



Issue 72.3, Arthroscopy, August 2020

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Upper extremity

Arthroscopy, Volume 36, Issue 8, p2071–2079

Hypo–High-Density Lipoproteinemia Is Associated With Preoperative Tear Size and With Postoperative Retear in Large to Massive Rotator Cuff Tears

Hyung Bin Park, Ji-Yong Gwark, Byung Hoon Kwack, Jaehoon Jung

<https://doi.org/10.1016/j.arthro.2020.04.043>

Purpose

To evaluate any association of specific subtypes of dyslipidemia with increments of preoperative tear size and with structural integrity after arthroscopic rotator cuff repair (ARCR).

Methods

One surgeon's consecutive patients who underwent ARCR from January 2011 to June 2018 were reviewed. The inclusion criteria were minimum 1-year follow-up ultrasonography, blood tests, physical examination, and provision of informed consent. The exclusion criteria were incomplete laboratory tests, history of acute trauma, previous shoulder surgery, isolated subscapularis tendon tear, inappropriate radiographs, no 1-year follow-up ultrasonography, and medication with lipid-lowering drugs. Associated preoperative factors for the increments of tear size and for retear after ARCR were determined using logistic regression analysis. Statistical significance was set at $P < .05$.

Results

Of the 502 ARCR patients from the study period, 195 patients (195 shoulders), with a mean age of 60.5 ± 7.5 years, met the inclusion and exclusion criteria. Age (odds ratio [OR], 1.2; 95% confidence interval [CI], 1.1-1.3), diabetes (OR, 3.6; 95% CI, 1.7-7.5), and hypo–high-density lipoproteinemia (hypo-HDLemia) (OR, 2.9; 95% CI, 1.5-5.6) were significantly associated with increments of preoperative tear size ($P \leq .01$). Diabetes (OR, 3.0; 95% CI, 1.3-6.6), critical shoulder angle (OR, 2.0; 95% CI, 1.4-3.0), and tear size (OR, 2.1; 95% CI, 1.3-3.4) were significantly associated with retear after ARCR in overall study subjects ($P = .01$). Diabetes (OR, 3.8; 95% CI, 1.3-11.4), hypo-HDLemia (OR, 3.0; 95% CI, 1.1-8.8), and critical shoulder angle (OR, 1.5; 95% CI, 1.1-2.3) had significant associations with retear after ARCR in patients with a large to massive preoperative tear size ($P \leq .04$).

Conclusions

Preoperative hypo-HDLemia (high-density lipoprotein level < 40 mg/dL in male patients and < 50 mg/dL in female patients) has a significant association with the increments of preoperative tear size and with retear after ARCR in large- to massive-sized rotator cuff tears.

Level of Evidence

Level IV, case series.

[BACK](#)

Factors Related to Symptomatic Failed Rotator Cuff Repair Leading to Revision Surgeries After Primary Arthroscopic Surgery

Sanghyeon Lee, In Park, Hye Ah Lee, Sang-Jin Shin

<https://doi.org/10.1016/j.arthro.2020.04.016>

Purpose

To evaluate the clinical characteristics of patients with symptomatic failed rotator cuff repair who required revision surgeries and to identify clinical and radiologic factors related to the need for revision surgery.

Methods

Ninety-eight patients who were diagnosed with rotator cuff retear within 2 years after primary arthroscopic surgery were included. Patients were divided into 2 groups: patients who underwent revision surgery within 2 years postoperatively (44 patients, group I) and patients who did not require additional treatment due to minimal discomfort during the same period (54 patients, group II). Demographic and radiographic factors related to cuff healing were analyzed. Univariate and multivariate analyses were performed to evaluate factors related to revision surgery.

Results

Group I showed significantly inferior clinical outcomes at the time of revision compared to group II (American Shoulder and Elbow Surgeons score; 54.0 ± 12.1 vs 86.5 ± 12.2 , Constant score; 65.2 ± 10.8 vs 84.0 ± 11.4 , $P < .001$). Total cholesterol level (210.2 ± 40.0 vs 189.7 ± 39.1 , $P = .012$), low-density lipoprotein level (130.7 ± 28.7 vs 115.5 ± 26.9 , $P = .008$), and fatty infiltration of the infraspinatus (20.5% vs 3.7% , $P = .011$) were significantly greater in group I than in group II. On postoperative magnetic resonance imaging, retear of the infraspinatus tendon occurred significantly more frequently in group I (81.8%) than in group II (37.0%, $P < .001$). In group I, relative changes in anteroposterior (AP) (19.2 ± 37.8) and mediolateral retear size (29.6 ± 90.7) were significantly greater than in group II (AP; -39.5 ± 19.2 , mediolateral; -29.2 ± 26.8 , $P < .001$). Relative change in AP retear size was the most powerful independent predictor of symptomatic failed rotator cuff repair (odds ratio 1.19, confidence interval 1.08-1.31, $P < .001$).

Conclusions

Preoperative serum total cholesterol level, low-density lipoprotein levels, and fatty infiltration of the infraspinatus were significantly related to symptomatic failed rotator cuff repair. Relative change in AP retear size was the most powerful independent predictor of symptomatic failed rotator cuff repair.

Level of Evidence

Level III, Case-control study

Preoperative Opioid Prescription Filling Is a Risk Factor for Prolonged Opioid Use After Elbow Arthroscopy

Edward O. Rojas, Zain M. Khazi, Trevor R. Gulbrandsen, Alan G. Shamrock, Christopher A. Anthony, Kyle Duchman, Robert W. Westermann, Brian R. Wolf

<https://doi.org/10.1016/j.arthro.2020.04.053>

Purpose

To (1) report the frequency of postoperative opioid prescriptions after elbow arthroscopy, (2) evaluate whether filling opioid prescriptions preoperatively placed patients at increased risk of requiring more opioid prescriptions after surgery, and (3) determine patient factors associated with postoperative opioid prescription needs.

Methods

A national claims-based database was queried for patients undergoing primary elbow arthroscopy. Patients with prior total elbow arthroplasty or septic arthritis of the elbow were excluded. Patients who filled at least 1 opioid prescription between 1 and 4 months prior to surgery were defined as the preoperative opioid-use group. Monthly relative risk ratios for filling an opioid prescription were calculated for the first year after surgery. Multiple logistic regression analysis was performed to identify factors associated with opioid use at 3, 6, 9, and 12 months after elbow arthroscopy, with $P < .05$ defined as significant.

Results

We identified 1,138 patients who underwent primary elbow arthroscopy. The preoperative opioid-use group consisted of 245 patients (21.5%), 61 of whom (24.9%) were still filling opioid prescriptions 12 months after surgery. The multivariate analysis determined that the preoperative opioid-use group was at increased risk of postoperative opioid prescription filling at 3 months (odds ratio [OR], 9.02; 95% confidence interval [CI], 5.98-13.76), 6 months (OR, 8.74; 95% CI, 5.57-13.92), 9 months (OR, 7.17; 95% CI, 4.57-11.39), and 12 months (OR, 6.27; 95% CI, 3.94-10.07) after elbow arthroscopy. Patients younger than 40 years exhibited a decreased risk of postoperative opioid prescription filling at 3 months (OR, 0.49; 95% CI, 0.25-0.91), 6 months (OR, 0.19; 95% CI, 0.06-0.50), 9 months (OR, 0.48; 95% CI, 0.22-0.97), and 12 months (OR, 0.44; 95% CI, 0.19-0.94) after surgery.

Conclusions

Preoperative opioid filling, fibromyalgia, and psychiatric illness are associated with an increased risk of prolonged postoperative opioid after elbow arthroscopy. Patient age younger than 40 years and chronic obstructive pulmonary disease are associated with a decreased risk of postoperative opioid prescription filling within the first postoperative year.

Level of Evidence

Level III, retrospective cohort study

Corticosteroid Injections May Increase Retear and Revision Rates of Rotator Cuff Repair: A Systematic Review

Addison M. Cimino, Garrison C. Veazey, James T. McMurtrie, Jonathan Isbell, Alexandra M. Arguello, Eugene W. Brabston, Brent A. Ponce, Amit M. Momaya

<https://doi.org/10.1016/j.arthro.2020.04.044>

Purpose

To synthesize the clinical outcome data of preoperative and postoperative corticosteroid injections (CIs) and their effect on rotator cuff repairs (RCRs).

Methods

A systematic review was performed to identify studies that reported the results or clinical outcomes of RCRs in patients receiving either preoperative or postoperative CIs. The searches were performed using MEDLINE, Google Scholar, and Embase, and studies were chosen following PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) guidelines.

Results

A total of 11 studies were included with data for 176,352 shoulders: 6 studies involving 175,256 shoulders with data regarding preoperative CIs, 4 studies involving 1,096 shoulders with data regarding postoperative CIs, and 1 study with 212 shoulders containing preoperative and postoperative data. Preoperative CIs were found in 3 studies to increase the risk of revision surgery when administered within 6 months (odds ratio [OR], 1.38-1.82) and up to 1 year (OR, 1.12-1.52) prior to RCR, with revision rates in 2 studies being highest when patients received 2 or more injections (OR, 2.12-3.26) in the prior year. Postoperative CIs reduced pain and improved functional outcomes in 5 studies without increasing the retear rates (5.7%-19% for CI and 14%-18.4% for control) in most studies.

Conclusions

CIs provide benefit by relieving pain and improving functional outcome scores. However, repeated preoperative CIs may increase retear rates and the likelihood of revision surgery. A lower frequency of CI and longer preoperative waiting period after CI should be considered to decrease such risks. Postoperative CIs several weeks after RCR do not appear to increase retear rates.

Level of Evidence

Level IV, systematic review of Level I through IV studies

Arthroscopic arthrolysis leads to improved range of motion and health-related quality of life in post-traumatic elbow stiffness

Schreiner, A.J., Schweikardt, N., Gühring, D., et al.

DOI: <https://doi.org/10.1016/j.jse.2020.01.099>

Background

Post-traumatic elbow stiffness is a frequent and disabling complication after elbow trauma. Surgical release is needed if conservative treatment fails. In contrast to open surgical release, arthroscopic arthrolysis is a good and least invasive option to restore joint mobility. The aim of this study was to evaluate the clinical outcomes, range of motion (ROM), and function of post-traumatic elbow contracture after arthroscopic arthrolysis and to assess health-related quality of life (HRQL).

Methods

Between 2007 and 2013, 44 patients with post-traumatic elbow stiffness were treated by arthroscopic arthrolysis and followed up in a consecutive series. Clinical (ROM) and functional analyses (Disabilities of the Arm, Shoulder, and Hand Questionnaire [DASH], Mayo Elbow Performance Index [MEPI]) were performed at final follow-up 3 (1-7) years postoperatively. Furthermore, HRQL was evaluated (EQ-5D, 36-Item Short Form Health Survey [SF-36]).

Discussion

The average arc of elbow motion increased from $84^{\circ} \pm 28^{\circ}$ preoperatively to $120^{\circ} \pm 18^{\circ}$ postoperatively. All applied scores significantly improved pre- to postoperatively: the MEPI ($59.8 \pm 17.3 / 84.3 \pm 14.0$), DASH ($43.5 \pm 23.1 / 16.8 \pm 15.6$), EQ-5D ($72.8 \pm 16.6 / 84.0 \pm 13.6$), and SF-36 showed improved results in all categories. Univariate logistic regression revealed that preoperative pain level predicts a poorer postoperative outcome measured with the MEPI score. Revision arthroscopy was needed in 1 case because of persistent pain.

Conclusions

Arthroscopic arthrolysis leads to good clinical and functional results in post-traumatic elbow stiffness regarding ROM, pain relief, functionality, and quality of life. The complication rate as well as the revision rate is very low.

Level of evidence

Level IV, case series.

Suprascapular nerve decompression in addition to rotator cuff repair: a prospective, randomized observational trial.

Gerber, C., Meyer, D.C., Wieser, K., et al.

DOI: <https://doi.org/10.1016/j.jse.2020.03.051>

Background

Tear and retraction of the supraspinatus (SS) and infraspinatus (IS) musculotendinous units and/or their repair may be associated with traction damage to the suprascapular nerve, potentially responsible for pain or weakness of the rotator cuff (RC). Arthroscopic release of the transverse scapular ligament at the suprascapular notch has been advocated to prevent or treat suprascapular nerve impairment associated with RC retraction and/or repair. The effect of this procedure on preoperative normal nerve function is, however, not well studied. We hypothesize that (1) decompression of the suprascapular nerve without preoperative pathologic neurophysiological findings will not improve clinical or imaging outcome and (2) suprascapular decompression will not measurably change suprascapular nerve function.

Methods

Nineteen consecutive patients with a magnetic resonance arthrography documented RC tear involving SS and IS but normal preoperative electromyography (EMG)/nerve conduction studies of the SS and IS were enrolled in a prospective, controlled trial involving RC repair with or without suprascapular nerve decompression at the suprascapular notch. Nine patients were randomized to undergo, and 10 not to undergo, a decompression of the suprascapular nerve. Patients were assessed clinically (Constant score, mobility, pain, strength, subjective shoulder value), with magnetic resonance imaging and neurophysiology preoperatively and at 3- and 12-month follow-up.

Results

There was no clinically relevant difference between the release and the non-release group in any clinical parameter at any time point. At magnetic resonance imaging, there was a slightly greater increase of fatty infiltration of the IS in the release group without any other differences between the 2 groups. Electromyographically, there were no pathologic findings in the non-release group at any time point. Conversely, 3 of the 9 patients of the release group showed pathologic EMG findings at 3 months, of whom 2 had recovered fully and 1 only partially at 12 months.

Conclusion

In the presence of normal EMG findings, suprascapular nerve release added to arthroscopic RC repair is not associated with any clinical benefit, but with electromyographically documented, postoperative impairment of nerve function in 1 of 3 cases. Suprascapular nerve release does not therefore seem to be justified as an adjunct to RC repair if preoperative EMG findings document normal suprascapular nerve function. Based on these findings, the ongoing prospective randomized trial was terminated.

Level of evidence

Level II

Do patients who smoke tobacco have success with primary arthroscopic rotator cuff repair? A comparison with nonsmokers.

Baumgarten, K.M., Schweinle III, W.E., Chang, P.S.

DOI: <https://doi.org/10.1016/j.jse.2019.12.034>

Background

It is recommended that patients cease smoking before rotator cuff repair. However, not all patients want to or are able to successfully cease smoking. This raises the question if these patients should be advised to pursue surgical intervention or if surgery should be contraindicated until patients successfully cease smoking.

Methods

A retrospective analysis of patients undergoing rotator cuff repair was performed to examine the effects of smoking tobacco on patient-determined outcomes (Western Ontario Rotator Cuff Index [WORC], American Shoulder and Elbow Surgeons score [ASES], Simple Shoulder Test [SST], and Single Assessment Numeric Evaluation [SANE]). Patients who smoked tobacco at the time of surgery were compared with patients who were not smoking to determine if differences in (1) severity of preoperative and postoperative symptoms and (2) the postoperative improvements were statistically significant.

Results

Thirty-one patients were smokers and 205 were nonsmokers. Preoperative scores were worse for smokers compared with nonsmokers: WORC (32 vs. 43; $P = .0002$), ASES (32 vs. 43; $P = .001$), SST (3.5 vs. 4.6; $P = .04$), and SANE (34 vs. 38; $P = .35$). Postoperative scores were worse for smokers compared with nonsmokers: WORC (79 vs. 89; $P = .001$), ASES (82 vs. 89; $P = .04$), SST (9.0 vs. 10.2; $P = .02$), and SANE (84 vs. 89; $P = .09$). There were no significant differences in change in scores over time or percentage of patients achieving the minimal clinically important difference of the score between groups.

Conclusions

From examining the patients' subjective patient-determined outcome scores, it does not appear that rotator cuff repair should be strictly contraindicated in active smokers. Postoperative improvements in smokers were similar to nonsmokers. Smokers have lower baseline preoperative and postoperative outcome scores compared with nonsmokers.

Level of evidence

Level III

Can subcoracoid cyst formation be a sign of anterosuperior rotator cuff tears and biceps pulley lesions? A prospective radiologic and arthroscopic correlation study.

Turkmen, I., Altun, G., Celik, H., et al.

DOI: <https://doi.org/10.1016/j.jse.2019.11.036>

Background

The aim of this study was to investigate the pathologies associated with subcoracoid cysts (ScCs) in patients with rotator cuff (RC) tears and the postoperative appearance of ScCs after arthroscopic repair.

Methods

A total of 114 patients who underwent arthroscopic RC repair were prospectively evaluated. The inclusion criteria were as follows: patients with or without ScCs, patients with Patte class 1 or 2 tears, and patients who were 40-65 years of age. Forty-four patients with ScCs (group 1) were evaluated during the 12-month study period. Fifty-two patients who had no ScCs (group 2) were evaluated as a control group. Preoperative and postoperative cyst volumes were measured on magnetic resonance imaging (MRI), and arthroscopic findings were noted.

Results

Thirty-one patients (70%) in group 1 had a subscapularis tear vs. 10 patients (19%) in group 2 ($P < .001$). Biceps lesions were encountered in 32 patients (72%) in group 1, whereas 12 patients (23%) had a biceps lesion in group 2 ($P < .001$). Cyst volume was significantly higher in the following situations: (1) patients who had a subscapularis tear compared with patients without a subscapularis tear, (2) patients who had biceps pulley lesions compared with patients without pulley lesions, and (3) patients who had both pathologies ($P = .047$, $P = .01$, and $P = .002$, respectively). Cyst volumes significantly decreased following RC repair in group 1 ($P < .001$).

Conclusion

Among patients with small- to medium-sized, full-thickness supraspinatus tears, the prevalence of biceps pulley lesions and/or subscapularis tears is higher in patients with ScCs.

Level of evidence

Level III

Which muscle performance can be improved after arthroscopic Bankart repair?

Lee, J.H., Park, J.S., Jeong, W.K.

DOI: <https://doi.org/10.1016/j.jse.2019.12.013>

Background

There are no published reports available regarding neuromuscular control recovery in nonathletic patients after arthroscopic (A/S) Bankart repair. This study aimed to compare neuromuscular control and performance of the rotator cuff muscles between patients who underwent A/S Bankart repair and normal controls.

Methods

In total, 32 nonathletic patients who underwent A/S Bankart repair were compared with 32 asymptomatic nonathletic volunteers. Neuromuscular control index (time to peak torque and acceleration time), muscle strength ratio, muscle strength, and muscle endurance of the internal rotators (IRs) and external rotators (ERs) were measured using an isokinetic device at an angular velocity of 180°/s, with 90° shoulder abduction.

Results

The neuromuscular control indices of both IRs and ERs were significantly lower in patients who underwent A/S Bankart repair than in normal controls (time to peak torque, IRs: 1059 ± 143 ms vs. 679 ± 226 ms, P = .011; ERs: 595 ± 286 ms vs. 379 ± 123 ms, P = .044; acceleration time, IRs: 75 ± 16 ms vs. 62 ± 15 ms, P = .039, ERs: 70 ± 19 ms vs. 54 ± 18 ms, P = .047). Muscle endurance was significantly lower in patients who underwent A/S Bankart repair than in normal controls (IRs: 670 ± 1 J vs. 718 ± 2 J, P = .002, ERs: 422 ± 6 J vs. 501 ± 2 J, P = .044). The neuromuscular control index showed a significant negative correlation with muscle endurance for both IRs and ERs after the operation (IRs: $r = -0.737$, P = .003, ERs: $r = -0.617$, P = .019).

Conclusion

Compared with normal controls, patients who underwent A/S Bankart repair did not show complete recovery of neuromuscular control of IRs and ERs, although their muscle strength ratio and muscle strength had fully recovered.

Level of evidence

Level III

Repair Integrity and Retear Pattern After Arthroscopic Medial Knot-Tying After Suture-Bridge Lateral Row Rotator Cuff Repair

Yasutaka Takeuchi, MD*, Hiroyuki Sugaya, MD, Norimasa Takahashi, MD, Keisuke Matsuki, MD, Morihito Tokai, MD, Takeshi Morioka, MD, Yusuke Ueda, MD, Shota Hoshika, MD

First Published July 14, 2020; pp. 2510–2517

<https://doi.org/10.1177/0363546520934786>

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Background:

Type 2 failure is a big issue after suture-bridge rotator cuff repair, which may be because of stress concentration at the medial row stitches. We have been performing medial knot-tying after suture-bridge lateral row repair to avoid the stress concentration. This study aimed to evaluate clinical and radiological outcomes after arthroscopic rotator cuff repair using this technique.

Hypothesis: This technique would yield better radiological outcomes with a reduced type 2 failure rate compared with reported outcomes after conventional suture-bridge repair.

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

Methods: The inclusion criteria of this study were (1) full-thickness tears, (2) primary surgery, and (3) minimum 2-year follow-up with pre- and postoperative magnetic resonance imaging (MRI). We investigated active ranges of motion (forward elevation and external rotation), as well as the Japanese Orthopaedic Association (JOA) and University of California, Los Angeles (UCLA), scores preoperatively and at the final follow-up.

Results: This study included 384 shoulders in 373 patients (205 men and 168 women) with a mean age of 65 years (range, 24-89 years) at the time of surgery. The mean follow-up was 29 months (range, 24-60 months). There were 91 small, 137 medium, 121 large, and 35 massive tears. Postoperative MRI scans demonstrated successful repair in 324 shoulders (84.4%, group S) and re-tear in 60 shoulders (15.6%). Among 60 re-tears, 40 shoulders (67%) had type 1 failure (group F1) and 20 shoulders (33%) had type 2 failure (group F2). Forward elevation and external rotation significantly improved after surgery ($P < .001$ for both). Postoperative JOA and UCLA scores in group F2 were significantly lower than those in the other groups.

Conclusion: The medial knot-tying after suture-bridge lateral row repair demonstrated excellent functional and radiological outcomes after surgery, with a re-tear rate of 15.6%. The type 2 failure showed significantly inferior functional outcomes; however, the rate of type 2 failure was less relative to previous studies using conventional suture-bridge techniques. Our technique could be a good alternative to conventional suture-bridging rotator cuff repair because it may reduce the rate of postoperative type 2 failure.

Lower Extremity

Arthroscopy, Volume 36, Issue 8, p2137–2144

Hip Arthroscopy in Patients Aged 40 Years and Older: Greater Success With Labral Reconstruction Compared With Labral Repair

Brian J. White, Julie Patterson, Alexandra M. Scoles, Ali T. Lilo, Mackenzie M. Herzog

<https://doi.org/10.1016/j.arthro.2020.04.031>

Purpose

To assess the outcomes of complete, primary, arthroscopic hip labral reconstruction among patients aged 40 years and older compared with those who underwent primary labral repair and compared with patients aged 30 to 39 years who underwent complete, primary labral reconstruction.

Methods

We recruited all patients who underwent arthroscopic labral reconstruction between March 2010 and June 2015 and were aged 30 to 65 years or who underwent arthroscopic labral repair between June 2009 and June 2015 and were aged 40 to 65 years. The modified Harris Hip Score (mHHS), Lower Extremity Function Score, and visual analog scale score for average pain were collected preoperatively and at minimum 2-year follow-up. Failure was defined as the need for revision ipsilateral hip surgery. The rate of conversion to total hip arthroplasty (a subset of failure) was assessed separately.

Results

A total of 363 hips in 343 patients met the inclusion criteria. Follow-up was available for 312 hips (86.0%), and the average time to follow-up was 4.2 years (range, 2.0-8.5 years). After adjustment for differences in follow-up time between groups, failure was 3.29 times more likely for hips in the repair group aged 40 years and older than for hips in the reconstruction group aged 40 years and older (relative rate, 3.29; 95% confidence interval, 1.25-8.69; $P = .02$), and there was no difference in the failure rate for hips in the reconstruction group aged 40 years and older compared with hips in the reconstruction group aged 30 to 39 years (relative rate, 0.58; 95% confidence interval, 0.18-1.89; $P = .37$). The rate of conversion to total hip arthroplasty was not meaningfully different between the 3 groups. Among hips for which treatment did not fail, average improvement in the mHHS measured 35 points and both labral reconstruction groups saw a greater mHHS improvement than the labral repair group of patients aged 40 years and older ($P = .01$ and $P < .01$).

Conclusions

Labral reconstruction led to a lower failure rate, greater average improvement in the mHHS, and equivalent postoperative patient-reported outcome scores compared with labral repair among patients aged 40 years and older in this study population, and the outcomes of labral reconstruction were similar between patients aged 40 years and older and those aged 30 to 39 years. Complete labral reconstruction may be particularly advantageous in patients aged 40 years and older.

Level of Evidence

Level III, retrospective comparative study

[BACK](#)

Is Labral Size Predictive of Failure With Repair in Hip Arthroscopy?

Joseph C. Brinkman, Benjamin G. Domb, Aaron J. Krych, Bruce A. Levy, Justin L. Makovicka, Matthew Neville, David E. Hartigan

<https://doi.org/10.1016/j.arthro.2020.04.022>

Purpose

To assess whether labral size is predictive of labral repair failure or shows an association with patient outcomes after hip arthroscopy.

Methods

We performed a retrospective chart review of patients who underwent arthroscopic hip labral repair. Labral size was measured in 4 quadrants with an arthroscopic probe. The average size across torn labral segments was assessed for failure as determined by the change in patient-reported outcomes, the rate at which subjects achieved the minimal clinically important difference and patient acceptable symptomatic state, and the need for additional surgery. Outcomes were evaluated for any continuous correlation as well as significant differences between the middle 50% of labral sizes and classes of labral sizes derived from upper and lower quartile and decile ranges. Included hips were those from patients aged between 18 and 55 years with 2-year postoperative follow-up and lateral center-edge angles between 25° and 40°.

Results

The study included 571 hips. Labral width did not show a significant difference between hips requiring revision and those not requiring revision ($P = .4054$). No significant correlation was found between labral width and the change in the International Hip Outcome Tool 12 score ($R^2 = 0.05780$), modified Harris Hip Score ($R^2 = 0.19826$), or Nonarthritic Hip Score ($R^2 = 0.23543$) from preoperatively to 2 years postoperatively. Hips with labral sizes in the upper decile of our cohort showed significantly decreased improvement in the International Hip Outcome Tool 12 score ($P = .0287$) and Nonarthritic Hip Score ($P = .0490$) compared with the middle 50% of labral sizes. No statistically significant difference was found in the rate at which the groups achieved the minimal clinically important difference or patient acceptable symptomatic state.

Conclusions

Hypertrophic labra in the largest 10th percentile showed lower postoperative outcome scores. However, no detectable clinical benefit was found in terms of patient-perceived clinical difference or acceptable symptomatic state. For most patients, labral size does not appear to significantly alter patient outcomes or the need for arthroplasty.

Level of Evidence

Level IV, retrospective case series

Endoscopic Repair of Full-Thickness Gluteus Medius and Minimus Tears—Prospective Study With a Minimum 2-Year Follow-Up

Mark R. Nazal, Paul F. Abraham, William K. Conaway, Noah J. Quinlan, Stephen M. Gillinov, Jada S. Gibbs, Shivam Upadhyaya, Kyle Alpaugh, Scott D. Martin

<https://doi.org/10.1016/j.arthro.2020.04.025>

Purpose

To evaluate the short-term outcomes of endoscopic repair of full-thickness gluteus medius and minimus tendon tears with a minimum of 2-year follow-up and add to the paucity of literature on abductor tendon tears.

Methods

All patients who underwent endoscopic abductor tendon repair between December 2013 and August 2017 were prospectively evaluated. The inclusion criteria for this study were primary full-thickness gluteal tendon tears and at least 2-years of follow-up. Clinical outcome data consisted of visual analog scale (VAS) pain score, hip abduction strength, Trendelenburg sign, complications, and patient-reported outcome measures (PROMs): modified Harris Hip Score, Hip Outcome Score, Non-arthritic Hip Scale, International Hip Outcome Tool-33, and Lower Extremity Functional Scale.

Results

A total of 15 hips, all full-thickness tears, met inclusion criteria with an average follow-up of 31.2 months, with no patients being excluded. On physical examination, there was a significant improvement in VAS pain score from 5.36 to 2.43 ($P = .0243$), hip abduction strength with 8 (53.3%) hips improving by at least 1 point ($P = .02056$), and resolution of Trendelenburg sign in all 15 hips at 2-years ($P = .0019$). The mean difference for all 6 PROMs was statistically significant, even after Bonferroni adjustment, with the majority of patient improvement exceeding the minimal clinically important difference (MCID) thresholds: modified Harris Hip Score: 86.67%, Hip Outcome Score—ADL: 86.67%, Hip Outcome Score—SSS: 66.67%, Non-arthritic Hip Scale: 93.33%, and International Hip Outcome Tool-33: 80%. Greater Goutallier grade was associated with a greater VAS pain score. There were no complications, including no retears.

Conclusions

In this study of 15 hips with full-thickness gluteal tendon tears managed endoscopically, we found excellent outcomes that exceeded the MCID thresholds in the majority of patients at an average of 31.2 months follow-up, while offering the potential advantages of less tissue violation, ambulatory day surgery, and fewer complications compared with open repair.

Level of Evidence

Level 4, Case Series

Arthroscopic Ligamentum Teres Reconstruction: Minimum 2-Year Patient-Reported Outcomes With Subanalysis of Patients With Ehlers-Danlos Syndrome

Philip J. Rosinsky, Shawn Annin, David R. Maldonado, Cynthia Kyin, Mitchell B. Meghpara, Jacob Shapira, Ajay C. Lall, Benjamin G. Domb

<https://doi.org/10.1016/j.arthro.2020.04.028>

Purpose

To report on minimum 2-year outcomes of patients undergoing arthroscopic ligamentum teres reconstruction (LTR).

Methods

Our institutional registry was retrospectively reviewed for all patients undergoing LTR between December 2012 and February 2016. LTR was indicated for a fully torn or dysfunctional ligamentum teres with symptomatic multidirectional instability not treatable by osteotomy or capsular plication alone. Demographic data, preoperative clinical and radiographic measures, and intraoperative data were recorded. Patient-reported outcome measures including the modified Harris Hip Score, the Non-Arthritic Hip Score, a visual analog scale score for pain, and patient satisfaction were recorded preoperatively and annually postoperatively. Revision arthroscopies and conversions to total hip arthroplasty were recorded.

Results

Twelve reconstruction procedures were performed in 10 patients during the study period. Minimum 2-year follow-up was available for 9 patients (11 hips). The mean follow-up time was 44.27 months (range, 24-72 months). There were 7 female and 2 male patients, and the mean age was 30.34 years (range, 17.23-43.68 years). Two hips underwent conversion to total hip arthroplasty at a mean of 21.12 months. For the remaining patients, significant improvements were observed in the modified Harris Hip Score (from 44.1 to 71.8), Non-Arthritic Hip Score (from 47.5 to 78.6), and visual analog scale score (from 7.8 to 3.6) ($P < .05$). The average patient satisfaction rating was 7.88 (range, 4-10). Subanalysis of 5 patients (7 hips) with a diagnosis of Ehlers-Danlos syndrome showed a higher failure rate in this group.

Conclusions

Although LTRs are indicated and performed only in a select group of patients, the procedure can provide meaningful improvement in patient-reported outcomes, pain reduction, and patient satisfaction. However, most patients undergoing LTR at present have underlying factors that significantly mitigate their prognosis, such as Ehlers-Danlos syndrome or failed previous surgery. Because these patients represent a subset of patients with complex hip pathologies in whom treatment is difficult, the expectations of surgery should be set accordingly.

Level of Evidence

Level IV, therapeutic study, case series

Hip Arthroscopy for Femoroacetabular Impingement and Concomitant Labral Tears: A Minimum 2-Year Follow-Up Study

Jun-Ki Moon, Jae Youn Yoon, Chul-Ho Kim, Sunhyung Lee, Aditya L. Kekatpure, Pil Whan Yoon

<https://doi.org/10.1016/j.arthro.2020.04.041>

Purpose

The present study investigated the minimum 2-year outcomes of hip arthroscopy for femoroacetabular impingement (FAI) and concomitant labral tears in Asian patients.

Methods

Patients who underwent hip arthroscopy for both FAI and concomitant labral tears between January 2012 and December 2017 were included. Patients with hip osteoarthritis of Tönnis grade ≥ 2 , previous hip surgery, or followed for less than 2 years were excluded. Clinical assessments were performed using the modified Harris Hip Score, Western Ontario and McMaster Universities Osteoarthritis Index, and the rates of achieving threshold values of the minimal clinically important difference and patient acceptable symptomatic state at the latest follow-up. Plain radiographs were acquired pre- and postoperatively for radiologic assessments.

Results

A total of 73 patients (90 hips, 58 male, 15 female; mean age 34.4 years) who underwent hip arthroscopy for FAI and concomitant labral tears were enrolled. Forty-three hips (47.8%) had cam-type, 7 (7.8%) had pincer-type, and 40 (44.4%) had mixed-type FAI. The mean follow-up duration was 5.2 years. In cam- and mixed-type FAI hips, the mean α angle significantly decreased from $66.7 \pm 8.28^\circ$ preoperatively to $44.9 \pm 3.78^\circ$ postoperatively (95% confidence interval [CI] 19.6° - 22.8° ; $P < .001$). The mean modified Harris Hip Score and Western Ontario and McMaster Universities Osteoarthritis Index increased from 74.8 ± 13.2 and 75 ± 12.7 preoperatively to 93 ± 8.1 (95% CI 15.4 - 20.9 ; $P = .001$) and 89.4 ± 8.4 postoperatively (95% CI 11.8 - 17 ; $P = .001$), respectively. Seventy-four hips (82.2%) crossed the minimal clinically important difference, and 85 hips (94.4%) had achieved the patient acceptable symptomatic state. There were 2 cases of pudendal nerve palsy and 1 case of sciatic nerve palsy. No additional surgeries were required.

Conclusions

Hip arthroscopy can be an effective treatment for FAI and concomitant labral tears in Asian patients as demonstrated in this study, with improved PRO scores and reoperation rates. Longer-term studies with larger cohorts are necessary.

Level of Evidence

Level IV, case series

Resilience as a Predictor of Patient Satisfaction With Nonopioid Pain Management and Patient-Reported Outcome Measures After Knee Arthroscopy

Tyler J. Chavez, Kirsten D. Garvey, Jamie E. Collins, Natalie A. Lowenstein, Elizabeth G. Matzkin

<https://doi.org/10.1016/j.arthro.2020.03.013>

Purpose

The purpose of this study was to evaluate the Brief Resilience Score (BRS) as a predictor for patient satisfaction with nonopioid pain management and patient-reported outcome measures (PROMs) after arthroscopic partial meniscectomy or chondroplasty.

Methods

One hundred seventy-five patients undergoing arthroscopic partial meniscectomy and/or chondroplasty were recruited from a single clinic and were preoperatively stratified into low-to-normal resilience or high resilience groups as measured by the BRS. Satisfaction with nonopioid pain control was assessed at a 2-week follow-up visit using the Hospital Consumer Assessment of Healthcare Provider and Systems questionnaire, and various PROMs were measured at 3 and 6 months postoperatively. Statistical analysis was performed to assess for differences in satisfaction with pain control or PROMs between resilience groups.

Results

Analysis revealed no statistically significant differences between the low-to-normal resilience group and the high resilience group with regard to satisfaction with nonopioid pain control or PROMs assessed at 3- or 6-month follow-ups. Outcome measures [visual analog scale pain, Knee Injury and Osteoarthritis Outcome Score (KOOS) Pain, KOOS Activities of Daily Living, KOOS Quality of Life, Single Assessment Numerical Evaluation (SANE) Knee, and Veterans Rand 12-Item Health Survey Physical and Mental Component Scores] all followed expected trajectories after surgery, without a statistically significant difference between resilience groups.

Conclusion

This study provides evidence that preoperative resilience score, as measured by the BRS, does not correlate with postoperative patient-reported functional outcome or satisfaction with a nonopioid pain regimen after knee arthroscopy.

Level of Evidence

II

Patellar Tendon Versus 4-Strand Semitendinosus and Gracilis Autografts for Anterior Cruciate Ligament Reconstruction: A Meta-analysis of Randomized Controlled Trials With Mid- to Long-Term Follow-Up

Haitao Chen, Hankun Liu, Liaobin Chen

<https://doi.org/10.1016/j.arthro.2020.04.024>

Purpose

To compare patellar tendon (PT) autografts with 4-strand semitendinosus and gracilis (STG) autografts concerning knee stability, functional outcomes, as well as complications after anterior cruciate ligament (ACL) reconstruction at minimal follow-up of 5 years.

Methods

A systematic search of the literature was performed in PubMed, Embase, and the Cochrane Library to identify published prospective randomized controlled trials on clinical studies comparing PT autograft and 4-strand STG autografts for ACL reconstruction. The results of the eligible studies were analyzed in terms of knee stability (laxity measurements, Lachman test, and pivot-shift test), functional outcomes (Lysholm score, International Knee Documentation Committee score, Cincinnati score, Tegner score, single-legged hop test, and return to preinjury activity level), and complications (loss of range of motion [ROM], pain, graft re-rupture, revision, and osteoarthritis [OA]).

Results

Nine clinical studies with 630 patients (313 PT and 317 STG autografts) met the inclusion criteria. No statistically significant differences were found between the PT and STG group in Lachman test, pivot-shift test, International Knee Documentation Committee score, Cincinnati score, loss of ROM, kneeling pain, graft re-rupture rate, revision rate, and OA rate. The STG group was found with less anterior knee pain ($P = .003$). There were no clinically significant differences for the outcomes of SSD, Lysholm score, and Tegner score.

Conclusions

Except for significantly greater risk of anterior knee pain, PT autograft had comparable results with 4-strand STG autograft in terms of knee stability and functional outcomes after ACL reconstruction with mid- to long-term follow-up. Besides, we found no statistically significant difference in loss of ROM, kneeling pain, graft re-rupture rate, revision rate, and OA change, but these results were underpowered.

Level of evidence

Level I, meta-analysis of Level I studies

Patient Outcomes After Horizontal Cleavage Tear Repair: A Systematic Review

Jesse H. Morris, Robert A. Magnussen, Alex C. DiBartola, Summer Aldabbeh, Robert A. Duerr, Christopher C. Kaeding, David C. Flanigan

<https://doi.org/10.1016/j.arthro.2020.04.027>

Purpose

To analyze the clinical outcomes and survivorship of meniscal horizontal cleavage tear (HCT) repairs with hopes of guiding future treatment decisions.

Methods

Standard systematic review methodology was used. A comprehensive search of PubMed was conducted on June 1, 2019. The inclusion criteria were articles that were published in English, involved human subjects, and reported on at least 1 outcome after repair of HCTs. The exclusion criteria included technique guides and reviews, studies without full text available, and studies with HCT outcomes not separated from other repair groups. Effect heterogeneity was determined using the I² measure. Forest plots were created in addition to a random-effects model to show the results.

Results

The systematic review yielded 19 studies evaluating 289 knees in a total of 273 patients. At most recent follow-up, there was a high probability of return to sport (93.1% [67 of 72]). Overall, 74% of patients (67 of 90) were symptom free at last follow-up, and 80% expressed satisfaction with their overall result (80 of 100). The most frequently reported subjective outcome was the Lysholm score, which improved from a preoperative study range of 48 to 79 (I² = 20.7%, P = .283) to a postoperative study range of 56 to 99 (I² = 49%, P = .081). The next most commonly reported was the International Knee Documentation Committee subjective score, which improved from a preoperative study range of 16 to 49 (I² = 47.7%, P = .125) to a postoperative study range of 72 to 95 (I² = 0%, P = .660). An overall 11.7% reported risk of reoperation was found, with most cases involving revision meniscectomy. Rates of complications beyond fixation failure were overall very low, with infrequent reports of septic arthritis and transitory dysesthesia.

Conclusions

The short- to intermediate-term results of repair of HCTs are comparable to prior studies. Survivorship is comparable to repairs of other types of meniscal tears with high rates of return to sport and low complication rates.

Level of Evidence

Level IV, systematic review of Level I-IV studies.

All-epiphyseal anterior cruciate ligament reconstruction produces good functional outcomes and low complication rates in pediatric patients: a systematic review.

Gupta, A., Tejpal, T., Shanmugaraj, A., et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06085-3>

Purpose

To assess the literature on indications, outcomes, and complications in pediatric patients undergoing all-epiphyseal (AE) anterior cruciate ligament reconstruction (ACLR).

Methods

PubMed, Medline, and Embase were searched for literature evaluating AE ACLR in pediatric patients. All included studies were assessed for quality using the Methodological Index for Non-Randomized Studies (MINORS). Descriptive statistics are presented where applicable.

Results

Overall, 17 studies comprising 545 patients, with a mean age of 12.0 ± 1.2 (range 8–19) met the inclusion criteria. The graft choices in this systematic review included hamstring tendon autografts (75.4%, $n = 403$), quadriceps tendon autograft (6.2%, $n = 33$), Achilles tendon allograft (3.6%, $n = 19$) and posterior tibialis tendon allograft in one patient (0.2%, $n = 1$). Time of return-to-sport ranged from 8 to 22 months. Postoperative subjective IKDC scores were above 90 points. The rate of return-to-sport after AE ACLR was 93.2% ($n = 219/235$) and 77.9% ($n = 142/183$) of patients returned to sport at pre-injury level. The overall complication rate was 9.8% ($n = 53/545$) with the most common complication being ACL re-rupture (5.0%; $n = 27/545$). Only 1.5% ($n = 8/545$) of patients demonstrated growth disturbances.

Conclusion

Overall, the AE ACLR technique can achieve good postoperative functional outcomes while notably minimizing the incidence of primary issue of physeal disruption and potential associated leg-length discrepancies. AE ACLR should be considered in pediatric patients with at least 2 years of skeletal growth remaining based on radiographic bone age to minimize the impact of growth-related complications.

Level of evidence

IV (Systematic Review of Level III and IV evidence).

Preoperative medial knee instability is an underestimated risk factor for failure of revision ACL reconstruction.

Alm, L., Krause, M., Frosch, K.H., et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06133-y>

Purpose

The purpose of this study was to carefully analyse the reasons for revision ACLR failure to optimize the surgical revision technique and minimize the risk of recurrent re-rupture. Large studies with a minimum of 2 years of follow-up that clinically examine patients with revision ACLR are rare.

Methods

Between 2013 and 2016, 111 patients who underwent revision ACLR were included in the retrospective study. All patients were examined for a minimum of 2 years after revision surgery (35 ± 3.4 months, mean \pm STD) and identified as “failed revision ACLR” (side-to-side difference ≥ 5 mm and pivot-shift grade 2/3) or “stable revision ACLR”.

Results

Failure after revision ACLR occurred in 14.5% ($n = 16$) of the cases. Preoperative medial knee instability ($n = 36$) was associated with failure; thus, patients had a 17 times greater risk of failure when medial knee instability was diagnosed ($p = 0.015$). The risk of failure was reduced when patients had medial stabilization ($n = 24$, $p = 0.034$) and extra-articular lateral tenodesis during revision surgery ($n = 51$, $p = 0.028$). Increased posterior tibial slope ($n = 11 \geq 12^\circ$, $p = 0.046$) and high-grade anterior knee laxity (side-to-side difference > 6 mm and pivot-shift grade 3, $n = 41$, $p = 0.034$) were associated with increased failure of revision ACLR. Obese patients had a 9 times greater risk of failure ($p = 0.008$, $n = 30$).

Conclusion

This study demonstrates the largest revision ACLR patient group with pre- and postoperative clinical examination data and a follow-up of 2 years published to date. Preoperative medial knee instability is an underestimated risk factor for revision ACLR failure. Additionally, high-grade anterior knee laxity, increased PTS and high BMI are risk factors for failure of revision ACLR, while additional medial stabilization and lateral extra-articular tenodesis reduce the risk of failure.

Level of evidence

III.

ACL reconstruction using a quadruple semitendinosus graft with cortical fixations gives suitable isokinetic and clinical outcomes after 2 years.

Roger, J., Bertani, A., Vigouroux, F., et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06121-2>

Purpose

The objective of this single-center randomized single-blinded trial was to assess the hypothesis that anterior cruciate ligament reconstruction (ACLR) using a four-strand semitendinosus (ST) graft with adjustable femoral and tibial cortical fixation produced good outcomes compared to an ST/gracilis (ST/G) graft with femoral pin transfixation and tibial bioscrew fixation. Follow-up was 2 years.

Methods

Patients older than 16 years who underwent primary isolated ACLR included for 1 year until August 2017 were eligible. The primary outcome measures were the subjective International Knee Documentation Committee (IKDC) score, isokinetic muscle strength recovery, and return to work within 2 years. The study was approved by the ethics committee.

Results

Of 66 eligible patients, 60 completed the study and were included, 33 in the 4ST group and 27 in the ST/G group. Mean age was 30.5 ± 8.9 years in the 4ST group and 30.3 ± 8.5 in the ST/G group (n.s.). No significant between-group differences were found for mean postoperative subjective IKDC (4ST group, 80.2 ± 12.5 ; ST/G group, 83.6 ± 13.6 ; n.s.), side-to-side percentage deficits in isokinetic hamstring strength (at $60^\circ/\text{s}$: ST group, $17\% \pm 16\%$; ST/G group, $14\% \pm 11\%$; n.s.) or quadriceps strength (at $60^\circ/\text{s}$: ST group, $14\% \pm 12\%$; ST/G group, $19\% \pm 17\%$; n.s.), return to work, pain during physical activities, side-to-side differential laxity, balance, loss of flexion/extension, or surgical complications.

Conclusion

This trial demonstrates that functional outcomes after 4ST for ACLR with cortical fixations could be as good, although not better, than those obtained using ST/G. The 4ST technique spares the gracilis tendon, which thus preserves the medial sided muscle and thereby could improve function and limit donor-side morbidity.

Level of evidence

Level I.

One sixth of primary anterior cruciate ligament reconstructions may undergo reoperation due to complications or new injuries within 2 years.

Lord, L., Cristiani, R., Edman, G., et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06127-w>

Purpose

To analyse the incidence, types and risk factors for reoperation within 2 years of primary anterior cruciate ligament reconstruction (ACLR).

Methods

Our clinic registry was used to identify primary ACLRs, performed from 2005 to 2015, and reoperations performed on the ipsilateral knee within 2 years at our institution. Reoperations were identified using procedural codes and analysis of medical records. A logistic regression analysis was used to evaluate risk factors for reoperation.

Results

A total of 6030 primary ACLRs were included. A total of 1112 (18.4%) reoperations performed on 1018 (16.9%) primary ACLRs were identified. The most common reoperations were screw removal (n = 282, 4.7%), meniscus procedures (n = 238, 3.9%), cyclops removal/notchplasty (n = 222, 3.7%) and reoperations due to graft rupture (n = 146, 2.4%), including revision ACLR. Age < 30 years (OR 1.57; 95% CI 1.37–1.80; P < 0.001), female gender (OR 1.33; 95% CI 1.17–1.51; P < 0.001), medial meniscus repair (OR 1.55; 95% CI 1.23–1.97; P < 0.001), lateral meniscus resection (OR 1.26; 95% CI 1.07–1.49; P = 0.005) and lateral meniscus repair (OR 1.38; 95% CI 1.03–1.85; P = 0.02) at primary ACLR were found to be risk factors for reoperation.

Conclusion

One sixth of all primary ACLRs underwent reoperation due to complications or new injuries within 2 years. The most common reoperations were screw removal, meniscus procedures, cyclops removal/notchplasty and reoperations due to graft rupture, including revision ACLR. Younger age (< 30 years), female gender, medial meniscus repair and lateral meniscus resection or repair at primary ACLR were associated with an increased risk of reoperation. This study provides clinicians with important data to inform patients about the short-term reoperation rates, the most common reoperation procedures and risk factors for reoperation after primary ACLR.

Level of evidence

III.

Inpatient admission following anterior cruciate ligament reconstruction is associated with higher postoperative complications.

Lu, Y., Lavoie-Gagne, O., Khazi, Z., et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-06094-2>

Purpose

To compare the occurrence of short-term postoperative complications between inpatient and outpatient anterior cruciate ligament reconstruction.

Methods

The ACS National Surgical Quality Improvement Program (NSQIP) database was utilized to identify patients undergoing arthroscopic anterior cruciate ligament reconstruction (ACLR) from 2007 to 2017. A total of 18,052 patients were available for analysis following application of exclusion criteria. Patients were categorized based on location of surgery. Inpatients and outpatient ACLR groups were matched by demographics and preoperative laboratory values and differences in 30-day complication rates following surgery were assessed. Significance was set with $\alpha < 0.05$.

Results

From 2007 to 2017, there was an increasing frequency for outpatient ACLR ($p < 0.001$), while the incidence of inpatient ACLR remained largely constant (n.s). Groups were matched to include 1818 patients in each cohort. Within the first 30 days of surgery, patients in the inpatient ACLR group experienced significantly greater rates of superficial incisional SSI (0.6% vs 0.1%, $p = 0.026$) and composite surgical complications (0.6% vs 0.2%, $p = 0.019$), as well as a greater rate of reoperation (0.7% vs 0.2%, $p = 0.029$). Inpatient procedures also demonstrated a greater rate of deep surgical incisional SSI (0.2% vs 0.0%, n.s) and readmission to hospital (0.8% vs 0.7%, n.s). Outpatient ACLR procedures were also associated with a significantly greater relative value unit (RVU)/h compared with inpatient ACLRs (0.17 vs 0.14, $p < 0.001$).

Conclusions

Inpatient ACLR may have an increased risk of postoperative complications compared to outpatient ACLR during the short-term postoperative period. Although some patients may require admission post-operatively for medical and/or pain management, doing so is not necessarily without a degree of risk.

Level of evidence

III.

Timing of anterior cruciate ligament reconstruction and preoperative pain are important predictors for postoperative kinesiophobia.

Theunissen, W.W.E.S., van der Steen, M.C., Liu, W.Y., et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-019-05838-z>

Purpose

Fear of movement (kinesiophobia) is a major limiting factor in the return to pre-injury sport level after anterior cruciate ligament reconstruction (ACLR). The aim of this study was to gain insight into the prevalence of kinesiophobia pre-ACLR, 3 months post-ACLR and 12 months post-ACLR. Furthermore, the preoperative predictability of kinesiophobia at 3 months post-ACLR was addressed.

Methods

A retrospective study with data, which were prospectively collected as part of standard care, was conducted to evaluate patients who underwent ACLR between January 2017 and December 2018 in an orthopaedic outpatient clinic. Patient characteristics (age, sex, body mass index), injury-to-surgery time, preoperative pain level (KOOS pain subscale) and preoperative knee function (IKDC-2000) were used as potential predictor variables for kinesiophobia (TSK-17) at 3 months post-ACLR in linear regression analysis.

Results

The number of patients with a high level of kinesiophobia (TSK > 37) reduced from 92 patients (69.2%) preoperatively to 44 patients (43.1%) 3 months postoperatively and 36 patients (30.8%) 12 months postoperatively. The prediction model, based on a multivariable regression analysis, showed a positive correlation between four predictor variables (prolonged injury-to-surgery time, high preoperative pain level, male sex and low body mass index) and a high level of kinesiophobia at 3 months postoperatively ($R^2 = 0.384$, $p = 0.02$).

Conclusion

The prevalence of kinesiophobia decreases during postoperative rehabilitation, but high kinesiophobia is still present in a large portion of the patients after ACLR. Timing of reconstruction seems to be the strongest predictor for high kinesiophobia 3 months post-ACLR. This study is the first step in the development of a screening tool to detect patients with kinesiophobia after ACLR. Identifying patients preoperatively opens the possibility to treat patients and thereby potentially increase the return to pre-injury sport level rate after ACLR.

Level of evidence

III.

Transphyseal anterior cruciate ligament reconstruction using living parental donor hamstring graft: excellent clinical results at 2 years in a cohort of 100 patients.

Ghosh, K., Salmon, L.J., Heath, E., et al.

DOI <https://doi-org.eur.idm.oclc.org/10.1007/s00167-019-05842-3>

Purpose

To determine outcomes of transphyseal ACL reconstruction using a living parental hamstring tendon allograft in a consecutive series of 100 children.

Methods

One hundred consecutive juveniles undergoing ACL reconstruction with a living parental hamstring allograft were recruited prospectively and reviewed 2 years after ACL reconstruction with IKDC Knee Ligament Evaluation, and KT1000 instrumented laxity testing. Skeletally immature participants obtained annual radiographs until skeletal maturity, and long leg alignment radiographs at 2 years. Radiographic Posterior tibial slope was recorded.

Results

Of 100 juveniles, the median age was 14 years (range 8–16) and 68% male. At surgery, 30 juveniles were graded Tanner 1 or 2, 21 were Tanner 3 and 49 were Tanner 4 or 5. There were no cases of iatrogenic physeal injury or leg length discrepancy on long leg radiographs at 2 years, despite a median increase in height of 8 cm. Twelve patients had an ACL graft rupture and 9 had a contralateral ACL injury. Of those without further ACL injury, 82% returned to competitive sports, IKDC ligament evaluation was normal in 52% and nearly normal in 48%. The median side to side difference on manual maximum testing with the KT1000 was 2 mm (range – 1 to 5). A radiographic PTS of 12° or more was observed in 49%.

Conclusions

ACL reconstruction in the juvenile with living parental hamstring tendon allograft is a viable procedure associated with excellent clinical stability, patient-reported outcomes and return to sport over 2 years. Further ACL injury to the reconstructed and the contralateral knee remains a significant risk, with identical prevalence observed between the reconstructed and contralateral ACL between 12 and 24 months after surgery.

Level of evidence

III (Cohort Study).

The Japanese version of the anterior cruciate ligament-return to sport after injury (ACL-RSI) scale has acceptable validity and reliability.

Hirohata, K., Aizawa, J., Furuya, H., et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05849-1>

Purpose

The anterior cruciate ligament-return to sports after injury (ACL-RSI) scale assesses the psychological impact of returning to sports (also referred to as psychological readiness) after ACL reconstruction. The aim of this study was to evaluate important measurement properties of the Japanese version of ACL-RSI scale.

Methods

Ninety-three participants who underwent ACL reconstruction filled out the Japanese version of ACL-RSI scale, the Tampa scale for kinesiophobia (TSK), the International Knee Documentation Committee-Subjective Knee Form (IKDC-SKF), and Knee injury and Osteoarthritis Outcome Score (KOOS). To assess test re-test reliability, 50 of the 93 participants re-answered the Japanese version of ACL-RSI scale within 10 days. Floor and ceiling effects, internal consistency, construct validity, and reliability of the Japanese version of ACL-RSI scale were analysed.

Results

There were no floor and ceiling effects. The Japanese version of ACL-RSI scale showed good internal consistency (Cronbach's alpha = 0.912). It was positively correlated with total points of IKDC-SKF and the Lysholm score, and with the all sub-categories of the KOOS, and it was negatively correlated with the TSK. Reliability of the Japanese version of ACL-RSI scale was satisfactory.

Conclusion

The Japanese version of ACL-RSI scale has acceptable measurement properties. It can be a useful for evaluation of psychological readiness for return to sports in Japanese athletes who undergo primary ACL reconstruction. Information provided by the Japanese version of the ACL-RSI scale may also help to identify athletes who find return to sport a challenge, and guide conversations regarding treatment and rehabilitation plans.

Level of evidence

II.

Promising clinical and magnetic resonance imaging results after internal bracing of acute posterior cruciate ligament lesions in multiple injured knees.

Otto, A., Helal, A., Imhoff, F.B., et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05852-6>

Purpose

The purpose of this study was to evaluate the clinical and radiological outcomes of acute posterior cruciate ligament (PCL) lesions in multiple injured knees that were surgically treated with internal bracing.

Methods

Acute complete PCL lesions in multiple injured knees with subsequent internal-bracing treatment within 21 days between 2014 and 2016 were eligible for inclusion. At final follow-up, patients were assessed with Tegner, Lysholm, and IKDC scores. PCL stability and healing were verified with KT-2000, stress radiography and magnetic resonance imaging (MRI).

Results

Fourteen patients [mean age 37.4 (\pm 17.8; SD) years] were evaluated after a mean follow-up of 19.9 (\pm 7.7; SD) months. Thirteen patients suffered complete lesions of the PCL with concomitant ligamentous injuries (Schenck I: six cases, Schenck III M: five cases, Schenck IV N: one case, Schenck V: one case). Median Tegner, mean Lysholm and mean IKDC scores at follow-up were 4 (2–7; interquartile range), 69.1 (\pm 16.6; SD) and 68.9 (\pm 18.1; SD) respectively. Posterior translation averaged 5.8 (\pm 2.2; SD) mm with the KT 2000 and stress radiography showed a mean posterior tibial translation of 5.5 (\pm 4.1; SD) mm in the side to side comparison. MRI showed adequate PCL healing.

Conclusions

Internal bracing as treatment for acute PCL ruptures in multiple injured knees showed adequate restoration of posterior tibial translation in a single-centre study including 14 cases.

Level of evidence

IV.

Paediatric proximal ACL tears managed with direct ACL repair is safe, effective and has excellent short-term outcomes.

Dabis, J., Yassen, S.K., Foster, A.J., et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05872-2>

Purpose

Anterior cruciate ligament (ACL) surgery in the paediatric population has long been a challenge. Non-operative treatment will result in persistent instability which can lead to chondral and meniscal injuries. The results of primary open ACL repair are poor. Concerns of growth plate disturbance with transphyseal techniques and issues with relatively small-diameter grafts in Tanner 1 and 2 patients, which are inadequate, have contributed to these challenges. With advancing instrumentation, there is renewed interest in ACL repair. The minimally invasive approach of arthroscopic primary ACL repair retains the native ligament. The objective and subjective outcomes at 2 years are presented.

Methods

Paediatric patients, less than 16 years of age, presenting acutely with complete proximal ACL ruptures underwent direct arthroscopic ACL repair, reinforced by a temporary internal brace, which was subsequently removed after 3 months. Patient-reported outcome measures including the Lysholm, Tegner and KOOS scores were collected at 6 months, 1 year and 2 years post-operatively.

Results

Twenty patients (age 6–16) completed data at 2 years post-operatively. There were no failures, no complications and no growth disturbance out to 2 years. The 2-year postoperative outcomes; Lysholm 95 (90–100), Tegner 7 (6–10), KOOS-Child 96.5 (88.9–100) demonstrated statistically significant improvements following surgery ($p < 0.001$). Objective measurements with an accelerometer did not demonstrate any significant side-to-side difference.

Conclusion

ACL repair for proximal ACL tears in the paediatric population demonstrates the potential for excellent outcomes at short-term follow-up. This presents an attractive alternative to ACL reconstruction when an adequate ACL remnant permits direct repair. Our results demonstrate that paediatric ACL repair is safe and effective.

Level of evidence

III.

Lower donor-site morbidity using QT autografts for ACL reconstruction.

Mouarbes, D., Dagneaux, L., Olivier, M., et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05873-1>

Purpose

Comparing scar cosmesis and regional hypoesthesia at the incision site between quadriceps tendon (QT), bone–patellar tendon–bone (BPTB), and hamstring tendon (HT) for anterior cruciate ligament (ACL) reconstruction.

Methods

Ninety patients undergoing ACL reconstruction with QT, HT or BPTB were evaluated at 1-year post-op. Scar cosmesis was assessed using the patient and observer scar assessment scale (POSAS) and length of the incision. Sensory outcome was analyzed by calculating the area of hypoesthesia around the scar. The classical ACL reconstruction functional follow-up was measured using the Lysholm score and KOOS.

Results

Concerning QT versus BPTB group, QT patients have a significantly lower mean POSAS (24.8 ± 6.3 vs. 39.6 ± 5.8 ; $p < 0.0001$), shorter mean incision (2.8 ± 0.4 cm vs. 6.4 ± 1.3 cm; $p < 0.0001$), lower extent of hypoesthesia (8.7 ± 5.1 cm² vs. 88.2 ± 57 cm²; $p < 0.0001$), and better Lysholm score (90.1 ± 10.1 vs. 82.6 ± 13.5 ; n.s.). No significant difference was seen in KOOS (90.7 ± 7.2 vs. 88.4 ± 7.0 ; n.s.). Concerning QT versus HT group, no significant difference was found regarding mean POSAS score (24.8 ± 6.3 vs. 31.8 ± 6.2 ; n.s.), mean length of the incision (2.8 ± 0.4 cm vs. 2.5 ± 0.6 cm; n.s.), KOOS (90.7 ± 7.2 vs. 89.8 ± 8.2 ; n.s.) and mean Lysholm score (90.1 ± 10.1 vs. 87.8 ± 0.6 ; n.s.). The mean measured area of hypoesthesia was significantly higher in the HT group (70.3 ± 77.1 cm² vs. 8.7 ± 5.1 cm²; $p < 0.0001$).

Conclusion

Quadriceps tendon harvesting technique has the safest incision by causing less sensory loss compared to BPTB and HT. It also has the advantage of a short incision with more cosmetic scar compared to BPTB, with no difference compared to HT. However, no significant difference in terms of functional outcome was shown between the three autografts. These findings provide surgeons evidence about their clinical practice and help with graft choice decisions.

Level of evidence

III.

Lower incidence of post-operative septic arthritis following revision anterior cruciate ligament reconstruction with quadriceps tendon compared to hamstring tendons.

Schuster, P., Schlumberger, M., Mayer, P., et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05878-w>

Purpose

To determine and compare the incidence of post-operative septic arthritis following revision anterior cruciate ligament reconstruction (R-ACLR) with autologous quadriceps tendon (with patellar bone block) compared to autologous hamstring tendons (semitendinosus and gracilis).

Methods

A total of 1638 isolated R-ACLR with either autologous hamstring tendons (n = 1004, 61.3%) or quadriceps tendon (n = 634; 38.7%) were performed between 2004 and 2017 and were retrospectively analysed with regard to the occurrence of post-operative septic arthritis. The technique of R-ACLR did not significantly change during the years of the study. All patients received pre-op i.v. antibiotics, but no presoaking of the grafts in vancomycin was performed in the years of the study. The individual decision of graft choice was based on graft availability, tunnel position and the presence of tunnel widening. Generally, hamstring tendons were preferred. There were no clinically relevant differences between the groups regarding gender or age. Routine follow-up examination was performed 6 weeks after the index operation (follow-up rate 96.5%), and patients unsuspecting for septic arthritis at that time were classified as non-infected.

Results

Fourteen patients with septic arthritis were identified, resulting in an overall incidence of 0.85%. There was one patient with septic arthritis in the quadriceps tendon group (incidence: 0.16%) and 13 patients in the hamstring tendons group (incidence: 1.29%), respectively. The difference was significant ($p = 0.013$).

Conclusion

In this series, the incidence of post-operative septic arthritis after R-ACLR was lower when quadriceps tendon graft was used compared to hamstring tendon grafts.

Level of evidence

III.

Vancomycin-soaked autografts during ACL reconstruction reduce the risk of post-operative infection without affecting return to sport or knee function.

Bohu, Y., Klouche, S., Sezer, H.B., et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05879-9>

Purpose

To compare return to sport and knee function 1 year after anterior cruciate ligament (ACL) reconstruction using autografts with and without vancomycin presoaking.

Methods

A case–control study based on a retrospective analysis of prospective data included athletes over the age of 16 operated from 2012 to 2018 for ACL reconstruction. There were two groups of patients due to a change in treatment protocols: Group 1 « without vancomycin » before November 2016 and Group 2 « with vancomycin » after this date. In Group 2, the graft was soaked in a vancomycin solution for 10 min and then fixed into the bone tunnels. The primary evaluation criterion was the return to sport 1 year after surgery. The secondary criteria were various knee scores. The number of patients needed to perform a non-inferiority study was calculated.

Results

1674 patients fulfilled the selection criteria, 1184 in Group 1 and 490 in Group 2. The series included 1112 men and 562 women, mean age 30 ± 9.7 years, 68 professional athletes, 674 competitive athletes and 932 recreational athletes. While seven patients presented with post-operative septic arthritis in Group 1, this complication was not found in Group 2. No significant difference was identified in the return to running between the two groups 1 year after surgery (75.9% vs. 76.1%, n.s.). Significantly more of the patients in Group 2 returned to their preinjury sport ($p = 0.04$). Knee function was comparable between the groups.

Conclusion

Vancomycin-soaked grafts during ACL reconstruction reduce the risk of post-operative infection of the knee without affecting the return to sport or knee function.

Level of evidence

III.

Soaking of the graft in vancomycin dramatically reduces the incidence of postoperative septic arthritis after anterior cruciate ligament reconstruction.

Schuster, P., Schlumberger, M., Mayer, P., et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05882-0>

Purpose

To determine and compare the incidence of postoperative septic arthritis following anterior cruciate ligament reconstruction (ACLR) with and without soaking of the graft in vancomycin solution prior to implantation in a large single-centre case series.

Methods

From 2004 to 2019, a total of 10,516 primary ACLR were performed and reviewed with regard to the occurrence of postoperative septic arthritis. From February 2017 onwards, all grafts were wrapped in a vancomycin-soaked (5 mg/ml) gauze swab between harvest and implantation (2294 patients, treatment group (2), prospectively followed). These were compared to 8222 patients before that date (control group (1), retrospectively evaluated). The technique of ACLR did not significantly change during the years of the study. There was no difference between the groups with regard to graft choice: Hamstring tendons were used in 99% and quadriceps tendons were used in 1% in both groups, respectively (n.s.). Routine follow-up examination was performed at 6 weeks (follow-up rate 97.1%) postoperatively. Patients with no treatment for septic arthritis at that time were classified as non-infected.

Results

There were 35 cases of postoperative septic arthritis in group 1 (incidence: 0.4%), and none in group 2 (incidence 0.0%), respectively. The difference was significant ($p < 0.001$).

Conclusions

Soaking of the graft in vancomycin solution prior to implantation dramatically reduces the incidence of postoperative septic arthritis in primary ACLR and should, therefore, be used in prevention of this major complication.

Level of evidence

III.

Articular cartilage repair using autologous collagen-induced chondrogenesis (ACIC): a pragmatic and cost-effective enhancement of a traditional technique.

Kim, S.J., Shetty, A.A., Kurian, N.M., et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05884-y>

Purpose

The autologous collagen-induced chondrogenesis technique is described, and the results of a 6-year follow-up clinical study using this technique are presented.

Methods

30 patients with International Cartilage Repair Society (ICRS) Grade III/IVa symptomatic chondral defects of the knee treated with enhanced microdrilling using atelocollagen were prospectively examined in this clinical series. The median age of the patients was 39.0 years (range 19–61 years). Patients were followed up to 72 months. Clinical evaluation was performed using functional knee scores and radiologically. Both quantitative and qualitative assessments were performed.

Results

Statistically significant and clinically relevant improvement was observed in 2 years and was sustained for the 6 years of the study observation. At 6 years, the mean Lysholm score was 79.7 (SD 6.8) compared to 52.6 (SD 10.7) pre-operatively ($p < 0.05$). The symptomatic Knee Injury and Osteoarthritis Outcome Score (KOOS) improved from 68.3 (SD 11.4) to 90.2 (SD 4.3) ($p < 0.05$). The subjective International Knee Documentation Committee (IKDC) also showed improvement from 39.1 (SD 4.1) to 81.6 (SD 7.8) ($p < 0.05$). The calculated T2* relaxation times were 26.0 (SD 4.2) seconds and 30.3 (SD 6.2) seconds for the repair tissue and native cartilage, respectively. The average magnetic resonance observation of cartilage repair tissue (MOCART) score was 78.5 (SD 9.6) for all lesions.

Conclusion

The enhanced microdrilling using atelocollagen is an enhancement of the traditional microfracture method using an off-the-shelf product. When used to treat moderate to severe chondral lesions, this enhancement produces hyaline-like cartilage with a corresponding improvement in symptoms.

Level of evidence

IV.

Anterior cruciate ligament—return to sport after injury scale: validation of the Norwegian language version.

Faleide, A.G.H., Inderhaug, E., Vervaat, W., et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05901-0>

Purpose

Evidence is emerging on the importance of psychological readiness to return to sport after anterior cruciate ligament (ACL) reconstruction. The ACL-Return to Sport after Injury scale (ACL-RSI) is developed to assess this. The aim of the current study was to translate ACL-RSI into Norwegian and examine the measurement properties of the Norwegian version (ACL-RSI-No).

Methods

ACL-RSI was translated according to international guidelines. A cohort of 197 ACL-reconstructed patients completed ACL-RSI-No and related questionnaires nine months post-surgery. One hundred and forty-six patients completed hop tests and 142 patients completed strength tests. Face and structural validity (confirmative factor analysis and explorative analyses), internal consistency [Cronbach's alpha (α)], test–retest reliability [Intraclass Correlation Coefficients (ICC)], measurement error [Standard error of measurement (SEM) and smallest detectable change at individual (SDCind) and group level (SDCgroup)] and construct validity (hypotheses testing; independent t tests, Pearson's r) were examined.

Results

ACL-RSI-No had good face validity. Factor analyses suggested that the use of a sum score is reasonable. Internal consistency and test–retest reliability were good (α 0.95, ICC 0.94 (95% CI 0.84–0.97) and measurement error low (SEM 5.7). SDCind was 15.8 points and SDCgroup was 2.0. Six of seven hypotheses were confirmed.

Conclusions

ACL-RSI-No displayed good measurement properties. Factor analyses suggested one underlying explanatory factor for “psychological readiness”—supporting the use of a single sum score. ACL-RSI-No can be used in the evaluation of psychological readiness to return to sport after ACL injury.

Level of evidence

III.

Greater knee joint laxity remains in teenagers after anatomical double-bundle anterior cruciate ligament reconstruction compared to young adults.

Nakanishi, Y., Matsushita, T., Nagai, K., et al.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05910-z>

Purpose

There is paucity in studies regarding double-bundle anterior cruciate ligament reconstruction (DB-ACLR) in teenagers. The purpose of this study is to investigate clinical outcome after DB-ACLR and analyze whether any differences exist between teenagers and young adults.

Methods

A retrospective study was performed between 2009 and 2017. Teenagers were defined as patients between 15 and 19 years and young adults between 20 and 25 years old. Isolated anterior cruciate ligament (ACL) injuries with DB-ACLR with minimum two-year follow up were included. Pre and post-operative Lysholm score, Tegner activity scale, KT-2000 arthrometer, manual pivot-shift grade, were assessed with post-operative one-leg hop test, isokinetic knee extensor strength test at 60°/sec, International Knee Documentation Committee Score (IKDC score), and re-injury rate.

Results

One-hundred and thirty-one patients, 75 patients in the teenage group (Group A) and 56 patients in the young adult group (Group B), were enrolled. Lysholm score was significantly lower in Group A (89.6 ± 21.1) compared to Group B (95.9 ± 4.6) ($p = 0.04$). Side to side difference in KT-2000 arthrometer (2.3 ± 2.2 mm vs 1.0 ± 2.3 mm, Group A vs Group B, respectively, $p < 0.01$) and ratio of post-operative positive pivot shift was significantly greater in Group A (30.7%) compared to Group B (7.1%) ($p < 0.01$). No significant difference was seen in re-injury rate (n.s.).

Conclusion

Teenage patients have a greater tendency for residual knee joint laxity after DB-ACLR. Although teenagers and patients in the early twenties are close in age, characteristic in knee joint laxity may be different and, therefore, may require attention upon surgery and post-operative follow-up.

Level of evidence

III.

Anterior cruciate ligament reconstruction with the use of adductor canal block can achieve similar pain control as femoral nerve block.

Min, H., Ouyang, Y., Chen, G.

DOI: <https://doi-org.eur.idm.oclc.org/10.1007/s00167-020-05933-6>

Purpose

Moderate-to-severe postoperative pain remains a challenge for both patients and surgeons after anterior cruciate ligament reconstruction (ACLR). The purpose of this study was to systematically review the current evidence in the literature to compare adductor canal block (ACB) with femoral nerve block (FNB) in the treatment of ACLR.

Methods

A comprehensive search of the published literature in PubMed, Scopus, EMBASE, and Cochrane Library databases was performed. Only English randomized clinical trials (RCTs) were included in this study. The primary outcome was pain score. Secondary outcome measures included opioid consumption, postoperative adverse events, patient satisfaction, and quadriceps strength.

Results

Eight RCTs with a total of 587 patients were included. No statistically significant difference was observed between the ACB and FNB groups in pain scores at 6 h, 12 h, 24 h, or 48 h; cumulative opioid consumption at 24 h or 48 h; patient satisfaction at 24 or 48 h; and postoperative adverse event. However, ACB showed superior quadriceps strength in the early postoperative period.

Conclusions

Both treatments provided similar overall pain relief after ACLR. The potential benefits of quadriceps preservation with ACB are worthy of future study. Therefore, ACB is recommended as an attractive alternative to FNB as the peripheral nerve block of choice for ACLR.

Level of evidence

Meta-analysis of Level 1 was performed in this study

Comparing Meniscectomy and Meniscal Repair: A Matched Cohort Analysis Utilizing a National Insurance Database

Kyle R. Sochacki, MD*, Kunal Varshneya, BS, Jacob G. Calcei, MD, Marc R. Safran, MD, Geoffrey D. Abrams, MD, Joseph Donahue, MD, Seth L. Sherman, MD

First Published July 15, 2020; pp. 2353–2359

<https://doi.org/10.1177/0363546520935453>

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Background: Meniscal repair leads to improved patient outcomes compared with meniscectomy in small case series.

Purpose: To compare the reoperation rates, 30-day complication rates, and cost differences between meniscectomy and meniscal repair in a large insurance database.

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

Methods: A national insurance database was queried for patients who underwent meniscectomy (Current Procedural Terminology [CPT] code 29880 or 29881) or meniscal repair (CPT code 29882 or 29883) in the outpatient setting and who had a minimum 2-year follow-up. Patients without confirmed laterality and patients who underwent concomitant ligament reconstruction were excluded. Reoperation was defined by ipsilateral knee procedure after the index surgery. The 30-day postoperative complication rates were assessed using the International Classification of Diseases, 9th Revision, Clinical Modification codes. The cost of the procedures per patient was calculated. Propensity score matching was utilized to create matched cohorts with similar characteristics. Statistical comparisons of cohort characteristics, reoperations, postoperative complications, and payments were made. All P values were reported with significance set at $P < .05$.

Results: A total of 27,580 patients (22,064 meniscectomy and 5516 meniscal repair; mean age, 29.9 ± 15.1 years; 41.2% female) were included in this study with a mean follow-up of 45.6 ± 21.0 months. The matched groups were similar with regard to characteristics and comorbidities. There were significantly more patients who required reoperation after index meniscectomy compared with meniscal repair postoperatively (5.3% vs 2.1%; $P < .001$). Patients undergoing meniscectomy were also significantly more likely to undergo any ipsilateral meniscal surgery ($P < .001$), meniscal transplantation ($P = .005$), or total knee arthroplasty ($P = .001$) postoperatively. There was a significantly higher overall 30-day complication rate after meniscal repair (1.2%) compared with meniscectomy (0.82%; $P = .011$). The total day-of-surgery payments was significantly higher in the repair group compared with the meniscectomy group (\$7094 vs \$5423; $P < .001$).

Conclusion: Meniscal repair leads to significantly lower rates of reoperation and higher rates of early complications with a higher total cost compared with meniscectomy in a large database study.

Hip Arthroscopy in the High-Level Athlete: Does Capsular Closure Make a Difference?

Jeffrey D. Hassebrock, MD*, Justin L. Makovicka, MD, Anikar Chhabra, MD, Matthew B. Anastasi, MD, Heather M. Menzer, MD, Justin G. Wilcox, PA-C, Kostas J. Economopoulos, MD

First Published July 15, 2020; pp. 2465–2470

<https://doi.org/10.1177/0363546520936255>

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Background: Hip arthroscopy has been shown to be effective in athletes who have femoral acetabular impingement and labral tearing. The effect of complete capsular closure versus nonclosure on return to play is unknown.

Hypothesis: Complete capsular closure after hip arthroscopy would lead to a higher rate and faster return to sports in high-level athletes.

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

Methods: A nonrandomized retrospective review was performed of high school, collegiate, and professional athletes undergoing hip arthroscopy by a single high-volume hip arthroscopic surgeon. Athletes were divided into those undergoing complete capsular closure (CC group) and non-capsular closure (NC group) after hip arthroscopy. Rate and time to return to play were determined between the 2 groups. Patient-reported outcomes including modified Harris Hip Score (mHHS), Hip Outcome Score Activities of Daily Living (HOS-ADL), and Hip Outcome Score Sport-Specific Subscale (HOS-SSS) were obtained at a minimum of 2 years.

Results: A total of 111 athletes with a minimum 2-year follow-up were included in the study. There were 62 in the CC group and 49 in the NC group. A higher percentage of athletes in the CC group returned to play compared with that in the NC group (90.3% vs 75.5%, respectively; $P = .03$). The CC group returned to play at a mean \pm SD of 4.7 ± 1.9 months compared with 5.8 ± 2.6 months in the NC group ($P < .001$). Patients in the CC group met the minimal clinically important difference for the mHHS, HOS-ADL, and HOS-SSS patient-reported outcomes at higher percentages: mHHS, 98.3% vs 87.7% for CC vs NC, respectively ($P = .02$); HOS-ADL, 98.3% vs 87.7% ($P = .02$); and HOS-SSS, 96.7% vs 89.7% ($P = .13$). The difference between groups was statistically significant for mHHS and HOS-ADL.

Conclusion: Complete capsular closure after hip arthroscopy was associated with faster return to play and a higher rate of return compared with that of nonclosure of the capsule in this sample population of high-level athletes. At a minimum 2-year follow-up, complete capsular closure was associated with significantly higher patient-reported outcomes compared with those of nonclosure in athletes who underwent hip arthroscopy.

Importance of Retaining Sufficient Acetabular Depth: Successful 2-Year Outcomes of Hip Arthroscopy for Patients With Pincer Morphology as Compared With Matched Controls

Claudia R. Brick, MBBS (Hons), BMedSci (Hons), Catherine J. Bacon, BSc, BPhEd (Hons), MSc, PhD, Matthew J. Brick, MBChB, FRACS§

First Published July 31, 2020; pp. 2471–2480

<https://doi.org/10.1177/0363546520937301>

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Background: Patients with pincer-type femoroacetabular impingement are commonly treated with arthroscopic reduction of acetabular depth as measured by the lateral center-edge angle (LCEA). The optimal amount of rim reduction has not been established, although large resections may increase contact pressures through the hip. A recent publication demonstrated inferior surgical outcomes in patients with acetabular overcoverage as compared with normal acetabular coverage. Casual observation of our database suggested equivalent improvements, prompting a similar analysis.

Purpose: To analyze patient-reported outcomes after hip arthroscopy for femoroacetabular impingement in patients with acetabular overcoverage who were matched with controls with normal coverage, as well as to analyze associations with reduction in LCEA.

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

Methods: Data were collected prospectively from patients with a minimum 2-year follow-up after receiving hip arthroscopy for femoroacetabular impingement by a single surgeon. Cases were reviewed to identify those with pincer-type morphology (LCEA >40°) and matched according to sex, age, chondral damage, and surgery date in a 1:1 ratio with controls with an LCEA of 25° to 40°. The surgical goal was to reduce the LCEA to the upper end of the normal range with minimal rim resection, usually 35° to 37°. Radiographic measurements of coverage, intraoperative findings, procedures, and patient-reported outcomes were recorded, including the 12-Item International Hip Outcome Tool, Non-arthritic Hip Score, Hip Disability and Osteoarthritis Outcome Score, visual analog scale for pain, rates of revision or reoperation, and conversion to total hip arthroplasty.

Results: A total of 114 hips (93 patients) for the pincer group were matched 1:1 from 616 hips (541 patients) for the control group. The pincer group (mean ± SD age, 34.5 ± 12.2 years) did not differ in age, body mass index, or follow-up from controls. LCEA was reduced in both groups pre- to postoperatively: the pincer group from 44.0° ± 2.8° to 34.2° ± 3.5° and the controls from 32.9° ± 3.9° to 31.0° ± 3.0°. No differences in improvement were observed: iHOT-12 improved by 35.7 points in both groups (P = .9 for analysis of variance interaction) and Nonarthritic Hip Score by 22.3 points (P = .6). From all eligible surgical procedures, 2-year follow up rates were 2.5% and 2.6% for the pincer and control cohorts, respectively, and 1.2% and 0.3% for conversion to total hip arthroplasty.

Conclusion: Arthroscopic management of acetabular overcoverage can achieve excellent results, equivalent to arthroscopy for other causes of symptomatic femoroacetabular impingement. A key finding was smaller rim resections producing a mean postoperative LCEA of 34.2° with a small standard deviation..

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