Displaced Femur Fracture--Total Hip Arthroplasty vs Hemiarthroplasty


Goh S-K, Samuel M, et al:

*J Arthroplasty; 24 (April): 400-406*

Hip replacement surgery for the treatment of femoral neck fractures may offer patients significant benefits in comparison to hemiarthroplasty.

**Objective:** To establish whether hip replacement or hemiarthroplasty is a superior treatment of displaced femoral neck fractures in a meta-analysis of prospective, randomized, controlled trials.

**Methods:** A search of the orthopaedic literature was utilized to extract all randomized, controlled studies comparing total hip arthroplasty (THA) to hemiarthroplasty in elderly patients with displaced femoral neck fractures. Outcome measurements including time to revision hip surgery, mortality, pain, function, and mobility were assessed.

**Results:** With regard to the comparison of rates of all subsequent surgeries (eg, revision surgery, drainage of infected implants, periprosthetic fractures), there was no significant difference between 1 and 4 years of follow-up. However, one study showed a lower revision rate at long-term follow-up in THA patients. No significant reduction was found in long-term mortality rates; however, patients who underwent THA had significantly less pain at both short- and long-term follow-up. Patients undergoing THA were also more likely to be ambulatory but, as expected, had a higher dislocation rate than did the hemiarthroplasty group.

**Reviewer's Comments:** The optimal treatment of a displaced femoral neck fracture in an elderly patient is somewhat controversial. However, this meta-analysis puts forth a compelling argument for hip arthroplasty in selected patients, that is, those with relatively good health, good pre-fracture mobility, and reasonable life expectancy. The presence of significant medical comorbid conditions should be considered. The possibility of an increased dislocation rate can be minimized with good surgical technique. Nevertheless, hip arthroplasty comes at an increased implant cost over unipolar or bipolar hemiarthroplasty, but the long-term benefits to the patient have been demonstrated in this meta-analysis of these randomized studies.

**Additional Keywords:** Hemiarthroplasty

**print tag:** () Refer to original journal article
**How Effective Is Continuous Femoral Nerve Block in TKA?**

*Continuous Femoral Nerve Block in Total Knee Arthroplasty: Immediate and Two-Year Outcomes.*

Shum CF, Lo NN, et al:

*J Arthroplasty;* 24 (February): 204-209

Continuous femoral nerve block following TKA provides excellent immediate pain control and overall increased patient satisfaction.

**Background:** Improvements in postoperative pain control after total knee arthroplasty (TKA) are a critical component of patient satisfaction. Improved analgesia promotes rapid mobilization and may decrease length of stay. The goal of regional anesthesia is to decrease opiate usage and thereby diminish side effects.

**Objective:** The authors hypothesized that the presence of a femoral nerve block would be more efficacious in relieving pain, promoting patient satisfaction, and diminishing opiate use.

**Participants/Methods:** The authors randomized 60 patients undergoing TKA into 3 groups of 20 patients each: morphine patient-controlled analgesia (PCA) only; low-dose continuous femoral nerve block (FNB) with ropivacaine 0.15% with supplementary PCA; or high-dose continuous FNB with ropivacaine 0.2% and morphine PCA. All patients received epidural anesthesia during the procedure. The authors recorded opiate use, pain scores, time to ambulation, and any FNB-related complications, as well as patient satisfaction. At 2 years following knee replacement, functional outcomes were assessed with the Oxford knee questionnaire and Knee Society clinical rating system.

**Results:** For up to 6 hours after surgery, patients receiving the FNB reported less pain and had lower cumulative morphine use. Patients in the FNB group also reported higher overall satisfaction. At 2 years, there were no significant differences in functional outcomes. Time to ambulation was not significantly different between groups.

**Conclusion:** A continuous FNB at either dose used in this study may hasten recovery and decrease overall opiate use with minimal risk of catheter-related complications.

**Reviewer's Comments:** While the results of this paper are interesting, they are not a strong endorsement of a continuous femoral nerve blockade. Overall opiate use was decreased, but pain scores were essentially equal 6 hours following the procedure, which, after knee replacement, is not a significant amount of time. In addition, the authors do not comment on catheter failures, suggesting a 100% success rate, which is unlikely. A more thorough study would be required to convince surgeons that femoral nerve blockade is a viable option for patients undergoing TKA.

**Additional Keywords:** Femoral Nerve Block

**print tag:** () Refer to original journal article.
A Review of Apophyseal Avulsion Fractures

Apophyseal Avulsion Fractures of the Hip and Pelvis.
McKinney BI, Nelson C, Carrion W:
Orthopedics; 32 (January): 42-50

Greater trochanter apophyseal avulsion fractures carry a small risk of osteonecrosis of the femoral epiphysis.

Objective: To review the current literature of apophyseal avulsion fractures of the hip and pelvis.

Design: Review article.

Anatomy & Etiology: Apophyseal avulsion fractures are often seen in adolescent athletes. Avulsion fractures result from a sudden contraction of the muscle attached to the apophysis. Common avulsion fractures include the ischial tuberosity (site of the hamstring insertion); anterior inferior iliac spine (attachment site of the direct head of the rectus femoris); the anterior superior iliac spine (attachment site of the sartorius); the iliac crest (insertion site of the obliques); pubic symphysis (attachment site of the hip adductors); the lesser trochanter (attachment site of the iliopsoas); and the greater trochanter (attachment site of the hip abductors).

Clinical Evaluation: Patients present with a history of a sudden onset of pain. They present with a limp, and experience pain with passive stretching or active contraction of the muscle group responsible for the avulsion. Anteroposterior x-ray of the pelvis can usually identify the avulsion. CT can provide detail, but represents increased radiation. MRI is an excellent way to identify an avulsion fracture and identify avulsed apophyses that have yet to ossify and that are not visible on plain x-rays. The authors classify avulsion fractures as Type I, nondisplaced fractures; Type II, displacement up to 2 cm; Type III, displacement >2 cm; and Type IV, symptomatic nonunion or painful exostosis.

Nonoperative Treatment: Phase I lasts 0 to 7 days and consists of rest, ice, and analgesics. Phase II lasts 7 to 14/20 days and consists of gentle active and passive range of motion. Once a patient regains 75% of their motion, phase III begins, which occurs on day 14/20 to 30 and involves supervised resistance. Phase IV, which occurs 1 to 2 months after injury, introduces stretching and sports-specific strengthening. Phase V (2 months after initial injury) consists of a return to competition. Most apophyseal injuries can be successfully treated nonoperatively.

Operative Treatment: Indications for surgery include all Type IV injuries, Type II greater trochanter avulsions, and Type II and III ischial tuberosity avulsions with neurologic symptoms. Relative indications include Type II greater trochanter avulsions; Type III anterior inferior iliac spine, anterior superior iliac spine, and ischial tuberosity fractures; and Type III avulsions in elite athletes. Return to competition ranges from 4 to 6 weeks to 3 to 4 months postoperatively.

Complications: The 2 most common complications of an apophyseal avulsion fracture are painful nonunion and exostosis. This can be treated with excision and reattachment of the muscle group. With greater trochanter avulsions, the dramatic complication of osteonecrosis of the femoral epiphysis can occur with both operative and nonoperative treatment.

Conclusions: A 5-stage rehabilitation program can effectively treat most apophyseal avulsion fractures.

Reviewer's Comments: This excellent review article consolidates the existing information of apophyseal avulsion fractures. The authors provide an easy-to-follow rehab protocol. In addition, they provide specific indications for surgical intervention.
ACL Reconstruction Re-Injury in Men vs Women

Incidence of Subsequent Injury to Either Knee Within 5 Years After Anterior Cruciate Ligament Reconstruction With Patellar Tendon Autograft.

Shelbourne KD, Gray T, Haro M:
Am J Sports Med; 37 (February): 246-251

The risk of re-injury to ACL reconstructions is increased in females and in patients <18 years of age.

Objective: To determine the risk of injury to an anterior cruciate ligament (ACL) reconstruction or contralateral knee.

Design: Cohort study.

Methods: Over a 9-year period, the authors performed 1820 unilateral primary ACL reconstructions with the central one-third of the patient's patellar tendon. Patients underwent accelerated rehabilitation. They were divided into 3 groups by age: <18 years (adolescent athlete); 18 to 25 years; and >25 years. Patients were generally followed up with yearly clinical examination and yearly subjective questionnaires. If patients did not participate in these follow-up methods, they were contacted by phone.

Results: The authors were able to provide follow-up on 1415 patients (78%) for a minimum of 5 years. Mean age at time of reconstruction was 21 years (range, 14 to 58 years). Overall, 4.3% of patients sustained a re-injury to their reconstructed knee (61 patients), while 5.3% injured the ACL of their contralateral knee (75 patients). By gender, females had a re-injury rate of 4.3% to their reconstructed knee versus 4.1% for males. However, women sustained a 7.8% injury rate to their contralateral ACL compared to 3.7% in men. By age, the risk of re-injury for the >25-year-old group was 1.1% to the reconstructed knee and 2.8% to the contralateral knee. In the 18- to 25-year age group, the re-injury rate to the reconstructed knee was 2.6% versus 4.0% in the contralateral knee. For the <18-year age group, the re-injury rate was similar for both the reconstructed and contralateral knee (8.7%). Females had a 7.5% rate of tear of their reconstructed knee and an 11.6% risk of tearing their contralateral knee. For males, the risk to the reconstructed knee was 10.6% compared to 4.6% in the contralateral knee. In patients returning to athletic competition in <6 months, 4.6% sustained a re-injury in their reconstructed knee and 5.2% in the contralateral knee. For those returning after 6 months, the risk of re-injury was similar, 4.0% in the reconstructed knee and 5.4% in the contralateral knee.

Conclusions: Women have a higher risk of injuring their contralateral ACL after ACL reconstruction.

Reviewer's Comments: This is an easy-to-read article with a wealth of clinical data that are useful in speaking to patients about their risk of re-injury to the ACL. Patients who satisfactorily completed their progressive rehab program in <6 months did not have an increased risk of re-injury. Re-injury rates to the reconstructed knee were similar in males and females, while women had a significant risk of injuring their contralateral knee, especially in those <18 years of age.

Additional Keywords: Re-Injury

print tag: () Refer to original journal article.
Partial and complete medial collateral ligament injuries load the intact anterior crucial ligament.

**Objective:** To determine the loads to the anterior cruciate ligament (ACL) after partial and complete medial collateral ligament (MCL) injuries.

**Design:** Controlled laboratory study.

**Methods:** The biomechanical study was conducted on 10 fresh-frozen human cadavers with a mean age of 52 years (range, 38 to 71 years). A 6-joint robotic system was used to test and measure the knee joint kinematics. Each intact MCL knee was tested at 0 degrees and 30 degrees of flexion with anterior load of 125 N, internal/external torque of 4 Newton-meters (Nm), and valgus torque to 10 Nm. Then a partial MCL injury was created by "pie crusting" the superficial MCL under valgus stress until 5 mm increase in opening was achieved. These knees then underwent testing of 125 N of anterior load, 4 Nm of internal/external rotation torque, and 10 Nm valgus torque. Next, the deep MCL was cut to create a complete MCL injury and testing was repeated as before. Finally, the ACL was debrided and the specimen retested.

**Results:** With the anterior load of 125 N, no significant increase in AP translation was noted. The increase in ACL load was 8.7% at 0 degrees and 12.3% at 30 degrees in the partial MCL testing. With complete MCL injury, the increase in ACL load at 0 degrees was 18.3% and 20.6% at 30 degrees. With a 10 Nm valgus load, the increased ACL load with the partial MCL injury was 55.3% at 30 degrees. This ACL load increased to 185% in the complete MCL injury. With 4 Nm internal rotation torque, the increased ACL load at 30 degrees degrees was 29.3% with partial MCL injury and 65.2% with a complete MCL injury.

**Conclusions:** Partial and complete MCL injuries allow greater ACL loads, particularly at 30 degrees with valgus and internal rotation torques.

**Reviewer's Comments:** This biomechanical laboratory supports existing knowledge of the contribution of ACL and MCL to combined knee ligament injuries. The authors highlight this information in the setting of an ACL reconstruction with a partial or complete MCL injury. A hinged brace may help protect the reconstructed ACL. Similarly, concern should be noted in the athlete with a partial MCL injury who may experience an increase in ACL loads and who may also benefit from MCL bracing.

**Additional Keywords:** Injuries

**print tag:** () Refer to original journal article.
Radial Nerve Palsy Associated With Humeral Shaft Fractures

Radial Nerve Palsy Associated With Humeral Shaft Fractures.
Hak DJ:
Orthopedics; 32 (February): 111-114

Radial nerve palsy associated with a humeral shaft fracture has approximately an 88% chance of recovering.

Objective: To review the current literature on the management of radial nerve palsies associated with humeral shaft fractures.

Design: Review article.

Results: Advocates of early surgery cite easier nerve dissection, the fact that open-reduction internal fixation reduces further injury and callous formation around the nerve, and earlier identification of the extent of nerve injury and decision for future treatment. Advocates of observation cite a high rate of recovery, elimination of unnecessary surgery, and an ultimate outcome similar between early and late nerve repair. In the last 40 years, 35 observational studies of radial nerve palsies associated with humeral shaft fractures were reviewed. Of these, 21 recommended observation, 9 recommended early exploration, and 5 depended on conditions. While the overall incidence of nerve palsy was 11.8%, it was higher in distal third fractures (23.6%) and middle third fractures (15.2%). The incidence in fracture patients was highest in transverse fractures (21.2%) and spiral fractures (19.8%). There were significant differences in the incidence of partial nerve palsy between closed and open fractures; 88% of these palsies recovered, with no difference in primary nerve palsies injured at time of humeral fracture and secondary nerve palsies injured with fracture treatment. Mean onset to recovery was 7.3 weeks (range, 2 weeks to 6.6 months). Mean time to full recovery was 6.1 months (range, 3.4 to 12 months). Secondary nerve palsies historically have been an indication for exploration; however, spontaneous recovery is reported at 93.1%, compared to 88.6% for primary nerve palsies. While open fractures had a similar spontaneous recovery of nerve palsies, nerves explored in open fractures had a >50% incidence of nerve laceration. It may be difficult to identify the zone injury at the time of index surgery to recommend primary epineural repair. Historically, Holstein-Lewis fractures and spiral fractures of the distal humerus are associated with radial nerve palsies. In a recent review of 11 patients with Holstein-Lewis fractures and radial nerve palsies, only 2 nerves were explored. Ten of 11 patients had full nerve recovery. Surgeons begin recommending an electromyogram at 6 weeks’ post-injury if there is no evidence of nerve recovery. Since nerve recovery may take 6 months, there is less consensus on when to perform a nerve repair or reconstruction. Nerve repair is recommended anywhere between 2 and 6 months, and tendon transfers at 6 to 12 months.

Conclusions: 88% of radial nerve palsies associated with humeral shaft fractures spontaneously resolve in 3 to 12 months.

Reviewer’s Comments: This is a recent review of a controversial injury that supports a conservative, observational approach to radial nerve palsies associated with humeral shaft fractures. Open fractures, multiple trauma, and floating elbow may represent conditions that warrant earlier operative fixation of the fracture and nerve exploration.

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What Is the Optimal Tx for Anterior Shoulder Instability?

The Treatment of Traumatic Anterior Instability of the Shoulder: Nonoperative and Surgical Treatment.

Brophy RH, Marx RG:
Arthroscopy; 25 (March): 298-304

Patients with a first-time shoulder dislocation have a lower rate of recurrence with arthroscopic versus nonoperative treatment. Arthroscopic shoulder stabilization with suture anchors yields comparable results to open treatment.

**Background:** A reasonable amount of controversy surrounds the optimal treatment of a patient who suffers a first-time traumatic anterior shoulder dislocation. While there seems to be Level I evidence that arthroscopic stabilization reduces the rate of instability, studies have used a variety of treatments. Suture anchors have the advantage of allowing for a more anatomic reattachment of the labrum to the glenoid.

**Objective:** To assess whether there is an advantage in treating first time traumatic anterior shoulder dislocations with suture-anchor surgical treatment and to determine if there is a difference in the results of open versus arthroscopic stabilization using suture anchors.

**Design:** Systematic literature review.

**Materials/Methods:** The authors searched for studies that compared surgical treatment versus nonoperative treatment of first-time anterior shoulder dislocation and studies that compared open versus arthroscopic treatment. Exclusion criteria were stabilization with anything other than suture anchors, use of a bone block, or treatment of any additional forms of instability.

**Results:** The authors found 6 articles that addressed surgical stabilization versus nonoperative treatment. There were 4 Level I studies and 2 Level IV studies. Two articles addressed the early and late outcomes of the same patient population; these were considered as 1 article. The authors found 8 studies that compared arthroscopic suture anchor stabilization with open stabilization. There were 2 Level I prospective randomized clinical trials, 4 Level III studies, and 2 Level IV studies. In looking at immediate stabilization with nonoperative treatment, the authors found a significantly lower rate of recurrent instability in the operatively treated group (7% vs 46%). The patients in these studies had a mean age of <24 years. At longer-term follow-up, the lower rate of instability persisted (10% vs 58%). In looking at open versus arthroscopic treatment, there was no significant difference between the 2 treatments in recurrence instability (8.2% for open vs 6.4% for arthroscopic). Both the outcome measures and range of motion were similar between open treatment and arthroscopic treatment using suture anchors.

**Conclusions:** The rates of recurrence after first-time anterior shoulder dislocation are lower in patients treated with surgical stabilization. In patients treated surgically with suture anchors, there appears to be little difference between open and arthroscopic stabilization.

**Reviewer's Comments:** This review shows that first-time shoulder dislocations have a lower rate of recurrence with arthroscopic stabilization versus nonoperative treatment. In the discussion, the authors point out that not every first-time dislocation needs shoulder stabilization. In this debate, the real question regards what the implication is of a single versus multiple instability events. The authors show several studies that demonstrate the equivalence between open and arthroscopic techniques for stabilization. The debate about open versus arthroscopic stabilization seems to be lessening with these studies.

**Additional Keywords:** Operative vs Nonoperative Tx

**print tag:** () Refer to original journal article.
Proximal Humerus Fx is Independent Risk Factor for Subsequent Hip Fx

Proximal Humeral Fracture as a Risk Factor for Subsequent Hip Fractures.

Clinton J, Franta A, et al:
J Bone Joint Surg Am; 91 (March 1): 503-511

A proximal humerus fracture is an independent risk factor for a subsequent hip fracture. The risk of subsequent hip fracture is greatest in the first year after proximal humerus fracture.

Background: Previous fractures, including proximal humerus fractures, can be a risk factor for developing a subsequent hip fracture.

Objective: To assess the association between hip fractures and proximal humerus fractures, using proximal humerus fractures as an independent variable.

Design: Prognostic cohort study; prognostic Level II.

Design/Participants: A prospective multicenter cohort study of women 65 years of age was carried out. These patients were enrolled from September 1986 to October 1988 from 4 distinct areas in the U.S. A total of 8049 women of an initial cohort of 9704 were followed. Women were enrolled if they underwent 2 examinations. They were contacted every 4 months to assess any fractures and underwent subsequent examination at 2-year intervals. If a subject sustained a fracture, the patient's treating physician and radiologist confirmed this. Patients were assessed for other risk factors in addition to proximal humerus fracture during the study period. Multivariate analysis was used to assess risk factors for a hip fracture. The authors also assessed whether the time from a proximal humerus fracture was a risk factor for subsequent hip fracture.

Results: The women in the study group were followed for an average of 9.8 years; 321 women suffered a proximal humerus fracture. There were 44 hip fractures in the proximal humerus fracture group (13.9 per 1000 patient-years) and 739 in the control group (9.7 fractures per 1000 patient-years). A proximal humerus fracture was associated with an 83% increase in subsequent hip fracture after adjusting for age and bone mineral density. Looking at multivariate analysis, having a proximal humerus fracture as a risk factor conferred a hazard ratio (HR) of 1.57. This compares to other risk factors, such as a low hip bone mineral density (HR, 2.08), history of falls (HR, 1.29), nonhumeral fracture (HR, 1.29), and decreased depth perception (HR, 1.53). Looking at the risk of sustaining a hip fracture over time, there was an HR of 6.16 in the first year after a proximal humerus fracture, an HR of 1.16 at 1 to 5 years after a proximal humerus fracture, and an HR of 0.64 at >5 years after a proximal humerus fracture after adjusting for age and bone mineral density.

Conclusions: A proximal humerus fracture is an independent risk factor for a subsequent hip fracture. The risk of subsequent hip fracture is greatest in the first year after proximal humerus fracture.

Reviewer's Comments: The large number of patients does strengthen the conclusions, although it is only in Caucasian subjects. The findings raise the question as to why this risk of fracture is so strong in the first year and then reverts to essentially normal. It is striking that loss of depth perception showed such an increased risk of subsequent hip fractures.

Additional Keywords: Hip Fx

print tag: () Refer to original journal article.
Operative vs Nonoperative Tx of Small Finger Fx

The Clinical Significance of Malunion of Fractures of the Neck and Shaft of the Little Finger Metacarpal.


There is no significant difference between operative and nonoperative treatment of small finger metacarpal neck or shaft fractures regardless of the degree of palmar angulation.

**Background:** Treatment of angulated small finger metacarpal fractures is controversial.

**Objective:** To determine if palmar angulation of small finger metacarpal affects strength and function.

**Methods:** Nonoperative patients 2 years from time of injury were recruited. Those who agreed to participate in the study completed a follow-up assessment. Of the identified candidates, 218 patients (17%) treated nonoperatively (17%) and 44 patients (44%) treated operatively (44%) participated. Nonoperative treatment was early mobilization or temporary splinting without reduction. Operative treatment was K-wires or plates. Demographics were similar. Clinical assessment was grip and small finger strength testing and clinical measurements of metacarpal shortening and palmar angulation. Patients completed the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire, including sports and instrument subsets. Original radiographs were used to measure fracture angulation.

**Results:** There were 105 nonoperatively treated patients with small finger metacarpal neck fractures and 113 with shaft fractures. None developed rotational deformity and all regained full flexion. There were no significant differences for strength, DASH, or cosmesis scores regardless of final degree of clinical angulation or initial radiographic angulation. There were no significant differences between the 105 nonoperative and 18 operative metacarpal neck fractures or the 113 nonoperative and 26 operative metacarpal shaft fractures, despite clinical palmar angulation being significantly greater in the nonoperative group. In the operative group there were 6 superficial infections, 4 plate removals, 2 with lack of full metacarpophalangeal (MCP) flexion, 1 with rotational malunion, and 1 with RSD.

**Conclusions:** No significant difference in strength or DASH scores, including cosmesis, were found for nonoperative and operative treatment of small finger metacarpal fractures regardless of degree of initial or final palmar angulation. Neck fractures with up to 50 degrees and shaft fractures up to 40 degrees of palmar angulation may be treated nonoperatively without reduction.

**Reviewer’s Comments:** This retrospective study supports previous published and unpublished opinions that the majority of small finger metacarpal neck and shaft fractures may be treated nonoperatively. The study further shows that though operative fixation improves the overall anatomy of the small finger metacarpal, this does not translate into an improvement in strength, DASH score, or cosmesis. The shortcomings of the retrospective study with a small percentage of captured final follow-up and no final radiographs are noted by the authors. It would also have been informative to see a more detailed breakdown of the most severely angulated fractures in the groups as this is the most controversial area of treatment. The authors mention that neck fractures of up to 50 degrees of palmar angulation were treated nonoperatively, but no data are presented for fractures in this range. There were 39 nonoperative and only 6 operative neck fractures with >35 degrees of initial palmar angulation, and there were 30 nonoperative and 13 operative shaft fractures with >30 degrees of initial palmar angulation.

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Recurrence of Clubfoot Highly Associated With Orthotic Use

Effect of Cultural Factors on Outcome of Ponseti Treatment of Clubfeet in Rural America.

Avilucea F., Szalay EA, et al:
J Bone Joint Surg Am; 91-A (March): 530-540

Even though technology is important to much of the practice of orthopaedic surgery, education and family participation have a bigger role in some treatments, such as the Ponseti method.

**Objective:** To determine if success with the Ponseti method was related to economic factors combined with distance from the care center.

**Design:** Prospective prognostic study; Level I.

**Participants/Methods:** All patients with idiopathic clubfeet who were previously untreated were invited to enroll in a study of clubfeet treatment results. Three different surgeons were involved. A total of 102 patients were enrolled, and 2 were lost to follow-up, for a total of 100 patients with 138 clubfeet. All were treated with weekly cast changes and most had a tenotomy in the clinic. Then they were instructed to wear the foot abduction orthosis full time for 3 months and then nightly and during nap time for 3 to 4 years. All patients were followed for a minimum of 2 years after treatment. The patients were evenly divided between urban and rural and almost evenly distributed between Caucasian, Hispanic, and Native American ethnic groups. Half of the parents were married and half were not. The authors studied factors that might contribute to recurrence, including urban versus rural residence, median income, time to drive to clinic, ethnicity, severity of the clubfoot, educational attainment, and type of insurance. The severity score was the outcome variable.

**Results:** 95% of feet were initially corrected by the casts, whereas 7 were not and underwent an early release. Twenty-six patients had an early recurrence. Initial severity of the clubfoot was not related to recurrence. Rural patients had a statistically significant increase in recurrence, but this was principally due to the difference in success between urban and rural Native American populations. Among the rural Native American population, the recurrence rate was 70%. The odds ratio for recurrence was 120 among those who discontinued bracing early. Other factors related to recurrence were low income, low education, low insurance, and unmarried parents.

**Conclusions:** In order for the Ponseti method of treating clubfeet to be successful, compliance with the orthotic regimen following treatment with a cast is mandatory. Recurrence of clubfoot is more highly associated with orthotic use than with initial clubfoot severity. Particular problems between rural Native American outcomes and those of other ethnic groups suggest that difficulties in communicating with families regarding the importance of bracing to maintain the correction may be at the root of the issue.

**Reviewer’s Comments:** This was a very enlightening article. Even though technology is important in much of the practice of orthopaedic surgery, education and family participation have a bigger role in some treatments, such as the Ponseti method. Although most of us do not care for a population similar to this one, we each do have our own unique cultural mix of patients, and it is important to take the time to understand who will be involved with the care of the clubfoot patient and to educate them in a way that maximizes their participation in the treatment.

**Additional Keywords:** Cultural Factors & Outcomes

**print tag:** () Refer to original journal article.
Conventional X-Rays Take Shorter Time to Present Image

Digital Imaging Data on CD-R: A Time Trap for Orthopaedic Surgeons in Outpatient Clinics.

Juenemann S, Hasler C, Brunner R:
J Child Orthop; 3 (February): 59-62

We must take advantage of the positives of digital imaging (ie, portability and permanency) and work on the practicalities of user access.

Objective: To test the hypothesis that the time required to present an image using a conventional x-ray is significantly shorter than on a digital format.

Design: Prospective comparison of images.

Participants/Methods: 10 artificial case presentations were used for the study, with 6 images for each case. Sets of the images were prepared in digital format as well as conventional x-ray. The computer was turned on and uniform viewing software was used for all images. The time to find and present the most recent of the images was compared between the 2 methods. Six experienced orthopaedic residents were involved in each case. Order of presentation was randomized.

Results: The presentation of the conventional x-rays was done in 21 seconds, where images on CD-R required 90 seconds. The difference was statistically significant at $P <0.001$. The standard deviation was also higher in the digital images, as sometimes the computer did not accept the CD, or it broke down and had to be restarted. The authors calculated that over the course of 1 year, this increased time resulted in an additional 2 physician work-days.

Conclusions: The authors comment that there have been several studies documenting that workflow and patient put through are increased in radiology departments when digital images are used. However, there was no comparable study looking at the receiving end of the technology, that is, patient assessment in the orthopaedic clinic. To quote the authors, digital imaging "is regarded as a relief by most radiologists, but more or less as a nuisance by most orthopaedic surgeons." The authors state that the solution would be to have a more uniform image presentation system with fewer differences between digital imaging and communication in medicine (DICOM) programs. They state that the DICOM format is harder to use than many other image presentation formats and suggest that images could be displayed by clinic personnel before a patient is seen.

Reviewer's Comments: This is a practical article addressing a challenge that we all face. The design of the study understated the problem because different programs were not included. Also, some of the more complex images such as MRI and CT take even more time. Tools to adjust image quality or especially to measure angles and distances vary with programs and in some cases are inaccessible. In these cases, technology results in a step backwards. Clearly, we must take advantage of the positives of digital imaging (ie, portability and permanency) and work on the practicalities of user access.

Additional Keywords: Time

print tag: () Refer to original journal article.
Trajectory Described May Simplify Assembly, Application of Pelvic Fixation

Low Profile Pelvic Fixation: Anatomic Parameters for Sacral Alar-Iliac Fixation Versus Traditional Iliac Fixation.
Chang T-L, Sponseller PD, et al:
Spine; 34 (March 1): 436-440

Pelvic fixation is commonly used in neuromuscular scoliosis surgery as well as adult degenerative and revision applications.

**Objectives:** To explore an anatomic trajectory that allows iliac fixation from a starting point on the sacrum, to define the ideal trajectory, and to compare it to the more traditional starting point on the posterior superior iliac spine.

**Design:** CT study using a 3-D image manipulation system to define an ideal trajectory for each method.

**Materials/Methods:** The radiographs of 20 skeletally mature adolescents were randomly selected and retrospectively reviewed. All had normal CTs of the pelvis. Utilizing systematic random sampling, the authors selected patients who had been scanned from the beginning of June 2007 through August 2007. The mean age of the 20 patients was 15 years at the time of the CT. Two experienced orthopaedic surgeons did the CT imaging manipulations and analyzed the CTs using InSpace, which is a 3D CT program. The starting-point parameters and the trajectory were measured. According to the authors, "Parameters were evaluated and compared for insertion from the posterior superior inferior spine (PSIS)."

**Results:** A sacral-alar iliac pathway could be developed for all specimens. The starting point was a mean of 22 mm lateral to the midline on the posterior surface of the sacrum. This coursed along the widest portion of the sacral ala, which was also in line with the widest portion of the ilium. This trajectory had a mean maximal length of 105 mm, ranging up to 129 mm in some patients. Of this distance, 35 mm was within the sacral ala and 70 mm was within the ilium. The narrowest mean width was 12 mm. The mean angulation was 40 degrees laterally as one looks in the transverse plane, and the mean caudal angulation was 39 degrees. For the PSIS trajectory, the mean length was 118 mm, although this would be diminished if the surgeon chose to recess the anchor as is often done. The S2-iliac pathway (S2AI) anchors were a mean of 19 mm deeper below the skin than those which started in the PSIS. The S2AI anchors were also directly below the starting point of the S1 screws. The mean difference in trajectories chosen by the surgeons was 2 degrees in the sagittal plane and 1 degrees in the coronal plane.

**Conclusions:** The S2AI pathway allows anchors of nearly equal length to those traditionally inserted from the PSIS. These anchors can be inserted in line with other pedicular anchors, enabling the muscle flap to be maintained intact. They are much deeper than those through the PSIS and should be less prone to cause pressure problems. Although the PSIS allows slightly longer anchors, both methods exceed the length of anchors typically chosen in practice.

**Reviewer's Comments:** Pelvic fixation is commonly used in neuromuscular scoliosis surgery as well as adult degenerative and revision applications. This method allows anchors to be chosen that can be inserted more in-line and deeply under a single muscle flap. The trajectory described here may simplify assembly and aftercare.

**Additional Keywords:** Sacral Alar vs Traditional

**print tag:** Refer to original journal article.
Worse Outcomes After Rotator Cuff Repair in Workers' Compensation Patients

Patients with Workers' Compensation claims report worse outcomes following rotator cuff repair surgery, even after controlling for confounding factors.

**Background:** Previous studies have demonstrated varying correlations between Workers' Compensation status and the outcome of rotator cuff repair. However, no study has formally accounted for potential confounding factors with rigorous multivariable analysis.

**Objective:** To evaluate the effect of a Workers' Compensation claim on the outcome of rotator cuff repair.

**Design:** Prospective cohort study.

**Participants/Methods:** The study included 125 patients (72 males and 53 females; mean age, 56.2 years; range, 32 to 84 years) who had a chronic rotator cuff tear and subsequently underwent unilateral primary rotator cuff repair by 1 surgeon between 1998 and 2001. Thirty-nine patients had an open Workers' Compensation claim (Workers' Compensation group), and 86 patients did not (non-Workers' Compensation group). Outcomes were assessed with the Simple Shoulder Test (SST), the Disabilities of the Arm, Shoulder, and Hand (DASH) index, and 3 visual analog scales (shoulder pain, quality of life, and shoulder function), and the Short Form-36 (SF-36).

**Results:** Final follow-up evaluation was performed at a mean of 54.1 weeks. Patients in the Workers' Compensation group were significantly younger, had greater work demands, and had lower marital rates, education levels, and preoperative expectations for the outcome of treatment as compared with those in the non-Workers' Compensation group ($P=0.001$ to $0.016$). Preoperatively, patients in the Workers' Compensation group had significantly lower scores on the SST, the SF-36 Physical Function scale, and the SF-36 Social Function scale ($P=0.01$ to 0.038). One year postoperatively, those patients reported worse performance on the SST, the DASH, all 3 visual analog scales, and the SF-36 ($P=0.0007$ to 0.05) and had worse improvement on the DASH, the visual analog scales for shoulder pain and function, and the SF-36 Bodily Pain and Role Emotional scales ($P=0.0028$ to 0.038). Furthermore, 18 (46%) of the 39 patients in the Workers' Compensation group had a postoperative DASH score that was >10 points worse than the mean postoperative non-Workers' Compensation group score of 85.7. Multivariable analysis controlled for sex, age, comorbidities, smoking, education, marital status, demands at work, duration of symptoms, tear size, and expectations. Worker's Compensation status was confirmed as an independent predictor of worse DASH scores. The multivariable correlation coefficient indicated that a Workers' Compensation claim accounted for an 8.7-point reduction in the postoperative DASH score.

**Conclusions:** After repair of the rotator cuff, patients with Workers' Compensation claims report worse outcomes, even after controlling for confounding factors.

**Reviewer's Comments:** The results of this study use multivariate analysis to confirm what many clinicians would suspect. However, as the authors point out, this should not discourage clinicians from recommending indicated rotator cuff repair to Workers' Compensation patients. Rather, it should provide a framework for outcome evaluation for both patients and surgeons.

**Additional Keywords:** Rotator Cuff Repair Outcomes

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Revision ACL Reconstruction May Fare Better Results Than Primary Repair

Revision Anterior Cruciate Ligament Reconstruction: Causes of Failure, Surgical Technique, and Clinical Results.
Denti M, Lo Vetere D, et al:

These results of revision anterior cruciate ligament reconstruction surgery are similar to those achieved in other series of primary reconstructions with a little less satisfactory results.

Background: Revision of anterior cruciate ligament (ACL) reconstruction is a complicated clinical procedure whose results are theoretically less satisfactory than those of the first operation because further intervention is required in an area where anatomical landmarks may have been altered by previous procedures.

Objective: To evaluate the results of revision ACL reconstruction at a midterm follow-up.

Design: Case series.

Participants: 66 patients (58 males and 8 females; mean age, 31.2 years; range, 16 to 55 years) underwent revision ACL reconstruction from 2000 to 2004. No patients had concomitant instability or malalignment of the lower limb.

Methods: Revision ACL reconstruction was performed with hamstring autograft (n=37), bone-patellar tendon-bone autograft (n=27), or Achilles tendon allograft (n=2). Concomitant procedures performed included 21 selective meniscectomies (13 medial, 8 lateral) and 5 meniscal repairs (4 medial, 1 lateral), 9 cartilage debridements, 6 microfractures, and 2 mosaicplasties. Outcome measures included the Lachman test, Lysholm score, Tegner score, International Knee Documentation Committee (IKDC) score, and assessment with the KT-1000 arthrometer.

Results: Mean final follow-up occurred at 41.9 months (range, 24 to 72 months); 6 patients were lost to follow-up. Lysholm scores were 57% excellent (95 to 100 points), 13% good (84 to 94 points), 22% fair (65 to 83 points), and 8% poor (<64 points). Of patients, 68% had negative Lachman tests, 20% had positive tests with a hard end point, 10% had positive results, and 2% had very positive results. Stabilometric evaluation with the KT-1000 arthrometer at the maximum load showed that 56% of patients had <3 mm side-to-side difference, 34% had between 3 and 5 mm, and 10% had 6 to 10 mm. IKDC scores were 36% excellent (class A), 46% good (class B), and 18% fair (class C). Of patients, 78% resumed sport at the same level, compared to 58% after their primary reconstruction. There were no significant differences regarding type of graft used in terms of knee stability.

Conclusions: These ACL reconstruction revision surgery results are similar to those in other series of primary reconstructions with a little less satisfactory results. The high success rate is attributed to the strict application of the same technique and the confinement of revision to motivated patients. It should be noted, however, that follow-up is only at the midterm stage (mean, 41.9 months).

Reviewer's Comments: This study is limited by the heterogeneity in graft selection and concomitant pathology, as well as the relatively short follow-up. Nevertheless, this study provides encouraging data for patients undergoing revision ACL surgery.

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Stretching Positions for Posterior Capsule Not Sufficient to Stretch Entire Capsule

**Stretching Positions for the Posterior Capsule of the Glenohumeral Joint: Strain Measurement Using Cadaver Specimens.**

Izumi T, Aoki M, et al:


Current posterior capsule stretching programs of the shoulder are not sufficient to stretch the entire posterior capsule.

**Background:** Overhead throwing athletes are subject to posterior capsular contracture, internal rotational deficits, and subsequently internal impingement. Various stretches have been introduced for the posterior shoulder; however, little quantitative analysis to measure stretching of the posterior capsule has been performed.

**Objective:** To perform a cadaveric study to measure strain on the posterior capsule during passive stretching and to elucidate whether effective stretching positions for the capsule might exist.

**Design:** Controlled laboratory study.

**Methods:** 8 fresh-frozen cadaver shoulders (3 males and 5 females; mean age, 82.4 years [range, 74 to 96 years]) were dissected and placed in the testing apparatus. Strain data on the posterior capsule of the glenohumeral joint were obtained from a displacement sensor (Pulse Coder, LeveX, Kyoto, Japan). Strain was measured in the upper, middle, and lower parts of the capsule. The measurement of strain was instituted from reference length. After placement of the glenohumeral joint in each of the 8 designated angles, passive internal rotation was applied to measure the strain on the capsule. The stretching positions tested included 0 degrees, 30 degrees, 60 degrees, and 90 degrees of elevation in the scapular plane; 60 degrees of flexion; 60 degrees of abduction; 30 degrees of extension; and 60 degrees of flexion and horizontal adduction.

**Results:** With internal rotation, mean strain on the upper capsule was 3.02% at 0 degrees elevation and 3.35% at 30 degrees extension. Middle capsule strain was 0.78% and 4.77%, respectively, at 0 degrees and 30 degrees elevation; on the lower capsule, it was 5.65% and 2.24%, respectively, at 30 degrees and 60 degrees elevation and 2.88% at 30 degrees extension. Increase in strains of the upper, middle, and lower capsule with internal rotation at 0 degrees, 30 degrees, and 60 degrees elevation were statistically significant, respectively (*P* <0.01). Other shoulder positions demonstrated no positive strain values.

**Conclusions:** According to this cadaver study, large strains on the posterior capsule of the shoulder were obtained at a stretching position of 30 degrees of elevation in the scapular plane with internal rotation for the middle and lower capsule, while a stretching position of 30 degrees of extension with internal rotation was effective for the upper and lower capsule. These positions are different from previously advocated stretching positions of horizontal adduction or 90 degrees of abduction with internal rotation.

**Reviewer’s Comments:** This study is limited by the fact that it is a cadaveric biomechanical study. In addition, specimens were from older individuals whose tissues probably do not adequately represent tissues of patients who develop posterior capsular contracture. Nonetheless, it would be interesting to test these stretching positions in a future clinical study.

**Additional Keywords:** Strain Measurement

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**Is There Increased Risk of Infection After Allograft ACL Reconstruction?**

*A Retrospective Comparison of the Incidence of Bacterial Infection Following Anterior Cruciate Ligament Reconstruction With Autograft Versus Allograft.*

Katz LM, Battaglia TC, et al: *Arthroscopy; 24 (December): 1330-1335*

**Background:** Allograft tendons have become an increasingly popular alternative to autograft tissues for anterior cruciate ligament (ACL) reconstruction. However, there is a potential for increased risk of viral disease transmission or bacterial infection when allograft tissue is used.

**Objective:** To compare the incidence of bacterial infection in ACL reconstruction with autograft versus allograft.

**Design:** Retrospective comparative study.

**Methods:** All ACL reconstructions performed at the authors' institutions between 2001 and 2005 were retrospectively reviewed. There were 170 autograft, 628 allograft, and 3 combined autograft/allograft reconstructions. Procedures were performed by 11 different surgeons, and the decision to use an allograft versus an autograft varied among surgeons. More than 98% of allograft specimens were obtained from LifeNet Health (Virginia Beach, VA), and all of these grafts underwent a sterilization process called Allowash XG. All patients received preoperative cefazolin, unless there was a documented cephalosporin allergy in which case patients received clindamycin or vancomycin based on surgeon preference; no postoperative antibiotics were administered. Data collection included patient demographics, comorbidities, preoperative antibiotics, fixation type, and occurrence of deep postoperative infection.

**Results:** Of 801 patients who underwent ACL reconstruction, 6 (0.75%) developed a confirmed deep infection. Two deep infections were confirmed in 170 autograft reconstructions (1.2%) versus 4 in 628 allograft reconstructions (0.6%). ACL reconstruction using autograft had nearly twice the risk of infection compared to allograft reconstructions (adjusted odds ratio [AOR], 1.83; 95% CI, 0.16 to 12.94), according to multivariate analysis; this was not statistically significant ($P = 0.77$). Preoperative antibiotic choice was linked to increased infection rate, with clindamycin patients having a higher rate of infection. Of 63 patients who received clindamycin, 6.3% developed an infection, compared to 0.6% of 728 patients who received cefazolin ($P = 0.004$; AOR, 12.0; 95% CI, 2.16 to 66.72).

**Conclusions:** This study was unable to establish that use of allograft tissue is associated with a higher rate of deep bacterial infection in ACL reconstructions.

**Reviewer's Comments:** It is important to note that 98% of allografts used in this study underwent a "sterilization" process; not all allografts used for ACL reconstruction undergo such a process. Although this process may reduce the infection rate, radiating the graft may also weaken it or delay graft incorporation. This study is limited by the fact that it is retrospective, it looked for bacterial infection and did not assess for viral transmission, and it may be underpowered to detect a statistically significant difference in infection rate.

**Additional Keywords:** Bacterial Infection

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Are There Detrimental Effects of CAL Resection, Acromioplasty?

The Effect of Coracoacromial Ligament Excision and Acromioplasty on Superior and Anterosuperior Glenohumeral Stability.

Su W-R, Budoff JE, Luo Z-P:
Arthroscopy; 25 (January): 13-18

In this cadaveric shoulder study, resection of the coracoacromial ligament leads to an increase in anterosuperior translation, and acromioplasty leads to an increase in superior translation.

Background: Subacromial decompression (SAD) is a commonly performed shoulder procedure that includes subacromial bursectomy, release or resection of the coracoacromial ligament (CAL), and acromioplasty. The CAL and acromion are static restraints against anterosuperior and superior glenohumeral translation. However, few full-length, peer-reviewed papers address biomechanical effects of their removal.

Objective: To determine the effect of CAL resection and SAD on humeral head translation under anterosuperior and superior loading in a cadaveric model with an intact rotator cuff.

Design: Biomechanical cadaveric study.

Methods: 6 healthy fresh-frozen cadaveric glenohumeral joints, with a mean age of 72.4 years (range, 63 to 85 years), were studied. All shoulders had an intact rotator cuff. Shoulders were mounted in a custom jig that prevented glenohumeral range of motion but allowed anterior, posterior, superior, and inferior glenohumeral translation. While rotator cuff tendons were loaded in a static fashion, humeral heads were subjected to translational forces in the anterosuperior and then the superior direction. Translational motion was then measured and recorded. Shoulders were tested in the intact state, following CAL resection and following SAD.

Results: Excising the CAL led to a significant increase in anterosuperior translation at 80 N in the anterosuperior direction, compared to the intact state (+17%; 2.1 mm; P =0.03). No further significant increases in anterosuperior translation were noted when performing a SAD. Excising the CAL did not lead to a significant increase in superior translation at 80 N in the superior direction, compared to the intact state. However, performing a SAD led to a significant increase in superior translation compared with the intact state (+28%; 2.5 mm; P =0.01) and to CAL resection (+29%; P =0.03).

Conclusions: Resection of the CAL led to a 2.1-mm increase in anterosuperior translation, and SAD led to a 2.5-mm increase in superior translation. CAL resection and SAD are common surgical procedures that may lead to increases in anterosuperior and superior glenohumeral instability. It is possible that without the secondary, static restraint of the coracoacromial arch that a rotator cuff following repair will be subjected to increased, potentially detrimental, biomechanical demands.

Reviewer's Comments: This study is limited by the fact that it is a biomechanical cadaveric study. As the authors note, statically loading the rotator cuff does not account for all physiologic dynamic loads that affect the glenohumeral joint. Furthermore, only 1 position of shoulder function was studied, which was the resting position the humerus attained following physiologic loading of the rotator cuff. Different results may have occurred had different positions been tested. In addition, while the 2.5-mm difference in anterosuperior and superior translation may be statistically significant, it may not be clinically significant.

Additional Keywords: Coracoacromial Ligament Excision & Acromioplasty

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FNB Provides No Significant Clinical Benefit vs Anesthetic in ACL Reconstruction

**Femoral Nerve Blockade as a Preemptive Anesthetic in Patients Undergoing Anterior Cruciate Ligament Reconstruction: A Prospective, Randomized, Double-Blinded, Placebo-Controlled Study.**

Matava MJ, Prickett WD, et al:
Am J Sports Med; 37 (January): 78-86

In autograft ACL reconstruction with bone-patellar tendon-bone, the addition of a preoperative FNB provided no significant clinical benefit over postoperative injection of local anesthetic alone (and IV ketorolac).

**Background:** It has yet to be shown conclusively if a preemptive femoral nerve blockade (FNB) is clinically beneficial for patients undergoing patellar tendon anterior cruciate ligament (ACL) reconstruction.

**Objective:** To evaluate FNB as a supplement to general anesthesia in patients undergoing isolated patellar tendon ACL reconstruction.

**Design:** Prospective randomized double-blind placebo-controlled trial.

**Participants/Methods:** 56 patients with a mean age of 27 years who were undergoing an endoscopic patellar tendon ACL reconstruction under general anesthesia were prospectively randomized to receive either a bupivacaine femoral nerve blockade (block) or a saline placebo injection (control). At closure of the wound, local bupivacaine injection and IV ketorolac was given to both groups. Surgeons and patients were blinded to group assignment. All patients underwent ACL reconstruction with bone-patellar tendon-bone autograft. Outcomes included postoperative pain measured on a validated visual analog scale (VAS) at postoperative intervals for 72 hours, intraoperative and postoperative narcotic consumption, admission rates, hospital charges, patient satisfaction, and complications related to the FNB.

**Results:** There were 31 block patients and 25 controls, with no significant differences between the 2 groups at baseline in regard to occupational intensity, age, sports activity level, sports intensity level, number of concurrent procedure performed, or baseline pain scores. During the 72-hour postoperative period, there was no significant difference in postoperative VAS pain scores between groups. There were no significant differences between groups in terms of the mean number of narcotic pain pills used from the day of surgery until postoperative day 3. There was also no significant difference in the mean milligram amount of intraoperative morphine sulfate equivalents given between groups. No significant differences between groups in readiness for discharge, duration of hospitalization, admission rates, hospital charges, or patient satisfaction were observed. There were no complications related to the FNB.

**Conclusions:** In patients undergoing autograft ACL reconstruction with bone-patellar tendon-bone, the addition of a FNB administered as a single preoperative injection provided no significant clinical benefit over postoperative injection of local anesthetic alone (and intravenous ketorolac).

**Reviewer's Comments:** This is a well-done study that provides useful information that may affect the clinical practice of physicians who perform autograft ACL reconstruction with bone-patellar tendon-bone.

**Additional Keywords:** ACL Reconstruction

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Less Flexion Causes Increased Risk of Injury in Double-Bundle ACL Reconstruction

Risk of Iatrogenic Injury to the Peroneal Nerve During Posterolateral Femoral Tunnel Placement in Double-Bundle Anterior Cruciate Ligament Reconstruction.

Hall MP, Ryzewicz M, et al; 
Am J Sports Med; 37 (January): 109-113

During posterolateral femoral tunnel placement during double-bundle ACL reconstruction, guide pin placement at knee flexion of 120 degrees is recommended to ensure safety of the peroneal nerve and the biceps tendon.

Background: In double-bundle anterior cruciate ligament (ACL) reconstruction during creation of the femoral tunnel for the posterolateral (PL) bundle, there is a theoretical risk of injury to the posterolateral structures of the knee and the common peroneal nerve.

Objective: To examine the risk of injury to the common peroneal nerve and the effect of knee flexion angle during PL femoral tunnel placement using an accessory medial portal.

Design: Controlled laboratory study.

Materials/Design: This anatomical descriptive study evaluated 10 cadaveric knees (5 male and 5 female; mean age 61.8 years).

Methods: The native ACL was arthroscopically removed. After this, the starting point of the PL femoral tunnel was identified. These measurements were obtained by using standardized measure from the articular cartilage rim: 5 mm posterior to the shallow margin and 2 mm superior to the low margin. A low-medial accessory portal and 1 cortical entry point was used to insert guide pins 120 degrees, 90 degrees, and 70 degrees of knee flexion. While the guide pins were kept in situ, dissection of the lateral structures of the knee was performed. The authors then analyzed the distance between guide pins and the common peroneal nerve and the relationship to the biceps tendon.

Results: During guide pin insertion, the common peroneal nerve was not directly injured. The mean distance of the common peroneal nerve to the guide pin at 120 degrees of flexion was 44.3 mm (range, 36.0 to 53.0 mm), and at 90 degrees of flexion, the mean distance was 28.6 mm (range, 25.0 to 32.0 mm). At 70 degrees of flexion, the mean distance from the guide pin was 22.8 mm, with a range of 20.0 to 28.0 mm. Differences between the means of all 3 groups were found to be statistically significant ($P <0.0001$). In all cases, when the guide pins were inserted at 70 degrees of flexion, they pierced the biceps femoris tendon. At 90 degrees of knee flexion, 4 of 10 specimens were found to have such a guide wire injury. In no case did a guide pin inserted at 120 degrees pierce the biceps femoris tendon.

Conclusions: According to the authors, "During PL femoral tunnel placement, the risk of injury to the common peroneal nerve is minimal, but is increased as the knee is placed in less flexion. Guide pin placement at knee flexion of 120 degrees is recommended to ensure safety of the peroneal nerve and the biceps tendon.

Reviewer's Comments: This study is limited by the fact that it is a cadaveric study performed on elderly specimens, which may not reproduce the anatomy of younger patients who typically undergo ACL reconstruction. Nevertheless, this study lends quantitative support to the suggestion that the femoral tunnel for the PL bundle should be drilled at knee flexion >90 degrees to maximize safety.

Additional Keywords: Femoral Tunnel Placement

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Tibial Fixation for All-Inside ACL Reconstruction

A Comparison Between a Retrograde Interference Screw, Suture Button, and Combined Fixation on the Tibial Side in an All-Inside Anterior Cruciate Ligament Reconstruction: A Biomechanical Study in a Porcine Model.


Soft tissue grafts fixed in the tibia with both a retrograde screw and a suture button are able to withstand higher initial failure and ultimate failure loads and are stiffer than grafts fixed with either a retrograde screw or a suture button alone.

Background: Retrograde pullout at ultimate load testing has been observed following effective soft tissue graft fixation to the tibial tunnel in all-inside anterior cruciate ligament (ACL) reconstructions.

Objective: To assess whether there is a synergistic effect and thus supportive fixation when including a cortical-cancellous titanium suture button suspension apparatus with the retrograde bioabsorbable screw for tibial tunnel ACL graft fixation.

Design: Controlled laboratory study.

Methods: 18 proximal, skeletally mature, fresh-frozen, intact porcine tibias and 18 fresh bovine extensor tendons were used to determine cyclic displacement (mm), cyclic stiffness (N/mm), initial failure load (N), ultimate load (N), pullout displacement (mm), and pullout stiffness (N/mm) for varying fixation techniques in an all-inside ACL tibial tunnel reconstruction. All specimens underwent a dual-energy x-ray absorptiometry scan prior to biomechanical testing to confirm that the bone mineral density was >1.24 g/cm². Specimens were divided into 3 groups composed of cortical-cancellous suture button suspension apparatus fixation retrograde bioabsorbable screw fixation, apparatus fixation, and combined fixation in the tibia. There were 6 specimens in each group. Cyclic (500 cycles, 50 to 250 N, 1 Hz) and load-to-failure (20 mm/minute) parameters were used to biomechanically test the specimens.

Results: The retrograde screw-only group had a larger cyclic displacement than did the suture button with retrograde screw combination group during the cyclic testing (2.98 ± 2.28 mm vs 1.40 ± 0.34 mm). The combination fixation group also produced a higher cyclic stiffness than the retrograde screw-only group (161.93 ± 61.81 N/mm vs 91.59 ± 43.26 N/mm). The authors state that, "In load-to-failure testing, the retrograde screw with suture button combination group withstood significantly higher initial failure forces (873.87 ± 148.74 N) than the retrograde screw-only (558.44 ± 126.33 N) and suture button-only (121.76 ± 40.57 N) groups. Also, when comparing the combination group to the retrograde screw group, ultimate loads were significantly higher for the combination group (1027 ± 157.11 N vs 679.00 ± 109.44 N). Pullout stiffness was significantly higher in the retrograde screw with suture button combination group when compared to either the retrograde screw-only group or the suture button-only group (152.50 ± 46.37 N/mm, 78.31 ± 12.85 N/mm; 25.79 ± 9.30 N/mm, respectively).

Conclusions: According to authors Walsh and Wijdicks, "Soft tissue grafts fixed in the tibia with a combination of a retrograde screw and a suture button were able to withstand higher initial failure and ultimate failure loads and were also stiffer than grafts fixed with either a retrograde screw or a suture button alone."

Reviewer's Comments: This study is limited by the fact that it is a biomechanical cadaveric study with time-zero data only. As the authors note, further clinical studies are recommended to determine the best tibial fixation technique and long-term outcome.

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Initial Stabilization Surgery Recommended in Patients With High Demands for Patellar Stability

_Treatment With and Without Initial Stabilizing Surgery for Primary Traumatic Patellar Dislocation: A Prospective Randomized Study._


Following an acute primary traumatic patellar dislocation, good patellar stability can be achieved with initial stabilization surgery, and such surgery might be considered for patients with high demands for patellar stability.

**Background:** Acute lateral patellar dislocation is a common injury among young adults. There is no clear evidence regarding whether operative treatment is superior to nonoperative treatment. The medial patellofemoral ligament is responsible for >50% of the lateral restraining force of the patella and is torn when the patella is dislocated.

**Objective:** To compare the outcomes of treating acute patellar dislocations with and without surgical stabilization.

**Design:** Prospective randomized trial.

**Participants/Methods:** 40 military recruits who presented to a military hospital for acute patellar dislocation were randomized to receive surgical stabilization or a knee orthosis (as well as arthroscopic removal of an osteochondral fragment, if necessary). The median age was 20 years. Ninety-three percent of patients were male. All patients underwent a clinical exam, radiographs, and an MRI. The post-injury or postoperative rehabilitation protocols were identical for the 2 groups. Median follow up was 7 years (range, 6 to 9 years). Follow-up consisted of radiographs, an MRI, Tegner and Lysholm scores as well as the patient's history of redislocation or subluxation.

**Results:** No redislocations occurred in the surgically stabilized group. Twenty-nine percent of 21 patients treated nonoperatively sustained a redislocation. Painful subluxation was noted in 2 patients in the surgery group and in 4 patients treated nonoperatively. Three patients who were initially treated nonoperatively went on to have surgery. The subjective results were nearly identical between the 2 groups. At the final follow up, radiographs demonstrated patellofemoral osteoarthrosis in 1 patient who underwent surgical stabilization, and was not found in any patients in the nonoperatively treated group. The overall rate of osteochondral fracture at presentation was 33%. At time of final follow-up, 38% of patients demonstrated a full-thickness articular defect in the patellofemoral joint.

**Conclusions:** Following an acute primary traumatic patellar dislocation, good patellar stability can be achieved with initial stabilization surgery, and such surgery might be considered for patients with high demands for patellar stability.

**Reviewer's Comments:** This is an excellent study. The methodology will be hard to surpass in the future. The one aspect that made the trial so clean also limits its applicability, as it was performed on a homogenous military population. Despite this, the reader is provided with important information on the mid-term follow-up of patellar dislocation. The surgeon must use this information to provide informed decision-making with his or her patients when treating these injuries.

**Additional Keywords:** Repair

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Single-Row Versus Double-Row Arthroscopic Rotator Cuff Repair: A Prospective Randomized Clinical Study.

Grasso A, Milano G, et al:
Arthroscopy; 25 (January): 4-12

Double-row rotator cuff repair does not show significant differences when compared to single-row repair in short-term follow-up.

Objective: To compare clinical outcomes of arthroscopic rotator cuff repair using double-row and single-row fixation techniques.

Design: Randomized controlled study, Level I evidence.

Participants/Methods: 80 patients with full-thickness rotator cuff tears (RCTs) underwent arthroscopic repair with suture anchors. Inclusion criteria were repairable full-thickness tears of the supraspinatus or the posterior-superior rotator cuff. The patients were randomly divided into 2 groups: group 1 was single-row repair and group 2 was double-row. Two different surgical techniques were used according to the tear pattern, tendon-to-bone repair with suture anchors was used in crescent shaped tears, and a combined technique with tendon-to-bone/suture anchors and side-to-side repair for retracted and larger tears. In all cases, 5.0-mm metal suture anchors were used. In all cases, a subacromial decompression was performed and biceps pathology was addressed. Outcome measures were assessed using the Disabilities of the Arm, Shoulder, and Hand (DASH) and Work-DASH questionnaires, Constant scores, and muscle strength measurements. Independent variables investigated included: baseline scores, age, gender, dominance, location, shape, and area of cuff tear, tendon retraction, fatty degeneration, treatment of biceps tendon, and cuff repair technique.

Results: 8 patients were lost to follow-up (10%). The mean follow-up was 24.8 ± 1.4 months. Mean age was 56.8 years. Tear retraction showed a positive correlation with work DASH scores. Tear location was significantly associated with the DASH score, and treatment of the long head of the biceps was associated with the DASH and work DASH scores. Comparison between groups using univariate and multivariate analysis did not show significant differences between groups when significance was set at \( P < 0.05 \). However, age, gender, and baseline strength significantly and independently influenced the outcome.

Conclusion: Re-rupture is one of the most common complications after arthroscopic rotator cuff repair. Primary fixation of the tendon-to-bone is considered to be the key to a successful procedure, as there is significant correlation with postoperative strength. Hence, the double-bundle repair allows a theoretical advantage of having a greater surface on which the tendon can heal. There are numerous biomechanical and clinical outcome studies of both single- and double-row repair. Double-row repair has shown some biomechanical superiority, but this does not correlate to clinical outcomes. Clinical outcomes measured in this study did not show any differences of significance in subjective or objective results between the 2 repair techniques.

Reviewer's Comments: This is a quality prospective randomized controlled study that has similar results to those previously reported in the literature. Tendon healing was assessed using strength evaluation as an indirect measure and not using MRI, which I feel is a weakness of the study. The authors also agree that another limitation is the small sample size and short follow-up period.

Additional Keywords: Single- vs Double-Row

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