaikh, D.E. Anderson

DOI: https://doi.org/10.1177/03635465231187904

Background: Socioeconomic disparities correlate with worse outcomes after arthroscopic rotator cuff repair. However, use of a surrogate to describe socioeconomic disadvantage has been a challenge. The Area Deprivation Index (ADI) is a tool that encompasses 17 socioeconomic variables into a single metric based on census location.

Purpose: Higher ADI would result in a worse minimal clinically important difference (MCID) for the Patient Reported Outcomes Measurement Information System (PROMIS) and have less improvement in range of motion (ROM) following arthroscopic rotator cuff repair (ARCR).

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

Methods: A retrospective review was performed for patients who underwent arthroscopic rotator cuff repair. Patients in the most socioeconomically disadvantaged quartile (ADIHigh) were compared with the least disadvantaged quartile (ADILow) in the ability to reach MCID. Demographic and surgical features were assessed for attainment of MCID.

Results: In total 1382 patients were identified who underwent ARCR, of which a total of 306 patients met final inclusion criteria. A higher percentage of patients within the ADIHigh cohort identified as “Black” or “other” race and had government-issued insurance compared with the ADILow cohort ($P < .05$). The ADIHigh cohort had significantly worse postoperative forward flexion compared with the ADILow cohort (145.0°± 32.5° vs 156.3°± 23.4°; $P = .001$) despite starting with comparable preoperative ROM ($P = .17$). Logistic regression showed that ADI was the only variable significant for predicting achievement of MCID for all 3 PROMIS domains, with the ADIHigh cohort having significantly worse odds of achieving MCID Physical Function (odds ratio [OR], 0.31; $P = .001$), Pain Interference (OR, 0.21; $P = .001$), and Depression (OR, 0.28; $P = .001$). Meanwhile, age, sex, body mass index, and smoking history were nonsignificant. Moreover, “other” for race and Medicare insurance were significant for achievement of MCID Depression but not Physical Function or Pain Interference. Finally, ADI was the main feature for predictive logistic regression modeling.

Conclusion: ADI served as the only significant predictor for achieving MCID for all 3 PROMIS domains after arthroscopic rotator cuff repair. Patients who face high levels of socioeconomic disadvantage have lower rates of achieving MCID. In addition, patients with greater neighborhood disadvantage demonstrated significantly worse improvement in active forward flexion. Further investigation is required to understand the role of ADI on physical therapy compliance and to identify the barriers that prevent equitable postoperative care.

BACK

Prediction of Retear After Arthroscopic Rotator Cuff Repair Based on Intraoperative Arthroscopic Images Using Deep Learning

S-H. Cho, Y-S. Kim

DOI: https://doi.org/10.1177/03635465231189201

Background: It is challenging to predict retear after arthroscopic rotator cuff repair (ARCR). The usefulness of arthroscopic intraoperative images as predictors of the ARCR prognosis has not been analyzed.

Purpose: To evaluate the usefulness of arthroscopic images for the prediction of retear after ARCR using deep learning (DL) algorithms.

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

Methods: In total, 1394 arthroscopic intraoperative images were retrospectively obtained from 580 patients. Repaired tendon integrity was evaluated using magnetic resonance imaging performed within 2 years after surgery. Images obtained immediately after ARCR were included. We used 3 DL architectures to predict retear based on arthroscopic images. Three pretrained DL algorithms (VGG16, DenseNet, and Xception) were used for transfer learning. Training and test sets were split into 8:2. Threefold stratified validation was used to fine-tune the hyperparameters using the training data set. The validation results of each fold were evaluated. The performance of each model in the test set was evaluated in terms of accuracy, area under the receiver operating characteristic curve (AUC), F1-score, sensitivity, and specificity.

Results: In total, 1138 and 256 arthroscopic images were obtained from 514 patients and 66 patients in the nonretear and retear groups, respectively. The mean validation accuracy of each model was 83% for VGG16, 89% for Xception, and 91% for DenseNet. The accuracy for the test set was 76% for VGG16, 87% for Xception, and 91% for DenseNet. The AUC was highest for DenseNet (0.92); it was 0.83 for VGG16 and 0.91 for Xception. For the test set, the specificity and sensitivity were 0.93 and 0.84 for DenseNet, 0.89 and 0.84 for Xception, and 0.70 and 0.80 for VGG16, respectively.

Conclusion: The application of DL algorithms to intraoperative arthroscopic images has demonstrated a high level of accuracy in predicting retear occurrences.

BACK

Effect of Anterior Acromial Coverage on Functional and Radiological Outcomes After Arthroscopic Repair of Anteroposterior Massive Rotator Cuff Tears

Z. Ye, Y. Qiao

DOI: https://doi.org/10.1177/03635465231187900

Background: Rotator cuff tear size, fatty infiltration, and scapular morphology are correlated with tendon healing and functional outcomes after arthroscopic repair; however, the association between anteroposterior acromial coverage and the clinical outcomes of anteroposterior massive rotator cuff tears (AP-MRCTs; involving all 3 tendons) remains unclear.

Purpose: To identify the association between AP acromial coverage and functional and radiological outcomes after arthroscopic repair of AP-MRCTs.

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

Methods: A total of 98 patients who underwent arthroscopic repair of AP-MRCTs between January 2015 and December 2020 were included in the study and classified according to whether anterior acromial coverage (AAC) was anterior (46 patients; positive AAC group) or posterior (52 patients; negative AAC group) to the scapular line on true lateral shoulder radiographs. Demographic characteristics, surgical details, and functional outcomes were prospectively collected. Acromial morphological features, global tear extension (GTE), the global fatty infiltration index (GFII), tendon integrity after repair, proximal humeral migration, and glenohumeral abduction were measured and calculated on radiographs or magnetic resonance imaging scans preoperatively and at 2 years postoperatively. Multivariate logistic regression was performed to identify the independent risk factors of a rotator cuff retear.

Results: The positive AAC group showed larger AAC, posterior acromial tilt, and anterior acromial slope as well as smaller posterior acromial coverage compared with the negative AAC group. Postoperatively, the American Shoulder and Elbow Surgeons score (82.5 ± 8.3 vs 77.2 ± 11.5, respectively; P = .013), active abduction (157.8°± 27.1° vs 142.7°± 39.6°, respectively; P = .048), and glenohumeral abduction (45.6°± 10.4° vs 39.7°± 14.9°, respectively; P = .041) in the positive AAC group were significantly higher than those in the negative AAC group, while the retear rate (23.9% vs 44.2%, respectively; P = .035) and proximal humeral migration (1.7 ± 1.0 vs 2.3 ± 1.2 mm, respectively; P = .006) were significantly lower in the positive AAC group than in the negative AAC group. Smaller AAC (odds ratio [OR], 0.93 [95% CI, 0.87-1.00]; P = .040), larger GTE (OR, 1.03 [95% CI, 1.01-1.06]; P = .017), and a higher GFII (OR, 3.49 [95% CI, 1.09-11.19]; P = .036) were associated with an increased risk of a rotator cuff retear.

Conclusion: Increased AAC was associated with a lower retear rate and better functional outcomes after arthroscopic repair of AP-MRCTs. A preliminary risk evaluation integrating GTE, the GFII, and AAC is recommended to consider the necessity of additional procedures for patients in need of arthroscopic rotator cuff repair.

BACK

A Radiostereometric Analysis of Tendon Migration After Arthroscopic and Mini-Open Biceps Tenodesis: Interference Screw Versus Single Suture Anchor Fixation

B. Forsythe, H.H. Patel

DOI: https://doi.org/10.1177/03635465231187030

Background: Studies suggest that similar clinical results are achieved via arthroscopic and open biceps tenodesis (BT) techniques.

Purpose: To quantify the postoperative migration of the BT construct between arthroscopic suprapectoral BT (ASPBT) and open subpectoral BT (OSPBT) techniques via interference screw (IS) or single-suture suture anchor (SSSA) fixation using radiostereometric analysis.

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

Methods: Distal migration of the biceps tendon after OSPBT with a polyetheretherketone IS, OSPBT with 1 SSSA, ASPBT with polyetheretherketone IS, and ASPBT with 2 SSSAs was measured prospectively. Patients with symptomatic biceps tendinopathy and preoperative patient-reported outcome measures (PROMs) including Constant-Murley subjective, Single Assessment Numeric Evaluation, or Patient-Reported Outcomes Measurement Information System–Upper Extremity scores were included. A tantalum bead was sutured on the proximal end of the long head of the biceps tendon before fixation of tendon tissue. Anteroposterior radiographs were performed immediately postoperatively, at 1 week, and at 3 months. Bead migration was measured, and preoperative PROMs were compared with those at latest follow-up.

Results: Of 115 patients, 94 (82%) were available for final follow-up. IS fixation yielded the least tendon migration with no difference between the open and arthroscopic approaches (4.31 vs 5.04 mm; P = .70). Fixation with 1 suture anchor demonstrated significantly greater migration than that achieved with an IS at both 1 week (6.47 vs 0.1 mm, 6.47 vs 1.75 mm, P < .001;) and 3 months (14.76 vs 4.31 mm, 14.76 vs 5.04 mm, P < .001) postoperatively. Two-suture anchor fixation yielded significantly greater migration than IS fixation at 1 week (7.02 vs 0.1 mm, P < .001; 7.02 vs 1.75 mm, P = .003) but not 3 months postoperatively (8.06 vs 4.31 mm, P = .10; 8.06 vs 5.04 mm, P = .07). Four patients with suture anchor fixation (3 patients in the OSPBT 1 SSSA group, 9.4%, and 1 patient in the ASPBT 2 SSSAs group, 3.8%) developed a Popeye deformity, whereas no Popeye deformities occurred in the IS groups. Mean 3-month bead migration in patients with and without a Popeye deformity was 60.8 and 11.2 mm, respectively (P < .0001). PROMs did not differ among groups at final follow-up.

Conclusion: Interference screw fixation yielded the least tendon migration whether achieved arthroscopically or open. The available data indicated that fixation with 1 SSSA but not 2 SSSAs resulted in significantly greater migration than that achieved with an IS. Despite variations in tendon migration, PROMs were similar among all groups. When SSSAs are used, tendon migration may be minimized by using ≥2 anchors.

BACK

Journal of Bone and Joint Surgery (JBJS), Volume 105, Issue 17+18

No Upper Extremity Abstracts.

BACK

Clinical Orthopaedics and Related Research (CORR), Volume 481, Issue 9

No Upper Extremity Abstracts.

BACK

Bone and Joint Journal (BJJ), Volume 105-B, issue 9

No Upper Extremity Abstracts.

BACK

Lower Extremity

Arthroscopy, Volume 39, Issue 9

Reprint of: Class I Obesity Delays Achievement of Patient-Acceptable Symptom State but Not Minimum Clinically Important Difference or Substantial Clinical Benefit After Primary Hip Arthroscopy for Femoroacetabular Impingement Syndrome

V. Gopinatth, F.J. Casanova

DOI: https://doi.org/10.1016/j.arthro.2023.02.009

Purpose: To systematically review the current literature regarding the indications, techniques, and outcomes after 2-stage revision anterior cruciate ligament reconstruction (ACLR).

Methods: A literature search was performed using SCOPUS, PubMed, Medline, and the Cochrane Central Register for Controlled Trials according to the 2020 Preferred Reporting Items for Systematic Reviews and Meta Analyses statement. Inclusion criteria was limited to Level I-IV human studies reporting on indications, surgical techniques, imaging, and/or clinical outcomes of 2-stage revision ACLR.

Results: Thirteen studies with 355 patients treated with 2-stage revision ACLR were identified. The most commonly reported indications were tunnel malposition and tunnel widening, with knee instability being the most common symptomatic indication. Tunnel diameter threshold for 2-stage reconstruction ranged from 10 to 14 mm. The most common grafts used for primary ACLR were bone–patellar tendon–bone (BPTB) autograft, hamstring graft, and LARS (polyethylene terephthalate) synthetic graft. The time elapsed from primary ACLR to the first stage surgery ranged from 1.7 years to 9.7 years, whereas the time elapsed between the first and second stage ranged from 21 weeks to 13.6 months. Six different bone grafting options were reported, with the most common being iliac crest autograft, allograft bone dowels, and allograft bone chips. During definitive reconstruction, hamstring autograft and BPTB autograft were the most commonly used grafts. Studies reporting patient-reported outcome measures showed improvement from preoperative to postoperative levels in Lysholm, Tegner, and objective International Knee and Documentation Committee scores.

Conclusions: Tunnel malpositioning and widening remain the most common indications for 2-stage revision ACLR. Bone grafting is commonly reported using iliac crest autograft and allograft bone chips and dowels, whereas hamstring autograft and BPTB autograft were the most used grafts during the second-stage definitive reconstruction. Studies showed improvements from preoperative to postoperative levels in commonly used patient reported outcomes measures.

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

BACK

Hypermobile Patients With Femoroacetabular Impingement Syndrome Can Be Effectively Treated Utilizing Hip Arthroscopy With Periportal Capsulotomy Closure: A Matched Cohort Analysis Compared to Patients Without Joint Hypermobility

K.K.J. Soriano, M.J. Hartwell

DOI: https://doi.org/10.1016/j.arthro.2023.03.008

Purpose: To assess the 2-year outcomes of arthroscopic treatment with periportal capsulotomy closure for femoroacetabular impingement syndrome (FAIS) in patients with generalized ligamentous laxity (GLL).

Methods: A retrospective analysis was performed from a prospectively collected database of FAIS patients undergoing hip arthroscopy. FAIS patients with GLL were identified as having Beighton score ≥4. FAIS patients with GLL were treated with arthroscopic labral repair, osteochondroplasty, via periportal capsulotomy with subsequent capsular closure. These patients were matched by age, sex, and body mass index (BMI) with a cohort of FAIS patients without GLL who underwent the same procedure via periportal capsulotomy without capsular closure. Preoperatively, and 2 years postoperatively, patients completed patient-reported outcomes (PRO) scores, including the Hip Disability and Osteoarthritis Outcome Score (HOOS), 12-item Short-Form survey (SF-12) and the visual analog scale (VAS).

Results: Forty patients (5 male, 35 female) with FAIS and GLL were included (age: 29.7 ± 9.0; BMI: 23.3 ± 4.1). FAIS patients with GLL demonstrated similar significant PRO score improvements compared to a matched cohort of FAIS patients without GLL at 2 years after surgery (VAS Pain: (−)2.5 ± 3.0, (−)2.7 ± 2.7; SF-12 PCS: 17.7 ± 14.2, 16.7 ± 15.0; HOOS-Symptoms: 26.3 ± 24.0, 20.6 ± 18.1; HOOS-Pain: 29.8 ± 20.4, 24.4 ± 9.0; HOOS-ADL: 24.9 ± 18.4, 22.0 ± 19.9; HOOS-Sports: 43.6 ± 26.1, 33.1 ± 29.8; and HOOS-QOL: 44.2 ± 27.6, 41.7 ± 27.1, respectively). Both cohorts achieved minimal clinically important differences (MCID) for each HOOS subscore at equivalent high rates (70-88%).

Conclusions: Patients with GLL in the setting of FAIS can be effectively treated with arthroscopy via periportal capsulotomy and capsular closure. These patients demonstrate significant improvements in PRO scores at 2 years, similar to normal laxity FAIS patients undergoing arthroscopic treatment via periportal capsulotomy without capsular closure.

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

BACK

Low Ceiling Effects of the Forgotten Joint Score Compared With Legacy Measures After Joint-Preserving Procedures: A Systematic Review

B.D. Kuhns, W.T. Harris

DOI: https://doi.org/10.1016/j.arthro.2023.01.107

Purpose: To determine, in patients undergoing joint preservation procedures, whether the Forgotten Joint Score (FJS) compares favorably with legacy measures.

Methods: Medical databases (including PubMed/MEDLINE and Embase databases) were queried for publications with the terms “Forgotten Joint Score” and “hip,” “knee,” “arthroscopy,” or “ACL.” Fourteen studies met the inclusion criteria. Methodologic quality was assessed through the Consensus-based Standards for the Selection of Health Measurement Instruments (COSMIN) checklist, and psychometric data were evaluated for ceiling or floor effects, convergent validity, internal consistency, reliability, responsiveness, measurement invariance, and measurement error by 2 fellowship-trained orthopaedic surgeons (B.D.K. and W.T.H.).

Results: Data were collected from 14 studies using the FJS after joint-preserving procedures in 911 patients (959 joints). Four studies reported strong internal consistency with an average Cronbach α of 0.92. Two studies reported responsiveness with an effect size ranging from 0.6 to 1.16. One study reported reproducibility with an interclass correlation coefficient of 0.9 (95% confidence interval, 0.8-0.9). One study reported measurement error with an minimum detectable change $(MDC)_{individual}$ of 32% and MDC_{group} of 4.5%. Studies reported moderate to very strong convergent validity across legacy measures for hip and knee preservation surgery. Ceiling effects were favorable compared with many legacy scores for hip and knee preservation. Three studies reported the minimal clinically important difference whereas 1 study reported the patient acceptable symptomatic state for the FJS.

Conclusions: The FJS is a methodologically sound outcome measure used to evaluate patient outcomes after hip and knee preservation surgery with overall low ceiling effects compared with legacy measures.

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

BACK

Consistent Indications and Good Outcomes Despite High Variability in Techniques for Two-Stage Revision Anterior Cruciate Ligament Reconstruction: A Systematic Review

V. Gopinatth, F.J. Casanova

DOI: https://doi.org/10.1016/j.arthro.2023.02.009

Purpose: To systematically review the current literature regarding the indications, techniques, and outcomes after 2-stage revision anterior cruciate ligament reconstruction (ACLR).

Methods: A literature search was performed using SCOPUS, PubMed, Medline, and the Cochrane Central Register for Controlled Trials according to the 2020 Preferred Reporting Items for Systematic Reviews and Meta Analyses statement. Inclusion criteria was limited to Level I-IV human studies reporting on indications, surgical techniques, imaging, and/or clinical outcomes of 2-stage revision ACLR.

Results: Thirteen studies with 355 patients treated with 2-stage revision ACLR were identified. The most commonly reported indications were tunnel malposition and tunnel widening, with knee instability being the most common symptomatic indication. Tunnel diameter threshold for 2-stage reconstruction ranged from 10 to 14 mm. The most common grafts used for primary ACLR were bone–patellar tendon–bone (BPTB) autograft, hamstring graft, and LARS (polyethylene terephthalate) synthetic graft. The time elapsed from primary ACLR to the first stage surgery ranged from 1.7 years to 9.7 years, whereas the time elapsed between the first and second stage ranged from 21 weeks to 13.6 months. Six different bone grafting options were reported, with the most common being iliac crest autograft, allograft bone dowels, and allograft bone chips. During definitive reconstruction, hamstring autograft and BPTB autograft were the most commonly used grafts. Studies reporting patient-reported outcome measures showed improvement from preoperative to postoperative levels in Lysholm, Tegner, and objective International Knee and Documentation Committee scores.

Conclusions: Tunnel malpositioning and widening remain the most common indications for 2-stage revision ACLR. Bone grafting is commonly reported using iliac crest autograft and allograft bone chips and dowels, whereas hamstring autograft and BPTB autograft were the most used grafts during the second-stage definitive reconstruction. Studies showed improvements from preoperative to postoperative levels in commonly used patient reported outcomes measures.

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

BACK

Journal of Shoulder and Elbow Surgery (JSES), Volume 32, issue 9

No Lower Extremity Abstracts.

BACK

Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA), Volume 31, Issue 9

Multimodal analgesia did not improve post-operative pain scores, reduce opioid consumption or reduce length of stay following hip arthroscopy

R.M. Degen, A. Firth

DOI: https://doi.org/10.1007/s00167-023-07445-5

Purpose: To determine whether different regimens of multimodal analgesia will reduce postoperative pain scores, opioid consumption, costs and hospital length-of-stay following hip arthroscopy.

Methods: From 2018 to 2021, 132 patients undergoing hip arthroscopy for femoroacetabular impingement syndrome (FAIS) were included in this prospective, single-center randomized controlled trial. Patients were randomized into four treatment groups:

1. (1)
   Group 1—Control: opioid medication (oxycodone-acetaminophen 5 mg/325 mg, 1–2 tabs q6H as needed), Heterotopic ossification prophylaxis—Naprosyn 500 mg twice daily × 3 weeks);

2. (2)
   Group 2—Control + postoperative sleeping aid (Zopiclone 7.5 mg nightly × 7 days);

3. (3)
   Group 3—Control + preoperative and postoperative Gabapentin (600 mg orally, 1 h preoperatively; 600 mg postoperatively, 8 h following pre-op dose);

4. (4)
   Group 4—Control + pre-medicate with Celecoxib (400 mg orally, 1 h preoperatively)

The primary outcome was pain measured with a visual analog scale, monitored daily for the first week and every other day for 6 weeks. Secondary outcomes included opioid consumption, healthcare resource use, and hospital length of stay.

Results: Patient characteristics were similar between groups. There were no statistically significant differences in pain scores between groups at any timepoint after adjusting for intra-operative traction time, intra-operative opioid administration and preoperative pain scores ($p > 0.05$). There were also no significant differences in the number of days that opioids were taken (n.s.) and the average daily morphine milligram equivalents consumed (n.s.). Similarly, there were no statistically significant differences in length of stay in the experimental groups, compared with the control group (n.s.). Finally, there were no differences in cost between groups (n.s.).

Conclusion: The routine use of Zopiclone, Celecoxib and Gabapentin did not improve postoperative pain control or reduce length-of-stay following hip arthroscopy. Therefore, these medications are not recommended for routine postoperative pain control following hip arthroscopy.

Level of Evidence: Level I.

BACK

Arthroscopic modified Broström procedure achieved similar favorable short term outcomes to open procedure for chronic lateral ankle instability cases with generalized joint laxity

A-H. Wang, T. Su

DOI: https://doi.org/10.1007/s00167-023-07431-x

Purpose: To compare the short-term clinical outcomes of the open versus arthroscopic modified Broström procedure in generalized joint laxity (GJL) patients.

Methods: From January 2018 to January 2020, 64 consecutive patients with chronic lateral ankle instability (CLAI) and GJL (Beighton score ≥ 4) were prospectively enrolled into two groups: those who underwent the open modified Broström procedure (open group, n = 32) and those who underwent the arthroscopic modified Broström procedure (arthroscopic group, n = 32). Patients underwent an open or arthroscopic modified Broström procedure based on the time when they attended the clinic for consultation. All patients were followed-up at 3, 6, 12, and 24 months postoperatively. The clinical outcomes were evaluated using the visual analogue scale (VAS), American Orthopaedic Foot and Ankle Society (AOFAS) score, and Karlsson score, and the radiographic outcomes were assessed using stress radiography at 24 months postoperatively. The time to return to work and the failure rate were also evaluated and compared.

Results: Follow-up was completed for 31 patients in the open group and 30 patients in the arthroscopic group. No significant differences were found between the two groups in terms of demographic characteristics, Beighton score (6.2 ± 1.9 vs. 5.5 ± 1.4, n.s.), or duration of symptoms. There were no significant differences in the functional scores before surgery and at 6, 12 and 24 months postoperatively or in the mean anterior translation of the talus and talar tilt angle on stress radiography at 24 months postoperatively between the open and arthroscopic groups. Compared to the open group, the arthroscopic group showed a significantly earlier return to work (6.8 ± 2.1 vs. 8.1 ± 2.4 weeks, $p = 0.006$). There was no significant difference in terms of the failure rate between the open and arthroscopic groups (16.1% vs. 23.3%, n.s.).

Conclusion: Arthroscopic modified Broström procedure achieved similar short-term outcomes to the open procedure for GJL patients. Arthroscopic modified Broström procedure showed an earlier return to work than the open modified Broström procedure and was an alternative to open surgery for CLAI patients with GJL.

Level of Evidence: Level III.

BACK

American Journal of Sports Medicine (AJSM), Volume 51, Issue 11

Progression of Osteoarthritis at Long-term Follow-up in Patients Treated for Symptomatic Femoroacetabular Impingement With Hip Arthroscopy Compared With Nonsurgically Treated Patients

M. Husen, D.P. Leland

DOI: https://doi.org/10.1177/03635465231188114

Background: Femoroacetabular impingement (FAI) is a common cause of hip pain, especially in young patients. When left untreated, it has been demonstrated to be a risk factor for the onset or progression of osteoarthritis (OA) and has been identified as one of the main contributors leading to the need for total hip arthroplasty (THA) at a young age. While the short-term therapeutic potential of hip arthroscopy is widely recognized, little is known regarding its potential mid- to long-term preventive effect on the progression of hip OA.

Purpose: To (1) report clinical outcomes of arthroscopically treated FAI syndrome with a minimum 5-year follow-up and compare the results to a cohort with FAI treated nonsurgically and (2) determine the influence of hip arthroscopy on the onset and progression of hip OA in patients diagnosed with FAI.

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

Methods: Patients who had hip pain and were diagnosed with FAI were included. Exclusion criteria were (1) previous or concomitant hip surgery, (2) <5 years of follow-up, and (3) insufficient radiographs. Patients treated with hip arthroscopy were compared with a cohort of patients with FAI who were treated nonsurgically. Kaplan-Meier estimates of failure (defined as conversion to THA) were performed. Bivariate analysis and Cox regression were used to identify factors associated with inferior clinical and radiographic outcomes.

Results: A total of 957 patients (650 female, 307 male; 1114 hips) (mean age, 28.03 ± 8.9 years [range, 6.5-41.0 years]) with FAI were included. A total of 132 hips underwent hip arthroscopy and 982 hips were nonoperatively treated. The mean follow-up was 12.5 ± 4.7 years (range, 5.0-23.4 years). At the final follow-up, the rate of OA progression was 26.5% in the operative group and 35.2% in the nonoperative cohort ($P < .01$). Conversion to THA was performed in 6.8% of the surgical patients and 10.5% of the initially nonsurgical patients ($P = .19$). Additionally, there was no significant difference in the risk of failure between the operatively and nonoperatively treated patients. Male sex, increased age at initial diagnosis, presence of cam morphology, and increased initial Tönnis grade were risk factors for failure (male sex: hazard ratio [HR], 2.3; $P < .01$; per year of increased age: HR, 1.1; $P < .01$; presence of cam: HR, 3.5; $P < .01$; per Tönnis grade: HR, 4.0; $P < .01$).

Conclusion: At a mean follow-up of nearly 13 years, 7% of patients of the surgical group experienced progression to THA, compared with 11% of the nonoperative control group. While most of the operative group showed little to no OA at final follow-up, moderate OA (Tönnis grade 2) was present in 12% of the cohort compared with 22% of nonsurgical patients. Increased age at diagnosis, male sex, presence of a cam morphology, and presence of initial arthritic joint changes were found to be risk factors for failure. The results of this study demonstrated evidence for a preventive effect of hip arthroscopy on the development and progression of OA in young patients with FAI at mid- to long-term follow-up.

BACK

Journal of Bone and Joint Surgery (JBJS), Volume 105, Issue 17+18

No Lower Extremity Abstracts.

BACK

Clinical Orthopaedics and Related Research (CORR), Volume 481, Issue 9

No Lower Extremity Abstracts.

BACK

Bone and Joint Journal (BJJ), Volume 105-B, issue 9

No Lower Extremity Abstracts.

BACK

Miscellaneous

Arthroscopy, Volume 39, Issue 9

The Majority of Sports Medicine and Arthroscopy-Related Randomized Controlled Trials Reporting Nonsignificant Results Are Statistically Fragile

S.Y. Sudah, M.A. Moverman

DOI: https://doi.org/10.1016/j.arthro.2023.02.022

Purpose: To evaluate the robustness of sports medicine and arthroscopy related randomized controlled trials (RCTs) reporting nonsignificant results by calculating the reverse fragility index (RFI) and reverse fragility quotient (RFQ).

Methods: All sports medicine and arthroscopic-related RCTs from January 1, 2010, through August 3, 2021, were identified. Randomized-controlled trials comparing dichotomous variables with a reported *P* value ≥ .05 were included. Study characteristics, such as publication year and sample size, as well as loss to follow-up and number of outcome events were recorded. The RFI at a threshold of $P < .05$ and respective RFQ were calculated for each study. Coefficients of determination were calculated to determine the relationships between RFI and the number of outcome events, sample size, and number of patients lost to follow-up. The number of RCTs in which the loss to follow-up was greater than the RFI was determined.

Results: Fifty-four studies and 4,638 patients were included in this analysis. The mean sample size and loss to follow-up were 85.9 patients and 12.5 patients, respectively. The mean RFI was 3.7, signifying that a change of 3.7 events in one arm was needed to flip the results of the study from non-significant to significant ($P< .05$). Of the 54 studies investigated, 33 (61%) had a loss to follow-up greater than their calculated RFI. The mean RFQ was 0.05. A significant correlation between RFI with sample size ($R^2 = 0.10$, $P = .02$) and the total number of observed events ($R^2 = 0.13$, $P < .01$) was found. No significant correlation existed between RFI and loss to follow-up in the lesser arm ($R^2 = 0.01$, $P = .41$).

Conclusions: The RFI and RFQ are statistical tools that allow the fragility of studies reporting nonsignificant results to be appraised. Using this methodology, we found that the majority of sports medicine and arthroscopy-related RCTs reporting nonsignificant results are fragile.

Clinical Relevance: RFI and RFQ serve as tools that can be used to assess the validity of RCT results and provide additional context for appropriate conclusions.

BACK

Journal of Shoulder and Elbow Surgery (JSES), Volume 32, issue 9

No Miscellaneous Abstracts.

BACK

Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA), Volume 31, Issue 9

No Miscellaneous Abstracts.

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American Journal of Sports Medicine (AJSM), Volume 51, Issue 11

No Miscellaneous Abstracts.

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Journal of Bone and Joint Surgery (JBJS), Volume 105, Issue 17+18

No Miscellaneous Abstracts.

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Clinical Orthopaedics and Related Research (CORR), Volume 481, Issue 9

No Miscellaneous Abstracts.

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Bone and Joint Journal (BJJ), Volume 105-B, issue 9

No Miscellaneous Abstracts.

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