Preserving Acetabular Labrum Benefits Functional Outcome


Safran MR:

J Am Acad Orthop Surg 2010; 18 (June): 338-345

Injuries of the acetabular labrum are seen more frequently as the use of hip arthroscopy increases. When approaching labral repairs, we must remember that more labral function will be lost as more labrum is removed.

Background: With MRI and hip arthroscopy, labral injuries are being diagnosed and treated with increasing frequency. Objective: To review the anatomy, biomechanics, and pathophysiology of the acetabular labrum. Anatomy: The acetabular labrum is an inverted horseshoe-appearing structure with the transverse acetabular ligament joining the inferior attachments. It consists of (1) the capsular side, which is made up of dense connective tissue, and (2) the articular side, which is made up of fibrocartilage. The 3-layered labrum consists of collagen fibers oriented differently in each layer, with largest fibers oriented in circumferential manner to best offset the forces of tension. The bony acetabular rim inserts into and attaches to the labrum with calcified cartilage. On the articular side, the labrum transitions into articular cartilage. The hip capsule joins the labrum, creating a 6-mm to 8-mm capsulolabral recess. Although the articular labrum has no inherent vasculature, the capsular-labral attachment to the acetabulum has a blood supply, which suggests a potential for healing in this area. The labrum is innervated, with a portion of it coming from the obturator nerve. Nerve endings are involved in pain perception, deep sensation, and joint proprioception. Biomechanics and Function: The labrum increases the acetabular volume by 33% and the surface area by 22%. It provides a seal, keeping synovial fluid in the hip joint, improving articular nutrition, distributing compressive forces, and maintaining negative pressure. Loss of this seal allows leakage of joint fluid and decreased hydrostatic pressures. Loss of the labrum may contribute to diminished joint lubrication and nutrition, and it decreases stability, particularly at end ranges. Pathophysiology: Tear or loss of the labrum decreases distraction force by 60%, resulting in greater shear forces in the hip. Loss also may lead to greater edge loading of the acetabulum and accelerated breakdown of chondral surfaces. This process also is affected by decreases in lubrication and chondrocyte nutrition. Treatment: Historically, the treatment of choice has been labral debridement in patients with symptomatic labral tears. Although early studies showed good short-term results, more recent studies have identified the importance of recognizing femoral acetabular impingement (FAI) as a cause of labral pathology. As imaging, arthroscopy, and physician awareness improve our understanding of FAI, labral tears are being treated with repair after addressing the FAI-contributing factors. Recent studies suggest that labral repair has a better prognosis than does resection. Conclusions: Basic science and early clinical evidence suggest that preserving as much labrum as possible is beneficial when repairing a labral injury. Reviewer's Comments: This is a good review of existing basic sciences and clinical information by 1 of the country's experts on this subject. The information is balanced and easy to read. This is recommended reading for physicians treating young and middle-age patients with hip pain. (Reviewer-John H. Wilckens, MD).

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Keywords: Hip Arthroscopy, Labral Tears, Normal Anatomy of Acetabular Labrum

Print Tag: Refer to original journal article
Non-weightbearing immobilization for 6 weeks appears to be as effective as surgical treatment in the management of partial and complete tarsal navicular stress fractures.

**Objective:** To review the effectiveness of conservative versus surgical treatment of tarsal navicular stress fractures (TNSF).

**Methods:** MEDLINE® search revealed 23 reports on the treatment of TNSF. Reports were queried for fracture description as to complete or incomplete fracture. Treatments included (1) rest with weightbearing, (2) immobilization and non-weightbearing (NWB), or (3) surgical fixation. Additionally, studies were reviewed for successful outcomes and for time to return to full activity.

**Results:** The best outcome was achieved with NWB and immobilization for 6 weeks (success rate, 96%). This treatment was more effective than surgery (success rate, 82%), but the difference did not reach statistical significance. NWB and immobilization for <6 weeks had a 77% success rate. Rest and weightbearing had the worst success rate (47%). The time to return to play was similar for surgical treatment (5.4 months) and NWB and immobilization (5.6 months).

**Conclusions:** Treatment with 6 weeks of immobilization and NWB was just as effective as internal fixation in the treatment of TNSF.

**Reviewer's Comments:** While this study exhibits all the shortcomings of a meta-analysis, it does provide some helpful information on the treatment of patients with TNSF. TNSFs are considered high-risk stress fractures. Other high-risk stress fractures, such as fifth metatarsal stress fractures, have been more predictably treated with surgery and quicker return to play. NWB and cast immobilization for 6 weeks had a higher success rate and similar return to play when compared with internal fixation. It should be noted that this is still a problem fracture that needs to be treated aggressively: non-operatively or operatively. (Reviewer—John H. Wilckens, MD).

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Keywords: Tarsal Navicular Stress Fractures

Print Tag: Refer to original journal article
3.5-mm Screws in 4 Cortices Preferred to Fix Syndesmosis

Ankle Fracture Syndesmosis Fixation and Management: The Current Practice of Orthopedic Surgeons.

Bava E, Charlton T, Thordarson D:

Am J Orthop 2010; 39 (May): 242-246

The most common method of fixing syndesmosis injuries among foot/ankle and trauma surgeons uses 1 or 2 3.5-mm screws engaging 4 cortices.

Objective: To determine how syndesmosis injuries associated with ankle fractures are treated by orthopedic surgeons.

Design: Survey.

Methods: Because there are a multitude of methods reported in the treatment of syndesmosis injuries, the authors conducted a survey of all trauma fellowship directors (n=45) of the Orthopaedic Trauma Association (OTA) and all American Orthopaedic Foot and Ankle Society (AOFAS) fellowship directors (n=40) regarding how they would treat a syndesmosis injury associated with Danis-Weber type C or Lauge-Hansen pronation-external rotation type IV ankle fractures. Besides demographic data, survey members were specifically asked about the type and number of fixation devices used, number of cortices engaged, and when and how the syndesmosis screws were removed. After 1 month, an additional 68 OTA and AOFAS members were surveyed. Of the total 153 surveys solicited, only 75 were completed and formed the study group.

Results: 33 (44%) surgeons routinely used a single syndesmosis fixation device, 33 (44%) routinely used 2 fixation devices, and 9 (12%) used 1 or 2 fixation devices, depending on clinical factors. Screw fixation was used by 69 surgeons, with the 3.5-mm screw being the most utilized. Other fixation devices include TightRope™ (n=5) and Kirschner wires (n=1). Two respondents used bioabsorbable screws. Of the 69 surgeons who used screws, 20 (29%) engaged 3 cortices, 46 (67%) engaged 4 cortices, and 3 (4%) engaged 3 or 4 cortices per screw. Overall, 19% engaged a single tibial cortex with a single 3-cortices screw, 43% engaged 2 tibial cortices with 2 single 3-cortices screws or a single 4-cortices screw, and 38% engaged 4 tibial cortices with two 4-cortices screws. Of the 66 surgeons using metal screws, 23 (35%) did not routinely remove syndesmosis screws, while 43 (65%) did. Of these 43 surgeons who removed the remove syndesmosis screws, 41 removed the screws in the operating room.

Conclusions: The most commonly used fixation for syndesmosis injury was 1 or 2 3.5-mm screws engaging 4 cortices, with removal at 3 months.

Reviewer's Comments: This is a very interesting survey from OTA and AOFAS fellowship directors and members. Clearly, there is no consensus. It is also interesting that these knowledgeable surgeons have a routine preference. As I attempted to answer the survey, the type of fixation and number of cortices engaged is dependent on the particular patient and unique clinical parameters (such as soft bone, athlete, other injures). Practically, I rarely find a long enough 3.5-mm screw for 4-cortices fixation in some commercially available small fragment fixation sets. An intriguing question for this survey to have asked would have been, “When do these syndesmosis fixed patients begin weightbearing?” (Reviewer-John H. Wilckens, MD).

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Keywords: Syndesmosis Injuries, Fixation, Surgeon Preferences

Print Tag: Refer to original journal article
A modified Fulkerson osteotomy allows patients with patellar instability and elevated quadriceps or Q angle to return to athletics.

**Objective:** To review the clinical results of modified Fulkerson osteotomy in the treatment of patellar instability in athletes.

**Design:** Retrospective case series.

**Methods:** During a 5-year study interval, the senior surgeon performed 44 modified Fulkerson osteotomies in 37 athletes with patellar instability. The mean age was 20 years (range, 14-54 years). All patients had a documented patellar dislocation treated with physical therapy for a minimum of 3 months. The surgical technique included an arthroscopy with a lateral release. Patients then underwent a modified Fulkerson osteotomy through an incision medial to the tibial tubercle. A medial-to-lateral tubercle osteotomy was made at a 30-degree angle. The tubercle additionally was advanced distally if the patient demonstrated patella alta. The tubercle was advanced distally to place the inferior pole of the patella even with the Blumensaat line on a 30-degree flexed lateral fluoroscopic view. The tubercle was fixed with 2 or 3 AO 4.5-mm bicortical screws. Two patients underwent medial patellofemoral ligament (MPFL) repair. Postoperatively, patients were allowed early weightbearing in a brace locked in extension. The brace was discontinued at 2 months. Return to play was allowed at 4 to 5 months once sufficient quadriceps strength was achieved.

**Results:** 34 patients (41 osteotomies) were followed up for a mean 46 months (range, 22-71 months). All but 1 patient was able to return to the previous level of athletics. By International Knee Documentation Committee (IKDC) score, 27 patients had a normal score, 12 were near normal, and 2 were abnormal. The average Lysholm score was 91.8 (range 67-100). All patients had their Q-angle corrected to <15°. Only 1 patient had a recurrent instability, and this patient was later diagnosed with Ehlers-Danlos syndrome. At an average of 8 months after osteotomy, 17 of 34 patients (50%) required hardware removal.

**Conclusions:** Modified Fulkerson osteotomy was successful in treating patellar instability in athletes.

**Reviewer's Comments:** The authors present excellent results in a large series of athletes with patellar instability. Their modified Fulkerson displaces the tubercle more medially than anteriorly. Their medial-to-lateral osteotomy seems much simpler than the traditional Fulkerson. Seventeen patients had preoperative Q-angles in excess of 20°. All patients with patella alta underwent distalization of the tubercle by 10 to 15 mm. While MPFL is the main stabilizing structure, the authors only repaired 2. The authors provided a very thoughtful approach to patellar instability. (Reviewer-John H. Wilckens, MD).

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Keywords: Patellofemoral Instability, Athletes, Modified Fulkerson Osteotomy

Print Tag: Refer to original journal article
Patients with generalized osteoarthritis of the hip do not gain significant benefit from arthroscopic osteochondroplasty of femoroacetabular impingement lesions.

**Background:** Very few studies have examined the results of arthroscopic treatment of femoroacetabular impingement (FAI) in patients with long-standing hip osteoarthritis (OA).

**Objective:** To evaluate the short-term results of arthroscopic hip surgery for patients with FAI who had severe chondral wear.

**Design:** Therapeutic case series.

**Participants:** 20 patients undergoing hip arthroscopy from 2004 to 2007 who were found to have marked chondral damage (Outerbridge grade II or greater).

**Methods:** Patients were diagnosed with FAI both clinically and radiographically. All patients underwent osteoplasty and treatment of any underlying chondral disorders. Postoperatively, patients were allowed to bear weight as tolerated, unless they had a microfracture, in which case they were partial weight bearing until 4 to 6 weeks. Patients were evaluated clinically. Patients were assessed to see if they had undergone a total hip arthroplasty (THA). Patients who did not undergo THA were assessed with the non-arthritic hip score (NAHS).

**Results:** 16 men and 4 women (mean age, 47.3 years) participated in the study during a 3-year study interval. One patient died during the study. Preoperatively, 9 hips had Tönnnis grade I OA, 6 had grade II OA, and 5 had grade III OA. At surgery, all patients had labral lesions and generalized chondral wear. Grade IV chondral lesions were found on the acetabulum in 14 hips (70%) and in the femur in 3 (15%). Radiographs and MRI underestimated the amount of chondral wear seen at surgery in 15 patients (75%). At final follow-up at an average of 3 years, 8 patients had undergone THA, and another 2 were planning on undergoing THA. All but 1 patient with grade IV lesions at arthroscopy went on to THA. A higher Tönnnis classification was associated with a higher risk for THA. In those patients who did not have a THA, there was a predictable improvement in pain scores, range of motion for both internal rotation and flexion, and the NAHS.

**Conclusions:** Patients with generalized OA of the hip do not gain significant benefit from arthroscopic osteochondroplasty of FAI lesions.

**Reviewer's Comments:** This article highlights the fact that patients with generalized OA of the hip do not do well with hip arthroscopy. There are obvious limitations with the study, most notably the small sample size and retrospective design. A concerning point for me is that radiographs and MRI often underestimated the degree of hip osteoarthritis seen at arthroscopy. It was striking that there was a decrease in pain scores and the NAHS in those patients who did not undergo a THA. (Reviewer-Nathaniel P. Cohen, MD).

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Keywords: Hip Arthroscopy, Femoroacetabular Impingement, Osteoarthritis

Print Tag: Refer to original journal article
Degenerative RCTs Initiate Posterior to Biceps Tendon

Location and Initiation of Degenerative Rotator Cuff Tears: An Analysis of Three Hundred and Sixty Shoulders.

Kim HM, Dahiya N, et al:


The location of degenerative rotator cuff tears (RCTs) is more posterior than previously thought. Most RCTs involve a region 13 mm to 17 mm posterior to the biceps tendon.

**Background:** It is generally thought that rotator cuff tears (RCTs) originate in anterior aspect of the supraspinatus tendon and propagate posteriorly.

**Objective:** To assess the most common area for degenerative RCTs, and to assess the pattern of tear location depending on tear size

**Design:** Diagnostic study.

**Methods:** The authors used ultrasound to assess both shoulders in 262 patients. These patients were part of a study assessing the natural history of asymptomatic RCTs. Patients were included in this study if they underwent shoulder ultrasonography for unilateral shoulder pain and had been found to have a full or partial thickness RCT in the asymptomatic shoulder. Tears were classified based on if they were full or partial thickness tears and their size. The distance of the biceps tendon to the anterior and posterior margins of the tear was recorded, as was the tear size. The authors grouped the tears together to create a frequency histogram of the size and posterior margin's distance from the biceps tendon for both full-thickness and partial thickness tears.

**Results:** 360 shoulders in 233 patients met the inclusion criteria for this study and had complete data. Of these shoulders, 180 were asymptomatic and the remaining 180 had symptoms. The tears had a mean width of 16.3 mm and a mean length of 17.0 mm. When the authors plotted a histogram of the full-thickness RCTs, they found a unimodal distribution, with the most common site of the rotator cuff tear being 16 mm posterior to the biceps tendon. The second most common site was 15 mm posterior to the biceps tendon. For small full-thickness tears, the authors found a similar pattern for the tear location. For partial thickness tears, a similar unimodal distribution was found, with most tears between being 13 mm and 15 mm posterior to the biceps tendon.

**Conclusions:** Most RCTs involve a region 13 to 17 mm posterior to the biceps tendon, which is thought to be either the junction of the supraspinatus and infraspinatus or infraspinatus alone.

**Reviewer’s Comments:** The results of this study challenge the notion that RCTs originate immediately adjacent to the biceps tendon. The strengths of this study are the large number of patients and the very consistent data seen in the histograms. The large number of patients excluded does cast some of the conclusions into doubt. Perhaps this tear pattern may be seen in purely asymptomatic tears. (Reviewer- Nathaniel P. Cohen, MD).

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Keywords: Degenerative Rotator Cuff Tears, Location

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To be satisfied with operative outcomes after surgical treatment of a distal radius fracture, patients require a large amount of wrist range of motion.

**Background:** Differences may exist between patient satisfaction and functional outcome/objective measures following open reduction with internal fixation (ORIF) of distal radius fractures (DRFs).

**Objective:** To compare patient satisfaction and functional outcome scores with objective measurements following ORIF of DRFs.

**Participants:** 125 patients with DRFs followed prospectively.

**Methods:** 125 patients who had inadequate reduction with closed treatment underwent ORIF with a volar locking distal radius plate. Three months after surgery, patients were evaluated with the Michigan Hand Outcomes Questionnaire. Grip and key pinch strength as well as wrist range of motion (ROM) were also recorded.

**Results:** Average wrist ROM was 79.8% of the uninjured side. Mean grip strength adjusted for hand dominance was 58.2% of the uninjured side. Mean key pinch strength adjusted for hand dominance was 81.8% of the uninjured side. In general, 65% of patients were satisfied with their ROM while 58% were satisfied with their strength. Patient satisfaction was positively correlated with the functional measures of strength and ROM. However, none of these functional measures perfectly distinguished between a satisfied and dissatisfied patient. Cutoff points for these functional measures to predict patient satisfaction were 95% ROM, 65% grip strength, and 87% key pinch strength.

**Conclusions:** Patients seem to require a relatively high restoration of ROM and strength to be satisfied after ORIF of DRFs.

**Reviewer's Comments:** Previous studies have indicated that relatively minimal wrist ROM (25%-50% of normal) is required to perform most activities of daily living. The authors suggest that 95% of normal wrist ROM is required for patients to be satisfied with their wrist ROM after these injuries. The authors agree that this is an unrealistic goal for most of these patients. The greatest strength of this study is that it may be used to counsel patients before surgery and during the postoperative period about how they may not be satisfied with their final wrist ROM. I tell patients they may not be happy with their wrist ROM as it relates to their other side or their pre-injury state but that they still should be able to do most, if not all, of the activities that they need and want to do. The two patient satisfaction measures were directly related to ROM and strength. It may be that patients rated their dissatisfaction relative to their uninjured side because it is something they can compare easily for themselves. However, this "dissatisfaction" may not have necessarily correlated with their overall satisfaction. It would have been interesting to know how satisfied the patients were overall or relative to their preoperative expectations. (Reviewer-Kenneth R. Means, Jr, MD).
Cervical spine fusion leads to greater motion at adjacent levels in vivo than does cervical disc replacement. However, cervical total disc replacement preserves most of the motion and avoids altered kinematics at adjacent levels.

**Background:** Anterior cervical discectomy and fusion (ACDF) is an effective treatment for cervical radiculopathy and myelopathy. However, the fusion leads to increased motion at adjacent levels, resulting in early degeneration. Cervical total disc replacement (TDR) was designed to address nerve compression pathology, while preserving motion and avoiding premature adjacent segment degeneration.

**Objective:** To perform an in vivo study of the kinematics of the cervical spine after cervical fusion and arthroplasty.

**Design:** Prospective, randomized, multicenter trial.

**Methods:** 182 patients were randomly assigned to ACDF, and 272 patients underwent TDR. Patients were followed up clinically and radiographically for 12 months. The radiographs were analyzed using validated computer-assisted methods to measure translation and angular range of motion (ROM) at the operated level and one level above and below. To avoid magnification errors, radiographs were scaled using a metal ring of known size attached to all patients' necks.

**Results:** Preoperatively, the ROM in all levels was similar between the groups and was found to be higher at the level above the operative level. ROM at the operative level decreased by almost 25% in the TDR group (8° preoperatively to 6.2° postoperatively) and was almost eliminated in the ACDF group. The angular motion at the level above did not change significantly in the TDR group (9.8° preoperatively to 10.8° postoperatively; *P* = 0.43). The ACDF, however, resulted in significant increase in ROM at the level above (9.6° preoperatively to 11.0° postoperatively; *P* < 0.003). Inferior adjacent level motion did not change significantly in both groups. ACDF also resulted in a trend toward increased translation at the level above (1.3 mm preoperatively to 1.5 mm postoperatively; *P* = 0.09). TDR resulted in a significant increase in translation at the operative level (0.8 mm to 1.0 mm; *P* = 0.004) and some change in the area of center of rotation. The lordotic angle at the index level and disc height was significantly improved in both groups.

**Conclusions:** In this in vivo study, cervical TDR resulted in equivalent improvement in disc height and lordosis while preserving most of the motion and avoiding altered kinematics at adjacent levels. The authors acknowledged that the study had relatively short follow-up and that the clinical significance of these kinematic differences has not been established.

**Reviewer's Comments:** The study was well conducted and used validated methods to accurately assess and compare in vivo kinematics of cervical disc replacement and fusion. As the authors stated, a longer term study is needed to demonstrate if there is clinical significance in the kinematic differences shown between the two operations. These early results, however, are among the first to show in vivo favorable kinematics of TDR. Hopefully, this will result in a lower incidence of adjacent level degeneration as compared to ACDF. (Reviewer-Vladimir Sinkov, MD).

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Keywords: Cervical Fusion, Degeneration in Adjacent Segments

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Triangulation Technique Saves Time When Pinning SCFE

In Situ Screw Fixation of Slipped Capital Femoral Epiphysis With a Novel Approach: A Double-Cohort Controlled Study.

Pring ME, Adamczyk M, et al:

J Child Orthop 2010; 4 (June): 239-244

A preoperative planning technique can help optimize the starting point and insertion angle for pinning a slipped capital femoral epiphysis on a fluorolucent table. This technique significantly decreases operative time.

Objective: To describe a technique in which the pin-entry point can be properly determined preoperatively and the screw can be optimally inserted intraoperatively for secure and adequate fixation of a slipped capital femoral epiphysis (SCFE).

Methods: Patients were assigned to undergo in situ screw fixation of SCFE either while on a radiolucent table (using the new technique) or while on a fixation table (using the standard technique). The new method determined both a starting point and an insertion direction for the cannulated screw using preoperative drawings, then inserting the screw according to these plans. The line down the center of the epiphysis perpendicular to the physis was drawn on both the anteroposterior (AP) and lateral views. The cortical entry point was identified on the lateral view. The perpendicular distance from the lesser trochanter was measured and marked as the starting point along the lateral trajectory. Then going back to the AP view, the starting point and the trajectory were drawn on the line already made. The screw was inserted at this point and along the line, and checked with fluoroscopy before starting. Then as the screw was advanced, AP and lateral images were obtained. Clinically, during a 6-year study interval, patients treated with the new method versus the fracture table were compared. The accuracy of pinning was rated as A, B, or C based on the quadrant in which the tip of the pin was located (A: most ideal position).

Results: The authors stressed that care must be taken not to bend the guide pin when inserting screws with the newer method. The study included 107 patients (mean age, 12 years) with 149 involved hips. Thirty-nine hips underwent fixation on the fracture table with the use of traditional AP and lateral radiographs. The remaining 110 hips underwent fixation with the new method. Total operative time was less with the new method (50 minutes) than with the fracture table method (65 minutes). This did not include the time required to set up the fracture table. The percentage of hips graded as A in both the AP and lateral projections was not statistically different between the 2 groups.

Conclusions: The fluorolucent table is much stronger and safer than other methods. Suspending an obese child in traction on a table can be risky. The triangulation technique described above is valuable.

Reviewer's Comments: I like this method. I have been using a similar technique with good results. Of course, it sometimes is hard to judge the exact starting point, but it gives the surgeon an acceptable target. If you pin SCFEs, I would urge you to take a look at the diagrams in this article. (Reviewer-Paul D. Sponseller, MS, MD).

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Keywords: Slipped Capital Femoral Epiphysis, Screw Fixation, Pin-Entry Point

Print Tag: Refer to original journal article
The diphosphonate family of drugs is effective in reducing the incidence of fragility fractures and may have a role after joint replacement. The side effects are few.
In infants with idiopathic clubfoot who undergo a complete tenotomy, healing of the Achilles tendon occurs in a predictable manner, and the tendon is mature at 12 weeks.

**Objective:** To provide ultrasonographic confirmation of the healing stages of the Achilles tendon after tenotomy in infants undergoing treatment of idiopathic clubfoot.

**Design:** Prospective longitudinal cohort study.

**Participants:** 27 Achilles tendons in 20 patients (mean age, 4 months) with idiopathic clubfoot in England.

**Methods:** Achilles tenotomy was performed in the clinic using a Beaver eye blade under local anesthetic. The tendon was studied sonographically with a 12-mHz ultrasound transducer, which is a relatively high-resolution device. The images were acquired at 0, 3, 6, and 12 weeks after tenotomy. Static and dynamic images were obtained. Longer times to imaging were obtained in older children. Casts were removed after 3 weeks. Then, patients were placed in full-time Denis Browne style braces.

**Results:** The tenotomy procedures had no associated complications. At 3 weeks, a gap was evident with discrete tendon ends. There were no oriented fibers at this stage. At 6 weeks, a bulbous tendon was evident at. At 12 weeks, a remodeled tendon was seen, and the tendon was dynamically as well as statically intact. At that time, the tendon had a normal diameter and there was no evidence of where the cut ends of the tendons were located. The tendons had homogenous longitudinal signals. The patients who were older had longer times to healing.

**Conclusions:** This was the first prospective longitudinal study of tendon healing in children after a complete tenotomy. Achilles tendon healing occurs predictably in idiopathic clubfeet, and it is mature at 12 weeks in infants.

**Reviewer's Comments:** This study provided useful evidence of the tendon healing for which we have hoped. It seems to be relatively predictable, which provides psychological comfort to the orthopedic surgeon. I was somewhat reserved about the orientation of the fibers since all tissues had longitudinal striations, including the subcutaneous fat planes, and some of this may have been an artifact of the ultrasound technique in the musculoskeletal system. However, the uniformity of size and internal structure of the tendon was well demonstrated. It provides evidence that longer immobilization is not needed. The strength of the tendon cannot be deduced from this study. How do we know when a tendon is healed? We know that children have excellent remodeling potential. This is seen in fractures visualized on x-rays. However, we rarely have a chance to see the healing of soft tissues. The Ponseti treatment of clubfeet is one instance in which this is relevant. Ponseti advocated a complete tenotomy of the Achilles tendon if it is “stalled” in correction of the idiopathic clubfoot. This commonly done procedure requires a leap of faith. Until now, there has been little concrete evidence regarding how well or how fast the Achilles tendon heals. (Reviewer-Paul D. Sponseller, MS, MD).

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**Keywords:** Idiopathic Clubfoot, Tenotomy-Gap Healing, Effect of Age

**Print Tag:** Refer to original journal article
After elastic stable intramedullary nailing of a femur fracture, the rate of torsional malunion is high. Careful patient selection, correct operative technique, and proper postop stabilization help reduce this malrotation.

**Objective:** To determine the incidence of length and rotational malalignments after elastic stable intramedullary nailing (ESIN) for the fixation of pediatric femoral fractures.

**Design:** Retrospective therapeutic study.

**Methods:** During an 11-year study interval, 67 patients (mean age, 5.6 years; oldest patient, 10 years) with closed femur fractures who were treated with ESIN at Ulm, Germany, were studied. The mean body weight was 21 kg. Of the 67 fractures, 43 were right-sided and 25 were left-sided. Most fractures were midshaft fractures (n=48), followed by the proximal third (n=13) and distal third (n=7). Rod fixation was performed closed, and no cast or external immobilization was used. Length and angulation were compared by radiographs of both lower extremities taken just before rod removal. Rotational alignment was calculated either by CT scan or ultrasound. The authors compared ultrasound with CT and found a mean difference of only 3° to 4° for rotational measurement.

**Results:** On follow-up, the length on the injured side elongated by a mean of 0.5 cm. Transverse fractures had the greatest tendency to heal with overlengthening, while spiral fractures had the greatest tendency to shorten. No patient in this study had >15 mm of shortening. Nearly half of patients had angulation of greater than 10° to 15°. Rotational malalignment was common. There was a general tendency for external rotational malalignment. This exceeded 15° in nearly half of patients. Rotational malalignment was greatest in comminuted fractures, whether looked at in terms of the femur or the entire limb.

**Conclusions:** The authors found that lengthening and external rotation were common after femur fractures fixed by this method. These were not even the most challenging patients (older or heavier ones). The authors attributed the inaccuracies of alignment to the closed technique as well as the lack of immobilization and low torsional stability of the devices. The authors believe that these results justify a more careful consideration of the indications for these nails, and for postoperative immobilization in some of the comminuted or spiral fractures.

**Reviewer’s Comments:** There is a significant potential for moderately suboptimal results after flexible intramedullary nailing. The remodeling potential of children saves most of these from becoming poor results, but external rotation of >25° is probably not ideal. With the availability of other options, more careful selection of patients is indeed a good idea. I prefer submuscular plating for lengthening unstable fractures, and locked nailing for larger patients. Titanium elastic nails have become widely used for pediatric femur fractures. The technique is relatively simple and allows early hospital discharge. However, they produce unpredictable results in a surprising number of cases. It would be nice to know if these problems could be predicted. (Reviewer-Paul D. Sponseller, MS, MD).

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Keywords: Femoral Shaft Fractures, Intramedullary Fixation, Malalignment

Print Tag: Refer to original journal article
As rotator cuff tears enlarge in length and width, fatty degeneration is more likely to occur. In addition, fatty degeneration is more likely to occur when a tear involves the anterior aspect of the supraspinatus tendon.

**Background:** In the setting of rotator cuff repair, the presence of fatty atrophy is associated with worse functional outcomes and higher rates of re-tear. It is unclear why fatty degeneration occurs in some rotator cuff tears and not others. If the presence of fatty degeneration could be predicted, this would be useful for surgeons to decide when to operate on patients with chronic rotator cuff tears. **Objective:** To determine whether rotator cuff tear size and location are associated with the presence of fatty atrophy. **Methods:** 237 patients (144 men, 93 women; mean age, 64.2 years) with asymptomatic rotator cuff tears underwent bilateral shoulder ultrasonography. The type of tear (full- versus partial-thickness) and dimensions of the cuff tear were recorded. In addition, the presence and degree of fatty infiltration in both the supraspinatus and infraspinatus muscles were noted. Finally, the location of the tear was assessed by measuring the distance from the posterior margin of the biceps to the anterior edge of the tear. Using statistical analysis, the relationship of rotator cuff tear size and location to the presence of fatty atrophy was evaluated. **Results:** Of the 251 shoulders with full-thickness rotator cuff tears, 87 (34.7%) had evidence of fatty degeneration. Only 2 patients with partial-thickness tears had fatty degeneration, while no patients with intact rotator cuffs had fatty degeneration. Fatty degeneration was found in 10% of the small tears, 29% of the medium tears, 82% of the large tears, and 100% of the massive tears. The mean dimensions of the full-thickness tears were a length of 18.1 mm and a width of 16.2 mm. When dimensions of rotator cuff tears with fatty atrophy were compared to those without fatty atrophy, the tears with fatty atrophy were significantly larger in both length and width ($P<0.0001$). The mean distance from the biceps tendon to the edge of the cuff tear was 7.8 mm. When the distance from the posterior biceps tendon to the rotator cuff tear was compared in patients with and without fatty degeneration, tears with fatty degeneration had a significantly shorter distance measured ($P<0.0001$). **Conclusions:** Rotator cuff tear size and location correlate with the presence of fatty degeneration; as tears enlarge in length and width, fatty degeneration is more likely to occur. In addition, fatty degeneration is more likely to occur when a tear involves the anterior aspect of the supraspinatus tendon. **Reviewer's Comments:** This well-done study provides a wealth of data useful for shoulder surgeons. It would be interesting to see if repairing the anterior aspect of the supraspinatus tendon, the so-called anterior cable, can prevent fatty atrophy from occurring. (Reviewer-Adam J. Farber, MD).
The supine anterior apprehension test has a 71% positive predictive value for a recurrent shoulder dislocation when performed in a first-time dislocator 6 weeks after the initial injury.

**Background:** The anterior apprehension test is useful for diagnosing traumatic unidirectional anterior shoulder instability. However, can this clinical examination test be used to determine which first-time dislocators are at risk for dislocating again, and thus may require surgical treatment?

**Objective:** To evaluate the statistical ability of the supine anterior apprehension test performed 6 weeks after a first dislocation episode to predict the risk for recurrent anterior shoulder instability.

**Design:** Prospective cohort study.

**Participants:** 52 men (mean age, 20.3 years; range, 17-27 years) who sustained a first-time traumatic anterior shoulder dislocation.

**Methods:** All patients were treated with a closed reduction and were then placed in a shoulder immobilizer for 4 weeks. After that time, patients began a standard physical therapy protocol. Patients were examined 6 weeks after the injury, and the supine anterior apprehension test was performed. The test was considered positive if the patient demonstrated apprehension or resistance during the maneuver. Patients who lacked adequate range of motion to perform the apprehension test were re-examined 2 to 3 weeks later. Patients gradually returned to full activity and were followed prospectively for 4 years after the initial injury. Statistical analysis was used to determine the sensitivity, specificity, and positive and negative predictive values of the apprehension test to predict recurrent anterior instability.

**Results:** Mean final follow-up occurred at 39.6 months (range, 24-48 months). Of the 52 patients, 24 (46.2%) sustained a recurrent dislocation during the study. Dislocation recurred in 71.4% of patients with a positive apprehension test and in 36.8% of patients with a negative apprehension test ($P=0.03$). Patients with a positive apprehension test at 6 weeks were 4.29 times more likely to sustain a recurrent dislocation episode. The sensitivity, specificity, positive predictive value, and negative predictive value of the anterior apprehension test for predicting recurrent instability was 41.7%, 85.7%, 71.4%, and 63.2%, respectively.

**Conclusions:** When the anterior apprehension test is performed 6 weeks after a dislocation episode in a first-time dislocator, a positive test has a 71% predictive value for another dislocation episode.

**Reviewer's Comments:** The results of this study suggest that the anterior apprehension test may be a useful tool for determining which patients are at high risk for recurrent dislocations following a traumatic anterior instability episode. The results of this study warrant further prospective investigations on this topic. (Reviewer-Adam J. Farber, MD).

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Keywords: Shoulder Dislocation, Recurrence, Anterior Apprehension Test

Print Tag: Refer to original journal article
Suture-Bridging Not Superior to Double-Row Fixation

Arthroscopic Supraspinatus Tendon Repair With Suture-Bridging Technique: Functional Outcome and Magnetic Resonance Imaging.

Voigt C, Bosse C, et al:


When isolated supraspinatus tendon tears are treated with arthroscopic rotator cuff repair performed using the suture-bridging technique, the re-tear rate measured by MRI is 29% at 1 year.

Background: Arthroscopic rotator cuff repair performed using the suture-bridging technique has biomechanical advantages over previously described double-row rotator cuff repair techniques. However, whether these biomechanical advantages lead to superior clinical results or healing rates is not known.

Objective: To present the short-term clinical and MRI results of arthroscopic rotator cuff repair of isolated supraspinatus tendon tears using the suture-bridging technique.

Design: Prospective case series.

Participants: 73 consecutive patients who underwent arthroscopic rotator cuff repair of an isolated, full-thickness supraspinatus tendon tear at 1 institution.

Methods: All patients underwent the suture-bridging technique. Of these, 51 patients (19 women, 32 men; median age, 62 years) were available for follow-up and comprised the study cohort. Rotator cuff repair was performed using a suture-bridging technique in 1 of 3 different repair configurations: 1 medial row anchor and 1 lateral row anchor (n=27); 2 medial row anchors and 1 lateral row anchor (n=23); or 2 medial row anchors and 2 lateral row anchors (n=1). Outcome measures included the simple shoulder test score and the Constant score. In addition, cuff repair integrity was evaluated with MRI scans obtained 12 months after surgery.

Results: The simple shoulder test score increased significantly from 9 points at 4 months postoperatively to 12 points at both 12 and 24 months postoperatively. In addition, the Constant score was excellent in 76% of patients, good in 12% of patients, and poor in 5% of patients. MRI, however, revealed a 29% re-tear rate. When patients with MRI evidence of a re-tear were compared to those with an intact rotator cuff, there was no difference in patient satisfaction or the Constant score between the 2 groups. Patients with a re-tear on MRI scan, however, were significantly older than were patients with an intact rotator cuff (P<0.05). When compared with historical controls, the suture-bridging rotator cuff repair technique did not lead to significantly improved clinical outcomes or lower re-tear rates compared with previously described double-row fixation techniques.

Conclusions: Although the suture-bridging technique of arthroscopic rotator cuff repair leads to good clinical and structural outcomes, this technique does not lead to superior results when compared to previously described double-row fixation techniques in historical controls.

Reviewer’s Comments: Most patients in this study did not undergo cuff repair using a construct which had both 2 medial and 2 lateral row anchors. This construct is the most frequently studied construct in the biomechanical studies. I think that future studies assessing the outcomes of this repair construct will lead to superior clinical and structural results. (Reviewer-Adam J. Farber, MD).

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Keywords: rotator cuff tear, arthroscopic repair suture-bridging magnetic resonance imaging (MRI)

Print Tag: Refer to original journal article
Meniscal repair, in the setting of concomitant ACL reconstruction, is more commonly performed on younger patients and by surgeons who are sports medicine fellowship-trained or sports medicine specialists.

Objective: To determine the frequency of performing a meniscal repair versus partial meniscectomy in the treatment of meniscus tears during concomitant anterior cruciate ligament (ACL) reconstruction among surgeons collecting cases for Part II of the American Board of Orthopaedic Surgery (ABOS) certifying examination.

Methods: This study utilized data from the ABOS database for surgeons who submitted cases from 2003 to 2007. Utilizing searches performed by Current Procedural Terminology codes, all ACL reconstructions performed during that time were reviewed to determine if concomitant partial meniscectomy or meniscal repair was performed. The authors calculated the frequency of meniscal repair versus partial meniscectomy. They also examined the influence of patient age, surgeon training, geographic location, and self-declared subspecialty on the frequency of repair versus meniscectomy.

Results: During the study period, 8342 patients underwent an ACL reconstruction. Isolated ACL reconstruction was performed in 51% of cases, concomitant partial meniscectomy was performed in 34% of cases, and concomitant meniscal repair was performed in 15% of cases. Geographic location affected the frequency of meniscal repair. Meniscal repair was performed most frequently in the Southwest region (18.6%; $P<0.001$) and least frequently in the Northwest region (11.3%; $P<0.001$). Patient age also influenced the frequency of concomitant meniscal repair. Meniscal repair was performed in 19% of patients younger than age 25 years versus in 8% of patients older than age 40 years ($P<0.001$). Surgeon training also significantly affected the frequency of meniscal repair. Meniscal repair was performed more frequently among sports medicine fellowship-trained surgeons (17% of cases) compared to general orthopedic surgeons or other fellowship-trained surgeons (12% of cases for each; $P<0.001$). In addition, physicians who considered themselves sports medicine specialists were more likely to perform meniscal repair compared to other subspecialists or general orthopedists (18% vs 15% and 14%, respectively; $P<0.001$).

Conclusions: Among surgeons preparing for their Part II ABOS examination, meniscal repair, in the setting of concomitant ACL reconstruction, is more commonly performed on younger patients and by surgeons who are sports medicine fellowship-trained specialists or sports medicine specialists.

Reviewer's Comments: This study is limited by the nature of the information included within the database. Specifically, the database does not include information on time from injury to surgery, type or location of meniscal tear, or method of meniscal repair. It would be interesting to assess the influence of these factors on surgical decision making. Also, the information is submitted by young surgeons who are potentially inexperienced, and the information is self-reported. Finally, physicians collecting cases for their Board examination often err on the side of being overly conservative. (Reviewer-Adam J. Farber, MD).

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Keywords: ACL Repair, Concomitant Meniscal Repair, Fellowship Training

Print Tag: Refer to original journal article
New, Old Suture Anchor Techniques Restore Labral Bumper

Restoring the Labral Height for Treatment of Bankart Lesions: A Comparison of Suture Anchor Constructs.

Slabaugh MA, Friel NA, et al:

Arthroscopy 2010; 26 (May): 587-591

Traditional suture anchor repair techniques and newer knotless anchor repair techniques can restore labral height following Bankart repair. The two techniques are similar for the labral height achieved.

Background: Current arthroscopic Bankart repair techniques attempt to restore the height of the anterior inferior glenoid labral bumper as well as to reestablish tension in the anterior band of the inferior glenohumeral ligament. Traditionally, arthroscopic Bankart repair has been performed with suture anchors and arthroscopic knot-tying techniques. Newer knotless anchors may also be used for arthroscopic Bankart repair.

Objective: To evaluate the height of both the native anterior inferior glenoid labrum and the height of the glenoid labrum following 2 different arthroscopic Bankart repair techniques. One technique uses a traditional suture anchor with arthroscopic knots, while the other technique utilizes a knotless suture anchor.

Methods: 10 matched pairs of cadaveric human shoulder specimens (5 males and 5 female; mean age, 63 years) with no evidence of shoulder pathology were utilized in this study. Using a 3-dimensional digitizer, the height of the anterior inferior glenoid labrum was measured in all specimens at the 3:30, 4:30, and 5:30 positions. Acute Bankart lesions were then simulated in all specimens by detaching the labrum from the glenoid from the 3:00 to 6:30 positions. For each matched pair of shoulder specimens, one side was repaired utilizing three 3.0-mm Bio-Suture Tak™ anchors (Arthrex, Naples, FL) with knot-tying techniques; 1 cm of tissue was incorporated into the repair; and simple knots were tied. The other specimen from each pair was repaired using three 2.9-mm knotless PushLock® suture anchors (Arthrex), and 1 cm of tissue was also incorporated during this labral repair. Following all repairs, the digitizer was again used to measure labral height. The change in labral height was calculated as a percentage increase from the height of the native intact anterior inferior glenoid labrum.

Results: The mean height of the native glenoid labrum was 5.35 mm. The height of the glenoid labrum was increased in all repair constructs—the mean height of the glenoid labrum after Bankart repair was 8.05 mm ($P<0.0001$). There was no statistically significant difference in the increase in labral height produced by the knotless anchor repair technique (153% increase in labral height) or the traditional suture anchor repair technique with arthroscopic knots (164% increase in labral height; $P<0.05$).

Conclusions: Both traditional suture anchor Bankart repair techniques and newer knotless anchor repair techniques can restore labral height following Bankart repair. In addition, there is no significant difference in the restoration of labral height achieved by either repair construct.

Reviewer’s Comments: This study is limited by the fact that it is a biomechanical cadaveric study with time-zero data. Future biomechanical studies are needed to test the durability of both repair constructs with cyclic loading, and clinical studies are needed to assess rates of recurrent instability. (Reviewer-Adam J. Farber, MD).

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Keywords: Glenoid Labrum, Bankart Lesion, Suture Anchors, Labral Height

Print Tag: Refer to original journal article
When primary reconstruction of the anterior cruciate ligament is performed using a non-irradiated Achilles tendon allograft, the failure rate is 5.6%, which does not appear to vary with patient age.

**Background:** Allograft use is becoming increasingly popular for anterior cruciate ligament (ACL) reconstruction surgery. The Achilles tendon is a common source of allograft in this setting. No studies have specifically examined the failure rate of Achilles tendon allografts used for ACL reconstruction as a function of patient age.

**Objective:** To determine if the failure rate of patients undergoing primary ACL reconstruction with an Achilles tendon allograft is similar to that for autograft tendon rates.

**Design:** Retrospective case series.

**Participants:** 144 patients (75 men, 69 women; mean age, 29.5 years) who underwent primary ACL reconstruction with an Achilles tendon allograft from 2005 to 2007.

**Methods:** Graft selection was based on patient preference. All allografts were obtained from the same source (Musculoskeletal Transplant Foundation) and were processed in a similar fashion. The grafts were subjected to low-dose gamma irradiation (only if culture-positive) and were freeze-dried. All cases were performed by a single surgeon using the same surgical technique. A single-bundle ACL reconstruction was performed. The femoral tunnel was drilled using an anteromedial portal technique. The bone block from the allograft was inserted into the femoral tunnel. All patients underwent an identical postoperative rehabilitation course. Failure was defined as a traumatic re-rupture of the ACL graft, side-to-side laxity difference >5 mm, or excessive laxity precluding return to sport. Failure rates were analyzed by patient age.

**Results:** The mean final follow-up occurred at 40 months (range, 24-48 months). According to the International Knee Documentation Committee scoring system, 94.4% of patients had normal or near-normal outcomes. Overall, 5.6% of patients sustained traumatic ACL re-ruptures or had excessive laxity and were defined as failures. For patients younger than age 18 years, there was an 8.7% failure rate. For patients aged 18 to 25 years, the failure rate was 8.8%. For patients aged 26 to 40 years, the failure rate was 5.7%. For patients older than age 40 years, the failure rate was 0%. There was no statistically significant difference in the failure rate between these 4 groups. There were no documented infections or evidence of viral transmission.

**Conclusions:** When primary ACL reconstruction is performed using a non-irradiated Achilles tendon allograft, the failure rate is 5.6%. The failure rate does not appear to vary with patient age.

**Reviewer's Comments:** This study is limited by its nonrandomized, retrospective nature and the small sample size. In addition, activity level, which may be more significant than patient age, was not specifically assessed in this study. Despite these limitations, the study provided encouraging results for surgeons who utilize allograft tissues for ACL reconstructions. Future prospective studies with larger numbers of patients are needed to validate these results. (Reviewer-Adam J. Farber, MD).

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Keywords: ACL, Allograft, Achilles Tendon, Age Failure

Print Tag: Refer to original journal article
Double-row suture-bridge triceps tendon repair techniques led to improved footprint coverage and decreased displacement with cyclic loading compared to simple suture anchor or transosseous suture repair techniques.

**Background:** With much recent interest in rotator cuff footprint anatomy and surgical repair techniques that restore the footprint, the authors sought to apply these concepts to the distal triceps tendon insertion.

**Objective:** To describe the anatomy of the triceps tendon insertional footprint, and to study the biomechanical properties of 3 different triceps tendon repair techniques.

**Design:** Anatomic and biomechanical cadaveric laboratory studies.

**Methods:** 27 human cadaveric elbows (mean age, 61 years) were utilized in the study. First, all specimens were dissected, and a triceps tendon rupture was simulated as the triceps tendon insertion was sharply dissected from the olecranon. The footprint was then measured in both length and width dimensions. Next, specimens were randomly assigned to be repaired via one of 3 different surgical techniques: a transosseous suture repair technique, a suture anchor repair technique, and a newly described anatomic repair technique. The transosseous repair technique was performed as a number 2 FiberWire Krackow stitch was placed in the distal triceps tendon and passed through 2 parallel drill holes in the olecranon. In the suture anchor repair technique, the Krackow whipstitches were tied to 2 metal 4.5-mm suture anchors inserted in the center of the anatomic footprint. In the anatomic repair technique, a double-row transosseous-equivalent repair was performed. Proximally, two 3.0-mm anchors were inserted to recreate the proximal aspect of the footprint; these suture tails as well as the Krackow whipstitches placed in the distal triceps tendon were then passed through two 3.5-mm PushLock™ anchors inserted distal to the tendinous footprint. Using an MTS machine, biomechanical measurements were recorded, including load at yield, peak load, and displacement with cyclic loading.

**Results:** The average length of the triceps tendon footprint was 20.52 mm, and the average width was 22.65 mm. On visual inspection, anatomic repair led to greater footprint coverage (86%) than the other 2 repair techniques (suture anchor repair, 48%; transosseous repair, 31%). During cyclic testing, the transosseous suture repair had the greatest amount of displacement, and the anatomic repair led to the least displacement ($P<0.05$). There was no statistically significant difference in the load at yield and peak load among the 3 different repair techniques ($P>0.05$).

**Conclusions:** The triceps tendon insertional footprint measures 20 x 22 mm. The anatomic repair described in this article seems to provide superior footprint coverage, and it appears to be a superior biomechanical construct to traditionally described transosseous or suture anchor repairs.

**Reviewer’s Comments:** The study is limited by the fact that is a biomechanical, cadaveric study with older tissue specimens and time-zero data only. The clinical implications of the improved anatomical and biomechanical properties of the suture-bridge repair require further study. (Reviewer-Adam J. Farber, MD).

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Keywords: Triceps Tendon Ruptures, Suture-Bridge Footprint, Olecranon

Print Tag: Refer to original journal article
No Single Test Detects Full-Thickness Rotator Cuff Tear

The Value of Clinical Tests in Acute Full-Thickness Tears of the Supraspinatus Tendon: Does a Subacromial Lidocaine Injection Help in the Clinical Diagnosis? A Prospective Study.

Bak K, Sørensen AK, et al:

Arthroscopy 2010; 26 (June): 734-742

When evaluating a patient within the first weeks after an acute shoulder injury, no single physical examination test can stand alone in diagnosing an acute full-thickness rotator cuff tear.

Objective: To assess the accuracy of certain physical examination tests with and without subacromial lidocaine injections to detect full-thickness tears of the supraspinatus tendon following an acute shoulder injury.

Participants: 52 of 104 emergency department patients with acute shoulder injuries and without fractures.

Methods: 29 patients (10 women and 19 men; median age, 56 years) had acute full-thickness tears of the supraspinatus tendon confirmed both by ultrasound and diagnostic arthroscopy. Twenty-three patients (4 women and 19 men; median age, 38 years) had no evidence of rotator cuff tearing on ultrasound. All patients underwent a variety of clinical examination tests, both before and after receiving a subacromial lidocaine injection. For each test, the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), accuracy, and likelihood ratios (LRs) were calculated. Strong diagnostic evidence is defined as a LR >10. In addition, all patients underwent a standard shoulder ultrasound examination.

Results: Patients were evaluated at a median of 13 days after the injury. The Hawkins sign, Jobe test, and painful arc test had the highest sensitivities (range, 74% to 97%) and the lowest specificities (61%). The painful arc test had the highest sensitivity at 97%. The lag signs, including the drop arm test, the external rotation lag sign, the infraspinatus drop sign, and the internal rotation lag sign, had high specificities (range, 73% to 91%) but low sensitivities (<43%). The external rotation lag sign had the highest specificity (91%). Subacromial lidocaine injection increased the specificity of all tests, decreased the sensitivity of all tests, but did not affect the predictive values or the accuracy of the tests. No test, either before or after lidocaine injection, had a likelihood ratio >10. Patients with full-thickness supraspinatus tendon tears had active abduction of 85° prior to the injection. In contrast, patients in the control group had 160° of active abduction before the injection (P<0.01).

Conclusions: When evaluating patients following acute shoulder injuries, performing a subacromial lidocaine injection increases the specificity of examination tests, but the sensitivity decreases. Although the lag signs are specific, no single examination test can stand alone to definitively diagnose an acute full-thickness supraspinatus tendon tear soon after the injury.

Reviewer's Comments: This study provides useful information to physicians who evaluate acute shoulder injuries. Although no single test can stand alone in diagnosing acute full-thickness rotator cuff tears, the results of this study suggest that loss of active abduction following an acute injury should necessitate further diagnostic workup with either ultrasound or MRI. (Reviewer-Adam J. Farber, MD).

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Keywords: Rotator Cuff Tears, Supraspinatus Tendon Full-Thickness Tears, Diagnosis

Print Tag: Refer to original journal article
Stability Not Superior With Double-Bundle ACL Repair

Outcome of Arthroscopic Single-Bundle Versus Double-Bundle Reconstruction of the Anterior Cruciate Ligament: A Preliminary 2-Year Prospective Study.

Park SJ, Jung YB, et al:

Arthroscopy 2010; 26 (May): 630-636

No clinical difference was detected between single-bundle and double-bundle anterior cruciate ligament reconstruction techniques.

Background: The results of biomechanical studies have suggested that double-bundle anterior cruciate ligament (ACL) reconstruction results in less anterior and rotational motion than does single-bundle reconstruction. Clinical outcomes have not been as clear as the biomechanical studies.

Objective: To evaluate the clinical outcomes of arthroscopic double-bundle ACL reconstruction compared with that of single-bundle ACL reconstruction. Level of evidence: II

Design: Prospective, randomized clinical trial.

Methods: 147 consecutive ACL reconstruction surgeries were performed by the senior author. Inclusion criteria were primary ACL reconstruction with no combined ligament injury or arthritic changes; no subtotal or total meniscectomy; no malalignment; and a normal contralateral knee. These inclusion criteria were met by 113 patients, and all were followed up for 2 years. Of the 113 patients, 50 underwent single-bundle reconstruction and 63 underwent double-bundle reconstruction. Objective assessment of anteroposterior (AP) stability was performed by use of radiographs with the telos device (telos, Marburg, Germany) and KT-2000 arthrometer (MEDmetric, San Diego, CA). Rotational instability was assessed by lateral pivot-shift test. Clinical results were assessed by International Knee Documentation Committee (IKDC) score, Orthopadische Arbeitsgruppe Knie score, and Tegner activity scale. In a single-bundle reconstruction of the ACL, traditional anteromedial (AM) bundle reconstruction with arthroscopy was done with both the semitendinosus and gracilis tendons, with each segment folded in half to form a quadruple-thickness replacement graft. In a double-bundle reconstruction, autografts from the semitendinosus tendon into a 3-stranded graft were used for AM bundle reconstruction and from the gracilis tendon into a 3-stranded graft were used for posterolateral (PL) bundle reconstruction. In both techniques, the grafts were harvested from the well leg.

Results: The 2 reconstructions did not differ significantly in residual AP translation or rotational stability at the 2-year follow-up. In addition, the 2 techniques demonstrated no differences in the IKDC score, Orthopadische Arbeitsgruppe Knie score, or Tegner activity scale. There was no significant difference in postoperative side-to-side difference in midthigh circumference between the 2 groups.

Conclusions: Double-bundle reconstruction of the ACL by a method using 2 femoral tunnels and 2 tibial tunnels showed no differences in stability results, any other clinical aspects, or patient satisfaction.

Reviewer’s Comments: I commend the authors for their prospective, randomized design to test a controversial issue. While the study has many strengths, 1 weakness is the subjective nature of rotational stability testing by the pivot-shift exam. In addition, the autograft was taken from the well leg, and thus, results may be different than if it were taken from the affected limb. (Reviewer-Carl H. Wierks, MD).

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Keywords: ACL, Double-Bundle Reconstruction,

Print Tag: Refer to original journal article
An ADSF technique achieves adequate short-term clinical results for displaced, comminuted fractures of the greater tuberosity. But, posteroinferior displacement of the fracture fragment requires open reduction.

**Background:** Arthroscopic guided fixation of isolated greater tuberosity (GT) fractures is being performed. This includes arthroscopic-assisted percutaneous fixation and utilization of arthroscopic double-row suture anchor fixation (ADSF) about the fracture itself.

**Objective:** To evaluate the usefulness and the early clinical results of arthroscopic fixation for comminuted, displaced GT fractures using an ADSF technique.

**Design:** Retrospective cohort study.

**Methods:** 16 patients who had isolated displaced, comminuted GT fractures were treated by the ADSF technique. All patients had a displacement that ranged from ≥5 mm to <20 mm. Diagnosis was based on standard plain radiographs and 3D CT scan. The study group included 11 men and 5 women (mean age, 56.5 years). True AP radiographs were used postoperatively to assess residual displacement of the greater tuberosity. At final follow-up, all patients were evaluated with a visual analogue scale (VAS); the University of California–Los Angeles (UCLA) rating scale; and the shoulder index of the American Shoulder and Elbow Surgeons (ASES). A transtendon repair with suture anchors was performed to establish the medial-row. The lateral-row anchor was passed into the inferior aspect of the GT fracture. After the reduction the medial row, suture anchors were tied and the strands of the lateral-row anchor were tied over the fracture site to buttress the fragments with the intact tendon. If the fragment was displaced posteroinferiorly (usually an avulsion fracture by the infraspinatus or teres minor tendons), the fragment could not be accessed arthroscopically, and the procedure was converted to an open reduction.

**Results:** After surgery, radiologic assessment of the adequacy of fracture reduction showed a mean step off displacement of the tuberosity of 0.7 mm. The VAS score improved from 9.4 to 1.2 at final follow-up. After surgery, 3 patients rated their results as excellent, 11 as good, and 2 as poor. At final follow-up, the mean UCLA score improved by 31 points, and the ASES score improved to 90.7 points. The follow-up radiologic evaluation showed that bony union was achieved within 6 to 12 weeks. Clinical results correlated with the accuracy of reduction. **Conclusion:** Adequate short-term clinical results were achieved by using an ADSF technique to treat displaced, comminuted fractures of the greater tuberosity.

**Reviewer's Comments:** The authors report on the expansion of an arthroscopic, double-row suture anchor technique as a way to treat a type of fracture that can be difficult to stabilize due to comminution. While the authors report satisfactory results with few complications, I imagine that this is a technically difficult procedure. In this light, it is particularly important to obtain a preoperative CT scan as the authors were unable to access the fragment arthroscopically if it was displaced posteroinferiorly. (Reviewer-Carl H. Wierks, MD).

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Keywords: isolated greater tuberosity fractures, double-row, arthroscopic, greater tuberosity

Print Tag: Refer to original journal article