

## Journal Scan

### Journal of Shoulder and Elbow Surgery

Edwin E. Spencer Jr MD

© The Association of Bone and Joint Surgeons 2008

#### Rotator Cuff

**The association of suprascapular neuropathy with massive rotator cuff tears: a preliminary report.** Mallon WJ, Wilson RJ, Basamania CJ. *J Shoulder Elbow Surg.* 2006;15:395–398.

**Context:** Massive rotator cuff tears can be associated with pseudoparalysis. One of the main questions is why do some patients with massive posterosuperior rotator cuff tears present with pseudoparalysis whereas some are still able to perform overhead functions. The related question is how to treat these patients with pseudoparalysis who have not yet had development of frank rotator cuff tear arthropathy.

**Study Design and Results:** The authors report on eight patients with massive rotator cuff tears (tears > 5 cm) all with EMG/NCV evidence of suprascapular neuropathy. All had atrophy and fatty infiltration of the supraspinatus on MRI as well. The patients had pain and marked weakness and inability to elevate greater than 40°. Four of these patients had surgery with a margin convergence repair of the cuff through a deltoid split in a mini-open fashion. The other four had no surgery. At an average of 24 months followup, all four surgical patients had regained greater than 90° forward elevation and were able to reach the back of their heads. Two of these patients had a followup EMG/NCV at 6 months and the neuropathy had improved with significant reinnervation potentials. The nonoperative cohort remained unchanged clinically but none of these had repeat neurologic studies.

**Conclusions:** Some patients with a massive rotator cuff tear with clinical pseudoparalysis have an associated suprascapular neuropathy. The pseudoparalysis might improve even with a partial rotator cuff repair.

**Comment:** Resolution of the pseudoparalysis might be effected by reducing traction on the suprascapular nerve. Although there were few subjects in this study, and it is unclear if both groups had the same rehabilitation, it does raise an important clinical concern regarding a suprascapular neuropathy contributing to the dysfunction in patients with massive rotator cuff tears.

**Pearls:** The role of the rotator cuff is to keep the head centered, and allow the deltoid to lift the arm. A complete cuff is not necessarily needed for this function: if there is an intact anterior and posterior force couple—from the subscapularis and posterior cuff—then the humeral head may be able to stay centered and allow the deltoid to raise the arm. By contrast, if there is an associated suprascapular neuropathy, then the infraspinatus will not function and the posterior force couple might be rendered ineffective, even if there is some cuff remaining.

**Rupture of the subscapularis tendon (isolated or in combination with supraspinatus tear): when is repair indicated?** Flury, MP, Goldhahn J, Schwyzer HK, Simmen BR. *J Shoulder Elbow Surg.* 2006;15:659–664.

**Context:** Subscapularis tears are relatively rare but can result in pain, instability, and significant dysfunction, as the subscapularis is the strongest of all the rotator cuff tendons. These tears can occur in isolation or in combination with supraspinatus tears. A previous report of isolated subscapularis ruptures yielded good results, but as yet there is a paucity of data regarding combined ruptures.

**Study Design and Results:** The authors retrospectively reviewed all of their rotator cuff repairs from 1995–2001

---

E. E. Spencer Jr (✉)  
Knoxville Orthopaedic Clinic, 260 Fort Sanders West  
Boulevard, Knoxville, TN 37922, USA  
e-mail: spencer9882@comcast.net

and found 1345 repairs. Seventy-three of these were subscapularis ruptures (5.5%). Sixty-three of the 73 patients were available for followup and were included in this study. Half of these patients also had concomitant supraspinatus ruptures. All patients were evaluated preoperatively via MRI, and each rupture was repaired anatomically to its respective native insertion site via transosseous braided sutures. After a mean followup of 35 months, the authors reported a rerupture rate of 13% for the subscapularis tears and 13% for the supraspinatus tears. All of the supraspinatus reruptures were associated with reruptures of the subscapularis. The Constant score improved from 62% to 96% for intact repairs but reruptures (diagnosed with postoperative ultrasound) did poorly, with a score of 69%. There was a significant correlation between reruptures and the Goutallier stage of fatty degeneration with a rerupture rate of 28% for Stage 2 and greater than 50% for Stage 3. There also was a significant correlation between time of injury and rerupture rates with the rerupture group averaging 15 months from the time of injury to repair whereas the intact group averaged 9 months. Interestingly, there was not a statistically significant relationship between the time of injury and the Goutallier stage indicating that time is not the only factor causing degeneration.

**Conclusions:** Subscapularis tears either isolated or in combination with supraspinatus tears are best treated by early anatomic surgical repair.

**Comments:** There are few studies on subscapularis ruptures and those series reported tend to have few subjects. The contribution of this study, thus, is in its size and its important message encouraging surgical management.

**Pearls:** My inference from these data is that subscapularis tears should be repaired as soon as possible, especially if degeneration is not yet present. Waiting may lead to degeneration (theory: the ruptured tendon prevents the muscle from pulling, and disuse atrophy sets in); and degeneration correlates with a poor result. For chronic tears and especially those with degeneration, the surgeon should give strong consideration for an initial pectoralis major transfer, although the results of pectoralis major transfers are variable.

**Rotator cuff repair: the effect of double-row fixation on three-dimensional repair site.** Meier SW, Meier JD. *J Shoulder Elbow Surg.* 2006;15:691–696.

**Context:** Double row rotator cuff repairs are becoming more popular to increase healing rates. Stronger biomechanical fixation with some double-row techniques have been reported.

**Study Design and Results:** Full-thickness 2-cm rotator cuff tears were created in seven human cadaveric shoulders. A previously reported method of 3-D digitization of the footprint of the rotator cuff insertion was used to compare the native footprint with three different repair methods. The

three methods included a traditional transosseous repair, a single row of lateral-placed suture anchors, and a double-row technique using two medial and two lateral anchors. All suture anchor repairs used simple vertical sutures.

**Conclusions:** A double-row repair better restores the anatomic footprint of the rotator cuff. In particular, the authors found 46% restoration of the footprint with the single-row suture anchor repair, 71% restoration with the traditional transosseous repair, and 100% restoration with the double-row repair.

**Comment:** This was a cadaver study; and although the double-row technique leads to better restoration of the anatomic footprint of the rotator cuff, better functional results were not shown.

**Pearls:** This is one of several studies that showed that a double-row repair better restores the anatomic footprint of the rotator cuff. There are also several studies showing that double-row repairs are biomechanically stronger than single-row or transosseous repairs and one published study showed there were better clinical healing rates. I suggest, therefore, that residents master this technique as it may become the standard.

**The biomechanical role of the subscapularis in latissimus dorsi transfer for the treatment of irreparable rotator cuff tears.** Werner CML, Zingg PO, Lie D, Jacob HAC, Gerber C. *J Shoulder Elbow Surg.* 2006;15:736–742.

**Context:** Latissimus dorsi transfer for massive irreparable posterosuperior rotator cuff tears has been reported to yield inferior results when the subscapularis is deficient. Only one clinical study has suggested that the subscapularis integrity does not matter when performing this procedure. The exact role of the subscapularis in the function of this transfer is unknown.

**Study Design and Results:** Massive posterosuperior rotator cuff tears were created in 10 cadaveric shoulders and the latissimus dorsi was transferred into the defect using the method of Gerber. The specimens were prepared such that the subscapularis and latissimus tendons could be loaded to 30 N. The scapula was fixed and the shoulder was tested in three positions: neutral, abducted and externally rotated 90°, and 90° flexion. The humeral head translation and rotation were measured via a 3-D tracking system with the subscapularis loaded and unloaded. With the subscapularis and latissimus loaded to 30 N there was a net posterior translation of the humeral head in all three positions. However when the subscapularis was unloaded, the joint translated anteriorly and inferiorly to a significant extent, and in fact, when the arm was in the abducted and neutral positions, loading the latissimus but not the subscapularis would cause the shoulder to dislocate.

**Conclusions:** The subscapularis provides a significant stabilizing force in the presence of a transferred latissimus

dorsi tendon. Transfer of the latissimus might be contraindicated in the absence of good subscapularis function.

Comment: This study underscores the point mentioned above regarding force couples—the shoulder functions by the coordinated effects of various muscle-tendon units operating in unison.

Pearls: Transfer of the latissimus dorsi tendon is technically demanding and is contraindicated in patients with static superior humeral head migration or advanced arthritis, in elderly patients, and in patients who are not able to perform rigorous rehabilitation. This study suggests that subscapularis deficiency should be added to the list. Be willing to tell patients that they have irreparable problems, without subjecting them to unnecessary surgery to prove it.

## Shoulder Arthroplasty

**Revision shoulder arthroplasty with positive intraoperative cultures: the value of preoperative studies and intraoperative histology.** Toploski MS, Chin PYK, Sperling JW, Cofield RH. *J Shoulder Elbow Surg.* 2006;15:402–406.

Context: The differential diagnosis of a painful shoulder arthroplasty includes infection, but the serologic workup for infection can be misleading. Infection of a prosthetic shoulder is relatively uncommon with reported rates ranging from 0% to 3.9%. It is important to elucidate the predictive value of the common tests for infection.

Study Design and Results: This is a retrospective review of 75 patients who had revision shoulder arthroplasties from which at least one positive intraoperative culture was obtained. The preoperative workup for infection varied among patients. Most (72) had a leukocyte count, 42 had an ESR, and 16 had a CRP level measured. Eleven had had an aspiration arthrogram and 15 had a tagged leukocyte scan. Frozen section histology was performed at the time of surgery in 73. Five patients had an elevated leukocyte count, six had an elevated ESR, and four had an elevated CRP. One patient had a positive aspiration, two had positive bone scans, and one had a positive tagged leukocyte scan. Radiographically, 14 patients had complete radiolucent lines around the glenoid. Seven histologic sections were read as positive with more than five neutrophils per high-powered field. After detection of the infection, most (54) were treated with the usual perioperative antibiotics. The remaining had some postoperative mixture of oral and intravenous antibiotics. Ten of 75 revisions required subsequent rerevision, and at the time of rerevision, seven were infected. The most common organism was *Propionibacterium acnes* (60%) followed by *Staphylococcus epidermidis* (13%) and general *Staphylococcus* species (9%).

Conclusions: Indolent infections of shoulder arthroplasties are difficult to diagnose preoperatively and require a high index of suspicion. Single-stage exchange seems to be fairly effective in most patients but needs additional study.

Comment: The true predictive value of the tests cannot be determined from a study such as this one, for it is possible that some patients with infection will not get surgery and thus will not be subjected to the gold standard test (intraoperative culture).

Pearls: In this study *Propionibacterium* cultures usually became positive after 5.1 days of growth in a broth medium. Thus it is perhaps reasonable to treat high-risk patients with antibiotics empirically until the culture results are known to prevent reseeding of the new implant.

**The Grammont reverse shoulder prosthesis: results in cuff tear arthritis, fracture sequelae, and revision arthroplasty.** Boileau P, Watkinson D, Hatzidakis AM, Horvorka I. *J Shoulder Elbow Surg.* 2006;15:527–540.

Context: The reverse TSA is gaining popularity to treat not only cuff tear arthropathy but also failed arthroplasties with cuff deficiency. The complication rate has been reported to be as much as 50%, therefore it must be used judiciously. Problems specific to the Grammont design are scapular notching, loss of external rotation, and acromial fractures.

Study Design and Results: Forty-five patients with a Grammont reverse TSA were followed for an average of 40 months. Indications included cuff tear arthropathy (21), posttraumatic conditions (five), and failed arthroplasty (19). Most TSAs (all but four) were performed through a deltopectoral approach with the humeral component in 20°–30° retroversion. There were 14 complications (nine of 19 in the revision group) with dislocation (three), infection (three), and acromial fracture (two) being the most common. Scapular notching was seen in 68% of cases, of which 26% had notching extending beyond the inferior screw but without glenoid loosening. The results were better in the group with cuff tear arthropathy: the Constant score improved from 18 to 66 and elevation improved from 53° to 123°. The fracture sequelae group did well with the Constant scores improving from 15 to 61 and elevation improving from 56° to 122°. The revision group improved but not as much; the Constant scores improved from 15 to 46 and elevation improved from 56° to 113°. The authors also noted that spurs seemed to originate at the origin of the long head of the triceps in 45% of cases, but the clinical significance is unclear. Also they noted reduced external rotation in patients with atrophy of the teres minor.

Conclusions: The reverse TSA can improve elevation and reduce pain in patients with cuff tear arthropathy with an acceptable complication rate. In revision cases, it is a salvage operation with a higher complication rate. Less

external rotation is obtained when there is teres minor atrophy.

Comment: Without a control group using another device, specific comment about this prosthetic design is limited.

Pearls: Reverse TSA is a very technically demanding operation; perhaps easy to do in theory, but difficult to perform in practice. The authors use intraoperative image intensification in all cases to place the glenoid base plate and glenosphere as low as possible (but still be able to obtain good purchase with the inferior screw). There are two schools of thought: one that holds that inferior translation of the glenosphere is the most effective way to reduce scapular notching and maintain stability, and the other is that the glenosphere should be tilted inferiorly to decrease scapular notching. If you choose the inferior tilt option, you must remove some bone, which can affect stability of fixation of the base plate. Also, by design, the Grammont prosthesis will result in less external rotation compared with designs that lateralize the center of rotation. Those that lateralize the center of rotation have higher stresses at the bone/base-plate interface (owing to the additional moment arm) and might result in failure at that interface. This is a trade-off to consider.

#### **Ultrasound evaluation and clinical correlation of subscapularis repair after total shoulder arthroplasty.**

Armstrong A, Lashgari C, Teefey S, Menendez J, Yamaguchi K, Galatz LM. *J Shoulder Elbow Surg.* 2006; 15:541–548.

Context: Shoulder arthroplasty traditionally has required a subscapularis tenotomy or release from the lesser tuberosity with subsequent reattachment. The structural and functional integrity of these subscapularis tenotomies and repairs have come into question with a study showing that approximately 66% of patients who had total shoulder arthroplasty have positive abdominal compression and lift-off tests. Therefore, it may be better to perform a lesser tuberosity osteotomy instead.

Study Design and Results: The subscapularis tendon integrity was evaluated via ultrasound in 30 total shoulder arthroplasties performed for standard OA. A subscapularis tenotomy was performed in all cases with complete release from the capsule and reattachment to the lesser tuberosity and remaining tissue without lengthening. Patients also were evaluated clinically with ASES scores, ROM measurements, and abdominal compression tests. The subscapularis healed in 87% of cases (only four ruptures), but the abdominal compression test was found to have a poor sensitivity (25%) and positive predictive value (13%) with a specificity of 73%. Interestingly, the ASES scores did not differ between patients with and without an intact subscapularis. In patients with an intact subscapularis,

forward elevation and external rotation increased but internal rotation did not significantly improve.

Conclusion: Subscapularis tenotomies have high healing rates, and clinical evaluation with the abdominal compression test may be misleading.

Comment: There is an important distinction between this study and that above by Flury et al. One should not confuse patients needing total shoulder arthroplasty with patients having a normal (nonarthritic) shoulder; in that latter group, subscapularis integrity is very important. But in arthritic shoulders, many of which will have internal rotation contractures, the role of the subscapularis may be less critical. Also, there is a significant difference between such groups when considering age and functional demands.

Pearls: The abdominal compression test and the lift-off test are equivocal when the posterior capsule is tight (causing loss of passive internal rotation), and in most arthritic shoulders (before and after arthroplasty), the posterior capsule is tight. Therefore, these tests may be limited among patients with arthritis. Also, it is possible to have an intact but nonfunctioning subscapularis; as such, functional evaluation may need to include an EMG. If anything, an EMG might provide reassurance that this dysfunction was present before arthroplasty, as many patients with arthritis have significant internal rotation contractures.

#### **Effects of glenoid component version on humeral head displacement and joint reaction forces: an experimental study.**

Nyffeler RW, Sheikh R, Atkinson TS, Hilaire ACJ, Favre P, Gerber C. *J Shoulder elbow Surg.* 2006;15: 625–629.

Context: Posterior glenoid bone loss and retroversion of the glenoid is common in shoulder arthritis. Suggested solutions have included leaving the glenoid retroverted and anteverting the humeral component, bone grafting the posterior glenoid defect, or reaming the high anterior side of the glenoid.

Study Design and Results: A total shoulder arthroplasty was performed in six cadaveric shoulders. The shoulders were implanted such that the glenoid version could be changed in 4° increments. The cuff was simulated with a weight and pulley system. The glenoid version was changed sequentially and displacements of the humeral head were measured. The effect of a compensatory change in humeral version also was tested. The authors found that for every degree of version change in the glenoid, there was a 0.5-mm translation of the humeral head, yet altering the humeral version did not change the translation.

Conclusions: Alterations in glenoid version significantly affect displacement of the humeral head, which in turn causes an eccentric load to be placed across the glenoid. Moreover, this effect cannot be mitigated with a compensatory change in humeral version.

Pearls: Two wrongs do not make a right: inappropriate glenoid retroversion cannot be addressed with a compensatory anteversion of the humeral component. This is a common misconception and should be laid to rest with this study and others. Viable options include neutralizing the glenoid surface with either reaming the high side or grafting the posterior defect. Grafting is technically demanding, but these studies show that having a retroverted component will lead to eccentric loading of the glenoid component and could lead to glenoid loosening. One might think that a hemiarthroplasty is a fair option, but it has been shown that those with glenoid retroversion and posterior subluxation did not do as well with a hemiarthroplasty. In short, be prepared to account for inappropriate glenoid retroversion.

## Sports Shoulder

**Electromyographic analysis of physical examination tests for type II superior labral anterior-posterior lesions.** Swearingen JC, Mell AG, Langendefter J, LaScalza S, Hughes RE, Kuhn JE. *J Shoulder Elbow Surg.* 2006; 15:576–579.

Context: Numerous physical examination tests have been reported to detect SLAP lesions. This study correlates seven different SLAP tests to EMG activity in the biceps. The thought is that those tests that elicit more biceps activity probably will be more accurate in detecting SLAP lesions.

Study Design and Results: Thirteen healthy volunteers underwent seven different SLAP physical examination tests. Each volunteer had surface electrodes placed on the long and short head of the biceps. Activity in the biceps was recorded with each test.

Conclusions: Four tests were found to maximally produce biceps activity: (1) the active compression test in supination, in which the shoulder is placed in 90° forward elevation and 15° cross-body adduction, the elbow is placed in full extension and forearm in supination and the patient resists a downward force from the examiner; (2) the active compression test in pronation, in which the arm is in the same position as above except the forearm is in pronation; (3) the anterior-superior SLAP test in which the arm is placed in 90° forward elevation in the scapular plane, the elbow is fully extended, and the forearm is held in supination while the patient resists a downward force from the examiner; and (4) the biceps tension test, which is the same as the active compression test in supination except that there is no cross-body adduction.

Comment: The four above tests had the greatest amount of biceps activity among the seven tested and theoretically, because the biceps tugs on the labrum, these might be

clinically better tests. Still, that was not proven in this study, as there was no gold standard applied to the results of these clinical tests. Also, the authors used surface electrodes which might not be as specific for biceps activity as fine-needle EMG. There are at least 12 EMG studies on biceps function in the shoulder. The two that used fine needle EMG coupled with bracing of the elbow (to exclude active elbow motion) concluded that the biceps played no significant role in forward elevation or abduction. These conflicting data should be taken into account when interpreting these data.

Pearls: Clinical tests for SLAP tears rely not on objective signs but on subjective symptoms; and some of the SLAP tests might cause pain for reasons beyond a tear of the labrum. Thus, the tests might not be specific. But perhaps the more important point is that we do not have a gold standard for detecting SLAP tears (especially Type II). Two surgeons looking at the same arthroscopic finding may disagree whether a given configuration qualifies as a tear. Thus, it is very difficult (ie, impossible) to determine the true sensitivity and specificity of a physical examination test: we have no gold standard against which the test could be assessed.

**The inferior glenohumeral ligament: a correlative investigation.** Ticker JB, Flatow EL, Pawluk RJ, Soslowsky LJ, Ratcliffe A, Arnoczky SP, Mow VC, Bigliani LU. *J Shoulder Elbow Surg.* 2006;15:665–674.

Context: Studies have been performed that have shown the strain rate dependency of the glenohumeral ligaments. This study seeks to correlate the materials properties of portions of the inferior glenohumeral ligament (IGHL) with the ligament composition and histology.

Study Design and Results: The anterior band, axillary pouch, and posterior band of the inferior glenohumeral ligament were studied in eight human cadaveric shoulders (average age, 60 years). Biomechanical testing was performed on the anterior band and axillary pouch, while all three areas were evaluated biochemically and histologically.

Conclusions: At the slow strain rate used in this study, the anterior band had a greater tensile modulus. The anterior band also had a higher proteoglycan content and had less uniformly arranged fiber orientation even in its midsubstance. There was more kinking of the fiber bundles in the axillary pouch. Also, there is significant variation in the fiber bundle arrangement and proteoglycan content in various portions of the IGHL which might account for the difference in materials properties and failure modes and response to treatments such as thermal shrinkage.

Comment: The IGHL is viscoelastic: faster strain rates produce failure preferentially at the ligament insertion sites. The data presented here provide insights into why injuries occur in certain locations. For example, fast

loading injuries will produce dislocations with Bankart lesions, whereas slower loading lesions such as repetitive throwing, will produce midsubstance damage.

## Elbow

### **A biomechanical comparison of the EndoButton versus suture anchor repair of distal biceps tendon injuries.**

Spang JT, Weinhold PS, Karas SG. *J Shoulder Elbow Surg.* 2006;15:509–514.

**Context:** Loss of flexion and supination strength has been reported for distal biceps tendon ruptures. Various methods are available to repair the distal biceps. This compares two of the more common methods.

**Study Design and Results:** Eleven matched pairs of cadaver arms had the distal biceps tendon repaired with either the EndoButton technique or with the use of two suture anchors. The tendons were loaded to failure on a servohydraulic testing machine with 10 mm of displacement being considered a clinical failure.

**Conclusions:** The Endobutton and suture anchor repairs had comparable strength of fixation. In particular, the Endobutton had a 16% higher ultimate tensile load and a 16% higher clinical load to failure but these results were not statistically significant.

**Comment:** Although the ultimate tensile load result was not statistically significant, the Endobutton repair maintained better contact with the bone during the testing process. This contact might aid in the healing process.

### **Late reconstruction of chronic distal biceps tendon ruptures with a semitendinosus autograft technique.**

Wiley WB, Noble JS, Dulaney TD, Bell RH, Noble DD. *J Shoulder Elbow Surg.* 2006;15:440–444.

**Context:** Chronic distal biceps injuries might not be amenable to direct repair of the native tendon to bone. This report describes a technique using the semitendinosus to reconstruct the tendon.

**Study Design and Results:** Seven patients had semitendinosus graft reconstruction of a chronic distal biceps tendon rupture. The semitendinosus was woven into the end of the native biceps tendon and attached to the bone with a two-incision technique. This group was compared with a group of seven patients with unreconstructed ruptures. Strength was measured at approximately 30 weeks.

**Conclusions:** Semitendinosus reconstruction of the distal biceps tendon results in improved flexion strength.

**Comment:** This was a small study, and the control group may not be aptly matched. Also many patients can tolerate a modest loss of flexion and supination strength. Thus, this study does not prove that chronic ruptures demand semitendinosus augmentation; rather, it suggests that

semitendinosus graft reconstruction might improve flexion strength in patients indicated for surgery.

**Pearls:** In the current study, the authors tensioned the graft to be taut near full extension. Alternatively, one can fold the graft to make it thicker and tension it at 60° flexion. In my experience, this produces better return of symmetry to the biceps contours and improved supination strength without a flexion contracture. Distal fixation of the tendon also can be accomplished with the EndoButton (as noted above).

## Other

### **Painful os acrominale (or unfused acromial apophysis) in athletes.** Pagnani MJ, Mathis CE, Solman CG. *J Shoulder Elbow Surg.* 2006;15:432–435.

**Context:** Treatment of the painful os acrominale has ranged from various forms of ORIF to open and arthroscopic resection. The obvious concern with resection is deltoid dehiscence and the problems with ORIF have been persistent nonunion and hardware prominence.

**Study Design and Results:** Eleven shoulders were treated with arthroscopic resection of a symptomatic meso os acrominale. All of the patients were collegiate or professional athletes. The patients were tender over the acromion at the junction of the os and had impingement type of pain with edema observed in five on MRI at the junction site.

**Conclusions:** All patients were able to return to normal athletic activity at 14 months except for one who was followed for 36 months and was asymptomatic at that point. Strength was assessed in seven with no side-to-side differences in abduction, or internal and external rotation. Arthroscopic meso os acrominale resection can yield good results and allow return to sport even in young high-demand athletes.

**Comment:** These patients were tender at the os, making it less likely that it was an incidental finding. The study does not give much guidance for management of patients with typical impingement in whom the os is not the focus of the pain.

**Pearls:** The results of open resection in other studies have been poor. These authors reported good results with arthroscopic resection even in high-demand athletes. The key difference is with arthroscopic approach, the surgeon does not disrupt the deltoid fascia. In my practice, I allow only pendulum or passive ROM for the first 6 weeks to further protect the attachment.

### **Long-term results of scapulothoracic arthrodesis of facioscapulohumeral muscular dystrophy.** Rhee YG, Ha JH. *J Shoulder Elbow Surg.* 2006;15:445–450.

**Context:** Facioscapulohumeral dystrophy (FSHD) is a rare condition that results in loss of function of the scapular

stabilizers. The ensuing scapular winging significantly decreases effective shoulder ROM and function. Traditional treatment has been scapulothoracic fusion.

**Study Design and Results:** Nine shoulders in six patients were treated with scapulothoracic arthrodesis for FSHD by fusing the third through sixth ribs to the undersurface of the scapula with plate augmentation.

**Conclusions:** The patients gained averages of 38° flexion and 32° abduction but lost internal rotation and horizontal adduction. These gains diminished 4 years postoperatively but they still were better than preoperative

flexion and abduction. There was no significant reduction in pulmonary function or rib fractures.

**Comment:** The gains offered by this operation come at a price. Patients must be told that they will lose some internal rotation and adduction in return for better flexion and abduction. Also, FSHD is a progressive disease and progressive loss of muscular function usually will result in diminished results with time.

**Pearls:** Plate augmentation can provide good initial strength and should be considered when attempting to fuse the thin scapular bone.