Symposia

What to do with a Failed Arthroscopic Repair of a Massive Cuff Tear

Introduction

Massive rotator cuff tears represent a small percentage of all rotator cuff tears (10 to 40%) but 80% of recurrent tears are massive tears\(^1\)\(^\text{-}\)\(^2\) revision of a failed massive rotator cuff tear is a great problem and continues to be a challenging scenario for orthopedic surgeons. The overall outcome of a massive rotator cuff repair is less predictable and less satisfactory with a high failure rate even if a complete repair is achievable. The main problems of a failed rotator cuff repair with a massive configuration are the poor tissue quality, a complex disruption of glenohumeral biomechanics and a variable decreased of the acromiohumeral distance.

When we talk about poor tissue quality we are talking about significant muscle atrophy, fatty infiltration and stiff tissue, with retraction. This makes surgical mobilization sometimes impossible. If you look at biopsies samples obtained from massive rotator cuff tears, 95% show some evidence of degenerative changes, reduced cellularity, decreased vascularity and structural disorganization with lower collagen concentration\(^3\).

The approach to patients with failed massive rotator cuff tears repair requires careful assessment not only because of the tissue quality, but also because of the altered biomechanics. The postero superior rotator cuff tears involving the supraspinatus, infraespinatus and, sometimes, the teres minor are the most common configurations of tears and these patients can have stable glenohumeral abduction without excessive superior translation if the remaining intact cuff generates sufficient force to counteract with the deltoid. In revision surgery a main problem could be the deterioration of the superior force couple (deltoid) when the primary surgery has detached it from the acromion\(^4\).

Shoulder motion is complex; we need a balance between motion, force transmission and stability, the rotator cuff contributes to all three.

Finally, the type of primary surgery and the physical examination are the most critical aspects of the decision making in a case of revision massive rotator cuff tear. Pain, weakness or a combination of both are possible scenarios; if the patient had had previous open cuff surgery, inspection of the previous incision is particularly important since deltoid status will define future treatment. Active and passive motion should be evaluated, patients who are unable to elevate their arm over 90° above horizontal are considered to have pseudoparalysis. In these cases we have to be ready to recognize a nerve injury and to understand whether the inability is coming from a formal biomechanical insufficiency or if it is a result of pain. Patients who are able to adequately elevate their arm over 90° above their head can typically have enough strength to perform most activities of the daily living; however, they usually state that pain is their primary compliant.

A massive cuff tear is not always an irreparable tear, even in revision surgery. Technically, even if the mobilization produces tension free or restores the footprint insertion with the best configuration possible, the probability of healing decreases when there is a chronicity of symptoms, weakness in external rotation, acromiohumeral distance less than 6 mm, tendon retraction to the glenoid and fatty infiltration over 50%.
There is no consensus among orthopedic surgeons in operative treatment of a failed massive rotator cuff repair.

**Arthroscopic or mini open approaches**

1. Debridement with decompression
2. Complete or partial repair
3. Use of Biological augments and patches
4. Superior capsular reconstruction

**Open approaches**

5. Tendon transfer
6. Allograft
7. Reverse total shoulder

**Arthroscopic Debridement with biceps tenotomy**

The ideal patient for this procedure is a low demanded patient over 70 years old with an irreparable massive rotator cuff retire and pain as the main symptom, unable to participate in an aggressive postoperative rehabilitation. Reasonable results have been reported with these procedures. Rockwood et al. reported 83% of good and excellent results in 57 primary massive rotator cuff tears at a mean of 6.5 years follow up. Gartsman in his series (1997) noted that the results are superior in massive cuff tears repairs than in arthroscopic debridement. Finally, there is moderate evidence that these procedures do not slow progression of radiographic osteoarthritis.

**Complete or partial Repair**

The ideal candidate for this procedure is a patient with a reparable massive rotator retire without arthropathy. Even if the possibility of healing seems to be low, we believe that rotator cuff revision should be considered since patients can have satisfactory functional results. The acromiohumeral distance is the only independent postoperative factor that affects functional outcomes; therefore gains of acromiohumeral distance postoperatively could mean the regaining of force couples. The goal is to create a “Functional Cuff”, restoration of the anterior and posterior force couples creates a fixed fulcrum for deltoid lever. Repairing the Infraspinatus along in a posterosuperior tears or the subscapular in an anterosuperior tears often restores function and range of motion. We have to create a stable fulcrum rather than an anatomical clothing. Tear pattern recognition, adequate mobilization, margin convergence and more secure mechanical configurations of repairs in deficient tendon tissues are the gold standards to minimize failure in the arthroscopic approach.
**Biological Argumentation**

The purpose of a biological argument in failed rotator cuff surgery is to increase healing rates. Platelet Rich Plasma and stem cells therapy are some indications for this. Preclinical researches are promising but clinical data is difficult to interpret, and sometimes the results are inconsistent and contradictory. To clarify the indications for the optimal use of PRP and Stem Cells Therapy in rotator cuff repair, we need better designed studies.

**Mechanical Argumentation**

Mechanical argumentation tries to provide some degree of load sharing forces across the site of tendon repair. A variety of materials are being used for tendon repair argumentation such as Extracellular Matrix derived Scaffolds, and synthetic scaffolds which can help when used in appropriate settings. When we treat young and high demand patients, surgical options like tendon transfers and arthroplasty would place excessive restriction in recreational activities and exceed patients life. In these patients with complex tears and tissue loss, patch argumentation could be a good option to increase mechanical and biological response to healing across the tissue defect.

Neviasser et al. first reported the use of an interposition allograft in 1978. Since then, a variety of materials have been developed. Origin, processing, physical properties and clinical results must be considered when choosing a rotator cuff augmentation.

**Tendon Transfer**

**Latissimus Dorsi**

The ideal candidate will be a relative young patient without evidence of significant arthropathy with an irreparable posterosuperior rotator cuff tear, intact subscapularis and good deltoid function. Managing patient expectation, this tendon transfer can provide containment of the humeral head, allow improvement glenohumeral motion, especially anterior elevation, and can provide pain relief.

**Pectoralis Major**

The ideal candidate for this type of tendon transfer is a patient with pain and dysfunction arising from an irreparable subscapularis tears with an intact or reparable superior cuff.

**Reverse Total Shoulder Arthroplasty (RSA)**

RSA can improve functional results in patients with irreparable cuff tears after a failing previous surgery. Contraindications are young active patients and non-function deltoid. Regarding the French experience, a multicenter study, with a 2-year follow up of 457 consecutive cases between 1991 and 2003, showed that the results are 80 to 90% satisfactory and predictable whatever etiology, with improve of active elevation but not active external rotation when infraespinatus and tear minor are absent or atrophied? The
best indications and results appear in patients with irreparable rotator cuff tear and arthropathy younger than 70 years old. In cases with severe external rotation weakness (hornblowers sign), addition of latissimus dorsi transfer could improve function. Concern exists over its complication rate like, scapular notching (60%), dislocation (3%), infection (5%), glenoid loosening (4%), acromion fracture (2%), and longevity.

Bibliography