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BACK

Upper extremity

Arthroscopy, Volume 34, Issue 4

Preoperative Radiographic Risk Factors for Incomplete Arthroscopic Supraspinatus Tendon Repair in Massive Rotator Cuff Tears

Andrew J. Sheean, M.D., Robert U. Hartzler, M.D., M.S., Patrick J. Denard, M.D., Alexandre Lädermann, M.D., Timothy G. Sanders, M.D., Michael B. Zlatkin, M.D., Stephen S. Burkhart, M.D.
Arthroscopy, April 2018, Volume 34, Issue 4, Pages 1121–1127
https://doi.org/10.1016/j.arthro.2017.09.046

Purpose
To determine if preoperative imaging findings of massive rotator cuff (RC) tears were associated with (1) incomplete arthroscopic repair and (2) the use of advanced mobilization techniques (interval slides) and/or the use of a load-sharing rip stop repair construct.

Methods
Eighty-six consecutive patients who underwent arthroscopic repair for massive RC tears performed by a single surgeon between July 2013 and July 2015 were retrospectively evaluated. Previously proposed radiographic risk factors for irreparability (acromiohumeral distances, tangent sign, and the Goutallier stage of fatty infiltration for the supraspinatus) were analyzed. Associations between preoperative imaging characteristics and intraoperative results of RC surgery were determined using binary logistic regressions and Fisher's exact tests. The interobserver reliability of imaging characteristics was determined using intraclass correlation coefficients (ICCs).

Results
Seventy-six massive RC tears were fully reparable (88%). In the case of 10 RC tears (12%), a complete repair was not obtained. Inability to obtain a complete repair of the supraspinatus was associated with a positive tangent sign (30% irreparable) versus a negative tangent sign (6.3% irreparable, odds ratio [OR] = 6.3, P = .0102) and with Goutallier grade 3-4 fatty infiltration of the supraspinatus (42.9% irreparable) versus grade 0-2 fatty infiltration (5.7% irreparable, OR = 11.8, P = .001). Advanced arthroscopic techniques (interval slides or load-sharing rip stop) for dealing with poor-quality or retracted tendon were used in 62% of cases; however, no associations were found between preoperative imaging characteristics and these techniques. Interobserver reliability was moderate (ICC = 0.75-0.90) for the tangent sign (ICC = 0.78) and high-grade (Goutallier 3-4) fatty infiltration of the supraspinatus (ICC = 0.74).

Conclusions
A positive tangent sign and/or high-grade fatty infiltration (Goutallier 3-4) of the supraspinatus were risk factors for incomplete RC repair. However, these were not completely predictive of reparability because the majority of massive RC tears with these imaging characteristics were still fully reparable.

Level of Evidence
Level IV, therapeutic case series.

BACK

Comparison of Short-term Complications After Rotator Cuff Repair: Open Versus Arthroscopic

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Arthroscopy, April 2018, Volume 34, Issue 4, Pages 1130–1136

DOI: https://doi.org/10.1016/j.arthro.2017.10.027

Purpose
To define and compare the incidence and risk factors for short-term complications after arthroscopic and open rotator cuff repair (RTCR), and to identify independent risk factors for complications after RTCR.

Methods
All patients who underwent open or arthroscopic RTCR from 2005 to 2013 were identified in the American College of Surgeons National Surgical Quality Improvement Program database. Short-term complications were categorized as surgical, medical, mortality, and unplanned 30-day readmission. Univariate analysis allowed the comparison of patient demographics and comorbidities. Propensity score matching was used to control for demographic differences between arthroscopic and open RTCR patient groups. Independent risk factors for complication were identified using multivariate logistic regression.

Results
Overall, 11,314 RTCRs were identified (24% open, 76% arthroscopic). The mean operative time for open RTCR was 78 minutes compared with 91 minutes for arthroscopic repairs ($P < .001$). The overall complication rate was 1.3%, with the highest complication unplanned return to the operating room (41 patients, 0.36%). The 30-day readmission was 1.16% (76/6,560 patients) and the mortality rate was 0.03% (3 patients). Total 30-day complications in the propensity-score-matched patient group were higher after open versus arthroscopic repair (1.79% vs 1.17%; $P = .006$). The overall infection rate after RTCR was 0.56%, with deep wound infection higher in the open repair patient group ($P = .003$). Multivariate analysis identified age >65 years (odds ratio [OR] 1.6; 95% confidence interval [CI] 1.2-2.3), operative time >90 minutes (OR 1.5; CI 1.1-2.1), and open RTCR (OR 1.6; CI 1.1-2.3) as independent risk factors for complications.

Conclusions
Short-term complications after RTCR are rare. Total complications are higher after open RTCR in propensity-matched patient groups and in multivariate analysis. Risk factors for complications include patient age >65, operative time >90 minutes, and open repair. Open RTCR is associated with an increased risk of surgical infections.

Level of Evidence
Level III, retrospective comparative trial.

BACK

Arthroscopically-Assisted Latissimus Dorsi Transfer for Irreparable Rotator Cuff Insufficiency: Modes of Failure and Clinical Correlation

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https://doi.org/10.1016/j.arthro.2017.10.052

Purpose
The main objective of this retrospective study was to analyze the rate and modes of failure of latissimus dorsi transfer (LDT). The secondary objective was to evaluate whether a rupture of the transfer was associated with a worse outcome.

Methods
During a 2-year period, we performed consecutive LDTs either for irreparable posterior-superior rotator cuff tears (RCTs) or for failed prior repair. All the LDTs were performed by a single surgeon. All transfers were arthroscopically assisted and fixed as a tubularized LD tendon in a bone tunnel inside the humeral head. Three metal clips were placed systematically intraoperatively in the tubularized tendon at a fixed distance of 2, 4, and 6 cm from the tip of the tendon. Immediate postoperative standard anteroposterior radiographs were performed and the position of the metal clips was compared with their position on radiographs performed at 6 weeks and 3 and 24 months postoperatively. Constant, Subjective Shoulder Value (SSV), Simple Shoulder Test (SST), Activities of daily living requiring active external rotation (ADLER), visual analog scale (VAS), American Shoulder and Elbow Surgeons (ASES) scores and patient's subjective satisfaction (assessed by self-questionnaire) at last follow-up were compared between patients who had a rupture of the transfer and those who did not.

Results
Sixty-six patients were included. Six of 66 patients (9%) were lost to follow-up. There were 11 complications (18.3%) in the global series (10 hematoma and 1 subscapularis retear). At a mean 35.2 months (range 24-50 months), there were 23/60 cases of rupture (38%). The 7 scores and the satisfaction reported were significantly lower for patients who had a rupture of the transfer versus those who had an intact transfer: Constant score, 42.8 versus 68.7 ($P = .001$); SSV, 48.9 versus 71.6 ($P = .001$); SST, 4.8 versus 8.4 ($P = .012$); ADLER, 19.7 versus 26.7 ($P = .005$); VAS, 3.7 versus 2.3 ($P = .082$); ASES, 55.4 versus 74.8 ($P = .056$); and 13% of either satisfied or very satisfied patients versus 78% ($P < .001$).

Conclusions
The rate of rupture of LDT is high (38%). With complete healing of LDT, the outcome is significantly lower in those with rupture compared with those without rupture, showing that LDT can efficiently treat massive and irreparable RCT.

Level of Evidence
Level IV, case series treatment study.

BACK

Propionibacterium acnes Suture Contamination in Arthroscopic Rotator Cuff Repair: A Prospective Randomized Study

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Arthroscopy, April 2018, Volume 34, Issue 4, Pages 1151–1155

https://doi.org/10.1016/j.arthro.2017.10.029

Purpose
To examine the contamination rate of the anchor-suture and to determine the efficacy of 2 different surgical skin preparation solutions with or without a plastic adhesive drape from suture contamination in arthroscopic rotator cuff repair.

Methods
A prospective randomized study was undertaken to evaluate 126 consecutive patients undergoing arthroscopic rotator cuff repair. Each shoulder was prepared with one of 2 randomly selected solutions according to an assigned envelope that indicated the procedure to be used: chlorhexidine-alcohol (1% chlorhexidine gluconate and 70% isopropyl alcohol) or povidone-iodine. Then, each group was further divided according to the usage of a plastic drape. The first cut-tails of the anchor-suture after cuff fixation were submitted to aerobic and anaerobic cultures.

Results
The overall rate of Propionibacterium acnes–positive cultures was 47% (14 of 31 cases) in the povidone-iodine group, 33% (11 of 33 cases) in the povidone-iodine with a drape group, 33% (10 of 30 cases) in the chlorhexidine-alcohol group, and 9.3% (3 of 32 cases) in the chlorhexidine-alcohol with a drape group. The positive culture rate in the chlorhexidine-alcohol with a drape group was lower than that in the povidone-iodine group (relative risk, 0.2; 95% confidence interval: 0.064-0.63; number needed to treat, 2.7; $P < .0001$). Coagulase-negative staphylococci were isolated in the povidone-iodine with a drape (1 case) and chlorhexidine-alcohol with a drape group (2 cases). No other bacteria were isolated, and no infections occurred in any of the patients treated in this study during the minimum 12-month follow-up period.

Conclusions
Chlorhexidine-alcohol solution with an adhesive plastic drape was more effective than chlorhexidine-alcohol without a plastic drape and povidone-iodine with/without a plastic drape in eliminating P acnes suture contamination. However, the usage of a plastic drape slightly increased the risk of coagulase-negative Staphylococcus proliferation.

Level of Evidence
Level I, therapeutic, prospective, randomized trial.

BACK

Risk Factors for Short-term Complications After Rotator Cuff Repair in the United States

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Arthroscopy, April 2018, Volume 34, Issue 4, Pages 1158–1163

https://doi.org/10.1016/j.arthro.2017.10.040

Purpose
To use a population-level dataset to evaluate the rate of 30-day complications after rotator cuff repair, and to evaluate the risk factors for complication and unplanned hospital readmission.

Methods
We used the American College of Surgeons National Surgical Quality Improvement Program from 2011 to 2015 to identify patients who underwent rotator cuff repair and concomitant procedures using Current Procedural Terminology codes. Postoperative complications and unplanned hospital readmissions were identified. Patient demographics, medical comorbidities, and perioperative variables were used in a multivariate logistic regression model to identify the risk factors for infection, any complication, and unplanned hospital readmission.

Results
A total of 23,741 patients were identified who underwent rotator cuff repair. Overall, 1.39% of patients experienced at least 1 complication, with 0.66% minor complications and 0.85% major complications. Unplanned readmission occurred in 1.16% of patients. Infection was the most common complication, occurring in 0.3% of patients (n = 72), and was the most common reason for return to the operating room. Open rotator cuff repair and male gender were independent risk factors for all outcomes. Increased age and numerous medical comorbidities were associated with the risk of any complication or unplanned hospital readmission.

Conclusions
Rotator cuff repair has a low incidence of short-term complications. Infection was the most common complication. Open repair, male gender, increased age, and medical comorbidities all significantly increased the risk of complications and hospital readmission.

Level of Evidence
Level IV, case series.

BACK

Biceps Autograft Augmentation for Rotator Cuff Repair: A Systematic Review

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https://doi.org/10.1016/j.arthro.2017.10.044

Purpose
To improve surgical outcomes in patients with massive cuff defects, different techniques and augmentations are proposed. The biceps tendon is easily available as an autograft. Our aim was to conduct a qualitative systematic review of various methods and surgical techniques that use a biceps autograft (BAG) for rotator cuff repair. Functional outcomes are also reported. We hypothesized that by using a BAG to treat massive rotator cuff tears, a more anatomic and biomechanical reconstruction could be achieved compared with other techniques.

Methods
A qualitative systematic review was conducted (MEDLINE and Embase databases) to inventory surgical techniques for use of a BAG for rotator cuff repair. The following search terms were used for MEDLINE: biceps AND (augment* OR autograft* OR transplantation* OR (cuff AND graft*) OR biceps-incorporat*). Studies were included if the following criteria were fulfilled: description of surgical technique, only human subjects, functional outcomes noted, all study designs except technical notes, and no restrictions on study date. The quality of the studies was assessed in a standardized manner using a tool based on the Cochrane handbook.

Results
We identified 981 studies; among these, 8 case series met the inclusion criteria. We identified 6 studies as high quality and 2 as medium quality. Different techniques for harvest and augmentation were used. Some studies left the proximal or distal portion intact, whereas others used it as a free graft. The clinical results of these studies showed significantly improved function, pain relief, and range of motion at follow-up, although this was not compared with a control group. The constructs were intact on magnetic resonance imaging in most patients (82%) within 2 years.

Conclusions
It can be concluded that use of a BAG is an option for augmentation in massive rotator cuff tears, although no definitive recommendations can be given. This is based on Level IV medium- and high-quality studies.

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

BACK

Journal of Shoulder and Elbow Surgery (JSES), Volume 27, issue 4

Minimal clinically important differences in Rowe and Western Ontario Shoulder Instability Index scores after arthroscopic repair of anterior shoulder instability

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Journal of Shoulder and Elbow Surgery, Volume 27, Issue 4, Published online: December 15, 2017

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Background
The minimal clinically important difference (MCID) is the threshold value for a change that would be considered meaningful by the patient. The purpose of this study was to determine the MCIDs for the Rowe score and the Western Ontario Shoulder Instability Index (WOSI) score after arthroscopic repair of anterior shoulder instability.

Methods
The study enrolled 198 patients who underwent an arthroscopic stabilization procedure for anterior shoulder instability. Patients were assigned to no change and minimal change groups by a 15-item questionnaire at the 1-year postoperative visit. The Rowe and WOSI scores were assessed preoperatively and at a 1-year postoperative follow-up. The MCID was calculated using an anchor-based method and a distribution-based method.

Results
There were 9 patients in the no change group and 26 patients in the minimal change group. The MCID for the Rowe score was 9.7 according to the anchor-based method. By the anchor-based method, the authors could not calculate MCID for the WOSI score because of insignificant difference of the mean score changes between the no change and minimal change groups. By the distribution-based method, MCIDs for the Rowe and the WOSI scores were 5.6 and 151.9 with the standard deviation–based estimate and 2.2 and 60.7 with the effect size–based estimate, respectively.

Conclusions
To assess the effectiveness of an arthroscopic stabilization procedure for anterior shoulder instability using the Rowe score, a difference of at least 9.7 in the score is clinically relevant. To compare clinical outcomes between different modalities, we should consider not only statistically significant differences but also the MCID.

BACK

The effectiveness of cerebral oxygenation monitoring during arthroscopic shoulder surgery in the beach chair position: a randomized blinded study

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Journal of Shoulder and Elbow Surgery, Volume 27, Issue 4, Published online: February 03, 2018

https://doi.org/10.1016/j.jse.2017.11.004

Background
Beach chair positioning for shoulder surgery is associated with measurable cerebral desaturation events (CDEs) in up to 80% of patients. Near-infrared spectroscopy (NIRS) technology allows real-time measurement of cerebral oxygenation and may minimize the frequency of CDEs. The purpose of this study was to investigate the incidence of CDEs when anesthetists were aware of and blinded to NIRS monitoring and to determine the short-term cognitive effects of surgery in the beach chair position.

Methods
NIRS was used to monitor cerebral oxygenation saturation in 41 consecutive patients undergoing arthroscopic shoulder surgery in the beach chair position. Patients were randomized to 2 groups, anesthetists aware of or blinded to NIRS data. The Montreal Cognitive Assessment (MoCA) was used to assess cognitive function preoperatively, immediately postoperatively, and at 2 and 6 weeks postoperatively.

Results
Overall, 7 (17.5%) patients experienced a CDE, 5 (25%) in the aware group and 2 (10%) in the blinded group. There was no significant difference in MoCA scores between the aware and blinded groups preoperatively (27.9.1 vs. 28.2; P = .436), immediately postoperatively (26.1 vs. 26.2; P = .778), 2 weeks postoperatively (28.0 vs. 28.1; P = .737), or 6 weeks postoperatively (28.5 vs. 28.4; P = .779). There was a correlation of NIRS with systolic blood pressure (r = 0.448), diastolic blood pressure (r = 0.708), and mean arterial pressure (r = 0.608).

Conclusion
In our series, the incidence of CDEs was much lower than previously reported and was not lowered by use of NIRS. Patients did not have significant cognitive deficits after arthroscopic surgery in the beach chair position, and there was a correlation between NIRS and intraoperative brachial blood pressure.

BACK

Arthroscopic subscapularis repair using single-row mattress suture technique: clinical results and structural integrity

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Journal of Shoulder and Elbow Surgery, Volume 27, Issue 4, Published online: October 17, 2017

https://doi.org/10.1016/j.jse.2017.08.009

Background
Rupture of the subscapularis (SSC) tendon, isolated or combined, is rare, and the treatment modalities are controversial. The purpose of this study was to evaluate, by magnetic resonance imaging (MRI), the clinical outcomes and structural integrity of the SSC tendon after all-arthroscopic repair with single-row mattress suture for isolated or combined SSC tendon tears.

Methods
This study included 68 patients who underwent all-arthroscopic repair using single-row mattress suture for isolated or combined SSC tendon tears between April 2011 and January 2013. The patients were evaluated by the visual analog scale for pain, American Shoulder and Elbow Surgeons score, Constant shoulder score, and SSC muscle strength measurement. MRI was used for assessment of the postoperative integrity of the SSC tendon.

Results
With a mean follow-up of 29.5 ± 4.0 months, the preoperative Constant shoulder and American Shoulder and Elbow Surgeons scores were 50.3 ± 21.0 and 46.6 ± 18.3, respectively, which improved at the last follow-up to 75.7 ± 16.6 and 81.3 ± 18.1, respectively, with statistical significance ($P < .001$). Belly-press and bear-hug test results showed some improvement in the last follow-up (>2 years) compared with the presurgical state ($P = .125$ and $.650$). A statistically significant SSC muscle strength deficit persisted in the postoperative state ($P = .015$). MRI evaluation showed a retear rate of 8.8%.

Conclusions
Arthroscopic repair of isolated or combined SSC tears with the single-row mattress suture technique results in significant clinical improvements and enduring tendon integrity, although SSC strength remains reduced from that on the normal side.

BACK

Lower Extremity

Arthroscopy, Volume 34, Issue 4

Clinical Outcomes, Return to Sports, and Patient Satisfaction After Anterior Cruciate Ligament Reconstruction in Young and Middle-Aged Patients in an Asian Population—A 2-Year Follow-up Study

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Arthroscopy, April 2018, Volume 34, Issue 4, Pages 1054–1059

https://doi.org/10.1016/j.arthro.2017.10.039

Purpose
To compare the clinical outcomes of arthroscopic anterior cruciate ligament (ACL) reconstruction in young and middle-aged Asians.

Methods
A retrospective study was performed using prospectively collected data from a tertiary institution ACL registry. All Asian patients with ACL tears who underwent primary arthroscopic ACL reconstruction by a single surgeon between 2008 and 2014, with minimum 2-year follow-up, were included. Patients with previous knee surgery or multiligamentous knee injuries were excluded. Two groups were formed: young patients (YP) (age <30) and middle-aged patients (MP) (age >40). They were compared preoperatively and 6 months, 1 year, and 2 years postoperatively for demographics, knee range of motion, anterior laxity, Tegner level, Lysholm and International Knee Documentation Committee grade, ability to return to preinjury level of activity, and patient satisfaction.

Results
YP (n = 84) and MP (n = 22) had differences in mean age (YP = 23.1 years, range 18-29 years; MP = 46.4 years, range 41-59 years, P < .001), preinjury Tegner level (YP = 7.4, MP = 6.4, P = .005), and preoperative Lysholm scores (YP = 65.3, MP = 53.0, P = .034). The incidence of meniscal and chondral injuries was similar. Two years postoperatively, both groups had comparable knee range of motion and anterior laxity. The Tegner score was different (YP = 6.3, MP = 5.2, P = .028), but the proportion of patients returning to preinjury Tegner level (YP = 45.2%, MP = 46.9%, P = .812), Lysholm scores (YP = 92.5, MP = 93.8, P = .794), proportion of patients with knees rated International Knee Documentation Committee A/B (YP = 77.4%, MP = 81.8%, P = .777), and satisfaction levels (YP = 98.5%, MP = 94.1%, P = .370) were similar. There were no graft ruptures or reoperations.

Conclusions
In an Asian, predominantly male population, the clinical outcomes of arthroscopic ACL reconstruction in YP and MP are equally good at 2-year follow-up. MP can benefit as much as younger patients from ACL reconstruction in terms of restoration of knee function and return to preinjury activity level, are equally satisfied with outcomes, and should not be excluded from surgery on the basis of age alone.

Level of Evidence
Level III, retrospective comparative study.

BACK

Clinical Outcomes of Arthroscopic Primary Repair of Proximal Anterior Cruciate Ligament Tears Are Maintained at Mid-term Follow-up

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https://doi.org/10.1016/j.arthro.2017.10.028

Purpose
To assess the mid-term clinical outcomes in patients with proximal avulsion anterior cruciate ligament (ACL) tears undergoing arthroscopic primary repair with suture anchors.

Methods
The first 11 consecutive patients with proximal avulsion tears treated with arthroscopic primary repair were evaluated at mid-term (minimum 5-year) follow-up. Physical examination was performed; laxity examination consisting of the Lachman, pivot-shift, and anterior drawer tests was performed; and patients were asked to complete the Lysholm, modified Cincinnati, Single Assessment Numeric Evaluation, and International Knee Documentation Committee (IKDC) questionnaires.

Results
Of the 11 patients, 10 were seen at a mean follow-up of 6.0 ± 1.5 years (range, 4.8-9.2 years). One patient was lost to follow-up, in whom failure had already occurred at short-term follow-up. One additional patient underwent reoperation for a medial meniscus tear and also had a partial ACL tear; this patient was clinically stable at last follow-up. All patients had full range of motion. Nine patients had negative Lachman and negative pivot-shift examination findings (IKDC score of A), and 1 patient had a 1A Lachman result and 1+ pivot-shift result (IKDC score of B). The mean Lysholm score was 96.0 ± 4.5 (range, 88-100); modified Cincinnati score, 95.6 ± 7.4 (range, 80-100); Single Assessment Numeric Evaluation score, 95.4 ± 5.4 (range, 85-100); preinjury Tegner score, 7.2 ± 1.2 (range, 5-9); postoperative Tegner score, 6.6 ± 1.8 (range, 3-9); and IKDC subjective score, 92.3 ± 11.3 (range, 64-100).

Conclusions
The clinical outcomes of arthroscopic primary repair of proximal ACL tears with suture anchors are excellent and are maintained at mid-term follow-up in a carefully selected subset of patients with proximal tears and excellent tissue quality.

Level of Evidence
Level IV, therapeutic case series.

BACK

Endoscopic Repair of Partial-Thickness Undersurface Tears of the Abductor Tendon: Clinical Outcomes With Minimum 2-Year Follow-up

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Arthroscopy, April 2018, Volume 34, Issue 4, Pages 1193–1199

https://doi.org/10.1016/j.arthro.2017.10.022

Purpose
To report the minimum 2-year outcomes of transtendinous repair of partial-thickness undersurface tears of the abductor tendon using patient-reported outcomes (PROs), visual analog scale (VAS) scores, and patient satisfaction scores.

Methods
All patients who underwent endoscopic transtendinous gluteus medius repair between October 2009 and May 2013 at 1 institution were prospectively evaluated. The exclusion criteria consisted of less than 2 years' follow-up, previous hip surgery, inflammatory arthritis, open surgery, full-thickness abductor tear, and Workers' Compensation patients. All patients underwent a documented preoperative physical examination with strength testing (scale of 0-5) and observation of their gait. Patient satisfaction and PRO scores were recorded preoperatively; at 3 months postoperatively; and at 1, 2, 5, and 10 years after surgery. The PRO scores collected were the modified Harris Hip Score, Hip Outcome Score–Activities of Daily Living Subscale, Hip Outcome Score–Sports-Specific Subscale, Non-arthritis Hip Score, and VAS score. Preoperative strength and gait were compared with latest follow-up.

Results
There were 25 patients who fit our criteria. Significant improvement in PRO scores were shown for the modified Harris Hip Score, Hip Outcome Score–Activities of Daily Living Subscale, Hip Outcome Score–Sports-Specific Subscale, Non-arthritis Hip Score, and VAS score from 54.9 to 76.2, from 50.2 to 80.6, from 30.1 to 67.3, from 51.9 to 82.4, and from 7.1 to 2.7, respectively ($P < .001$). Before surgery, 11 patients had objective weakness; 7 of these patients moved up at least 1 strength grade by final follow-up. Preoperatively, 14 patients had a Trendelenburg gait; 12 of them had a normal gait at latest follow-up ($P < .001$). The average patient satisfaction rating was 7.5. There were no revision surgical procedures, and no complications were noted.

Conclusions
Partial-thickness undersurface tears of the abductor can be treated successfully with endoscopic transtendinous repair preserving the intact attachment of the superficial fibers of the gluteus medius. We recommend this treatment for partial undersurface tears recalcitrant to nonoperative treatment because patients showed clinical benefit at greater than 2 years' follow-up that exceeded substantial clinical benefit and the minimal clinically important difference.

Level of Evidence
Level IV, case series.

BACK

Acetabular All-Suture Anchor for Labral Repair: Incidence of Intraoperative Failure due to Pullout

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Purpose
To report on the incidence and features of intraoperative anchor pullout in a consecutive series of patients undergoing arthroscopic labral repair of the hip.

Methods
Over an 18-month period, 434 consecutive cases underwent labral repair by a single surgeon with a particular anchor system. The following data were recorded: (1) age and gender of all cases; (2) number of anchors used; (3) number of cases in which intraoperative anchor failure occurred; (4) number of anchors that failed; and (5) age and gender of those cases in which anchor failure occurred. Failures were reported for 3-month intervals. One patient underwent repair with an alternative anchor system during this time period and was excluded.

Results
Mean age was 34.2 (14-71) years with 180 males and 254 females. A total of 2,007 anchors were used, averaging 4.6 per case (1-8). Thirty-three anchors pulled out among 30 patients, representing a 1.6% incidence among all anchors. Mean age among pullouts was 37.8 (17-54) years with 11 males and 19 females. There was no difference compared with patient population in which no anchor pulled: mean 33.9 (14-71) years ($P = .085$) with 169 males and 235 females ($P = .578$). Pullouts were evenly distributed over the 3-month intervals (4, 4, 6, 6, 5, 8). Pullout was mostly due to failure to securely imbed the anchor in bone. Only 2 were known to pull out in the presence of being securely seated in bone.

Conclusions
These data support that the security of this particular all-suture anchor at implantation is exceptionally reliable for a single experienced surgeon, and there is no demonstrable learning curve.

Level of Evidence
Level IV, retrospective review of a case series.

BACK

Excision of Labral Amorphous Calcification as a Part of Hip Arthroscopy—Clinical Outcomes in a Matched-Controlled Study

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Purpose
To evaluate clinical outcomes, demographics, and radiographic findings for patients whose hip arthroscopies involved amorphous calcification (AC) excision and to compare them with a control group with no AC and with the general population regarding diabetes mellitus and hypothyroidism.

Methods
Patients who underwent primary hip arthroscopy involving surgical excision of AC deposit in the anterosuperior labralcapsular recess between October 2008 and July 2014 were reviewed. Demographics, radiographic findings, intraoperative findings, and procedures were reviewed. Minimum follow-up was 2 years and included visual analog scale for pain, patient satisfaction, and the following patient-reported outcome scores: modified Harris hip score, hip outcomes score sport-specific subscale, and nonarthritic hip score. These patients were matched (1:2 ratio) to patients who underwent hip arthroscopy with no AC using the following matching criteria: age at surgery ± 5 years, body mass index ± 5, gender, type of labral treatment, and type of capsular treatment.

Results
We reviewed 12 cases in 11 female patients. Mean latest follow-up scores improved from 64.0 to 83.4 ($P = .003$) for modified Harris hip score, from 57.6 to 80.6 ($P < .001$) for nonarthritic hip score, from 35.4 to 62.7 ($P = .021$) for hip outcomes score sport-specific subscale, and from 6.4 to 2.8 ($P = .016$) for visual analog scale. The survivorship rate was 91.7%, with one hip converting to total hip arthroplasty. Mean patient satisfaction was 8.4 ± 2.3. Six hips of the 12 (50%) had clock face localization of the AC. They were all between 11 and 12 with a mean of 12:30. Postoperative radiographic findings showed no subsequent AC in all 12 hips. No complications or revisions were reported. There were no significant differences between the AC group and the control group.

Conclusions
The treatment of AC as part of hip arthroscopy for labral tear and femoro-acetabular impingement is safe and has favorable and similar outcomes compared with a control group at minimum 2-year follow-up. Female gender may be a risk factor for the development of AC. There is no strong evidence that AC should be debrided.

Level of Evidence
Level III, case control study.

BACK

Revision Hip Arthroscopy After Labral Reconstruction Using Iliotibial Band Autograft: Surgical Findings and Comparison of Outcomes With Labral Reconstructions Not Requiring Revision

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Purpose
To determine the causes of revision hip arthroscopy in patients who underwent labral reconstruction and to compare outcomes of these patients with patients who did not require a revision following reconstruction.

Methods
Patients who underwent revision hip arthroscopy after previous labral reconstruction from 2006 to 2014 were included. Patients with less than 2-year follow-up, preoperative joint space of ≤2 mm, or who underwent other reconstructive procedures at the time of labral reconstruction were excluded. Each patient was matched by year of surgery, age, gender, and the number of previous surgeries with 2 patients that underwent labral reconstruction but did not require a revision following the reconstruction. Preoperatively and at a minimum 2-year follow-up, outcome scores were collected including the Hip Outcome Score–Activities of Daily Living (HOS-ADL) and HOS–Sports Scale, modified Harris Hip Score, Western Ontario and McMaster Universities Index (WOMAC), the 12-Item Short Form Health Survey (SF-12) Physical Component Summary, and the patient satisfaction outcome were collected. Differences between the preoperative and the postoperative outcomes score of each patient in the 2 groups was assessed using the paired t test. The Mann-Whitney U test was used to compare the 2 groups.

Results
From 347 patients who underwent iliotibial band autograft labrum reconstruction from 2006 to 2014, 28 hips (8%) in 26 patients (18 females and 8 males) had revision arthroscopy after labral reconstruction. The mean age was 32 years (range: 16-64). The mean number of hip surgeries prior to the labral reconstruction was 1.9 ± 1.2. The average time from the last labral reconstruction procedure to revision labral reconstruction was 27 months (range: 5-59). Procedures performed at revision included lysis of adhesions (100%), additional femoroacetabular impingement (FAI) correction (50%), ligamentum teres debridement (50%), psoas release (29%), labral augmentation or reconstruction (14%), and others. Following revision surgery after previous labral reconstruction, 4 patients (14%) underwent total hip arthroplasty and 2 (7%) patients required a subsequent revision arthroscopy (age 67 and 23) at 15 months and 16 months. The average follow-up time was 3.6 years ± 1 year after revision following labral reconstruction and after labral reconstruction in the nonrevision group. No significant difference was detected in the outcome scores and postoperative satisfaction between the 2 groups. The HOS-ADL improved 16 points in the nonrevision group and 19 points in the revision group.

Conclusions
Patients who underwent revision surgery after labral reconstruction were mostly female, with 2 or more surgeries prior to reconstruction, and 14% required THA and 7% had recurrent scarring. In those who did not fail, outcomes significantly improved and were similar with patients who did not need revision. Adhesions and residual FAI were the most common findings during revision labral reconstruction.
Level of Evidence
Level III, retrospective comparative study.

BACK

A Systematic Review of Arthroscopic Versus Open Tenotomy of Iliopsoas Tendonitis After Total Hip Replacement

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Purpose
To conduct a systematic review of the literature comparing patient outcomes following arthroscopic and open operative management of iliopsoas tendonitis (IPT) following total hip replacement (THR).

Methods
This review study was conducted in accordance with the Preferred Reporting Items for Systematic review and Meta-Analysis (PRISMA) statement. Inclusion criteria were as follows: outcome studies following open or arthroscopic iliopsoas tendon release after THR with at least 6 months of follow-up, English language, and human studies. The exclusion criteria included case reports, articles evaluating nonsurgical management or cup revision, and articles without a specific diagnosis of IPT or in which results between open and arthroscopic treatment were reported in conjunction.

Results
A total of 131 studies were initially retrieved, with 7 satisfying all inclusion criteria (4 studies on arthroscopic tenotomy and 3 studies on open tenotomy). The review included a total of 88 patients with IPT—61 patients treated arthroscopically and 27 patients treated with open tenotomy. In total, 77 of the 88 patients demonstrated successful outcomes following surgery. In the group treated with arthroscopy, 91.8% (56/61) of patients had successful outcomes, whereas in those treated with open tenotomy, 77.8% (21/27) of patients had successful outcomes. Of patients with signs of mechanical impingement from acetabular component overhang, those who underwent open tenotomy had complete pain relief in 6/8 patients (75%) compared to arthroscopic tenotomy in which there was relief in 40/43 patients (93%).

Conclusions
Arthroscopic iliopsoas release for management of IPT is suggested to be an effective minimally invasive operative technique that may also yield a lower complication rate in comparison to open tenotomy. Tenotomy, both arthroscopic and open, are successful treatment options for IPT, including those with signs of mechanical impingement, and are recommended prior to cup revision.

Level of Evidence
Level IV, systematic review of level IV studies.

BACK

Knee Osteoarthritis After Anterior Cruciate Ligament Reconstruction With Bone–Patellar Tendon–Bone Versus Hamstring Tendon Autograft: A Systematic Review of Randomized Controlled Trials

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Purpose
The primary purpose of this study was to systematically review high-quality studies in the literature to compare the postoperative radiographic incidence of knee osteoarthritis (OA) after anterior cruciate ligament reconstruction (ACLR) with bone–patellar tendon–bone (BPTB) versus hamstring tendon (HT) autograft. The secondary purpose of this study was to compare other symptoms of postoperative knee OA between these 2 groups through patient-reported outcome scores and knee range of motion.

Methods
A systematic review was performed by searching PubMed, Embase, and Cochrane Library to locate randomized controlled trials that compared postoperative progression of knee OA in patients who had undergone ACLR with BPTB versus HT autograft. Search terms used were “anterior cruciate ligament reconstruction,” “patellar tendon,” “hamstring,” “randomized,” and “osteoarthritis.” Patients were assessed based on radiographic evaluation (Kellgren-Lawrence, Ahlbäck, Fairbank, and the Objective International Knee Documentation Committee scales), patient-reported outcome scores (Knee Injury and Osteoarthritis Outcome Score and visual analog scale scores), graft failure, and active knee flexion and extension deficit.

Results
Eight studies (6 Level I, 2 Level II) were identified that met inclusion criteria, including a total of 237 and 268 nonoverlapping patients who had undergone ACLR with BPTB and HT autograft, respectively, with a mean follow-up of 11.5 years (range, 3-16 years). Graft failure was experienced by 7.0% of patients in each group ($P = .99$). A Kellgren-Lawrence grade ≥2 was found in 52.0% and 51.0% of BPTB and HT autograft patients, respectively ($P = .85$). An Ahlbäck and Fairbank grade ≥2 was found in 5.0% and 8.4% of BPTB and HT autograft patients, respectively ($P = .36$). There were no significant differences in any patient-reported outcomes between groups within any study.

Conclusions
Patients undergoing ACLR with BPTB autograft or HT autograft can be expected to experience a similar incidence of postoperative knee OA at long-term follow-up.

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

BACK

Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA), Volume 26, Issue 4

Early combined arthroscopic treatment for simultaneous ruptures of the patellar tendon and the anterior cruciate ligament leads to good radiological results and patient satisfaction

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Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA), Volume 26, Issue 4, 1164 – 1173

https://link.springer.com/article/10.1007/s00167-017-4562-2

Purpose
Simultaneous rupture of the patellar tendon (PT) and the anterior cruciate ligament (ACL) is a relatively rare injury. This study offers a comprehensive review of the published reports and presents two cases of simultaneous PT and ACL rupture.

Methods
A systematic review of English literature was performed, and data from two patients who were referred to our institution with simultaneous PT and ACL rupture were collected. Both patients underwent primary arthroscopic ACL reconstruction combined with PT reconstruction and, 1 year after surgery, magnetic resonance imaging (MRI), clinical examination, strength measurement and functional assessment.

Results
Fourteen studies (24 patients) were included in the review. A two-stage approach was used in eight cases (33.3%), and in nine the use of arthroscopy was documented (37.5%). Post-operative scores were documented for nine patients (average IKDC 91.2; Lysholm 94.6), and radiological results were provided for seven. In the two newly reported cases, satisfactory functional results were obtained and MRI at 1-year follow-up revealed regular PT and ACL signal.

Conclusions
No consensus has been established for neither a diagnostic nor a therapeutic algorithm for simultaneous PT and ACL ruptures. Early combined arthroscopic treatment leads to good radiological results, accelerated recovery and patient satisfaction; further studies are required to confirm the role of arthroscopy and assess the superiority of a specific technique.

Level of evidence
Review of level IV and V studies and case series, Level IV.

BACK

Bone and Joint Journal (BJJ), Volume 100, issue 4

Arthroscopically assisted fixation of Hawkins type II talar neck fractures; a case series

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https://doi.org/10.1302/0301-620X.100B4.BJJ-2017-0772.R3

Aims
Arthroscopically controlled fracture reduction in combination with percutaneous screw fixation may be an alternative approach to open surgery to treat talar neck fractures. The purpose of this study was thus to present preliminary results on arthroscopically reduced talar neck fractures.

Patients and Methods
A total of seven consecutive patients (four women and three men, mean age 39 years (19 to 61)) underwent attempted surgical treatment of a closed Hawkins type II talar neck fracture using arthroscopically assisted reduction and percutaneous screw fixation. Functional and radiological outcome were assessed using plain radiographs, as well as weight-bearing and non-weight-bearing CT scans as tolerated. Patient satisfaction and pain sensation were also recorded.

Results
Primary reduction was obtained arthroscopically in all but one patient, for whom an interposed fracture fragment had to be removed through a small arthrotomy to permit anatomical reduction. The quality of arthroscopic reduction and restoration of the talar geometry was excellent in the remaining six patients. There were no signs of talar avascular necrosis or subtalar degeneration in any of the patients. In the whole series, the functional outcome was excellent in five patients but restricted ankle movement was observed in two patients. All patients had a reduction in subtalar movement. At final follow-up, all patients were satisfied and all but one patient were pain free.

Conclusion
Arthroscopically assisted reduction and fixation of talar neck fractures was found to be a feasible treatment option and allowed early functional rehabilitation.

BACK

American Journal of Sports Medicine (AJSM), Volume 46, Issue 3

Hip Distraction Without a Perineal Post: A Prospective Study of 1000 Hip Arthroscopy Cases

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http://journals.sagepub.com/doi/full/10.1177/0363546517741704

Background:
Hip arthroscopy has traditionally been performed with a perineal post, resulting in various groin-related complications, including pudendal nerve neurapraxias, vaginal tears, and scrotal necrosis.

Purpose:
To assess the safety of a technique for hip distraction without the use of a perineal post.

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

Methods:
We prospectively analyzed a consecutive cohort of 1000 hips presenting to a dedicated hip preservation clinic; all patients had hip pain and were subsequently treated with hip arthroscopy. Demographic variables, hip pathology, and lateral center edge angle were recorded for each case. In the operating room, the patient's feet were placed in traction boots in a specifically designed distraction setup, and the operative table was placed in varying degrees of Trendelenburg. With this technique, enough resistance is created by gravity and friction between the patient's body and the bed to allow for successful hip distraction without the need for a perineal post. In a subset of 309 hips (n = 281 patients), the degrees of Trendelenburg as well as the distraction force were analyzed.

Results:
The mean ± SD Trendelenburg angle used among the subset of 309 hips was 11° ± 2°. The mean initial distraction force necessary was 90 ± 28 lb, which decreased to 65 ± 24 lb by 30 minutes after traction initiation ($P < .0001$). The most important variables in determining initial force for this cohort of patients were, in order of magnitude, sex ($P < .0001$), weight ($P < .0001$), and lateral center edge angle ($P < .01$). No groin-related complications occurred among the entire cohort of patients, including soft tissue or nerve-related complications. The rate of deep venous thrombosis was 2 in 1000.

Conclusion:
The use of the Trendelenburg position and a specially designed distraction setup during hip arthroscopy allows for safe hip distraction without a perineal post, thereby eliminating groin-related soft tissue and nerve complications. Certain patient variables can be used to estimate the required distraction force and inclination angle with this method.

BACK