A 72-year-old woman presents with chronic shoulder pain subsequent to a fall that has not responded to conservative treatment. She tells you that she “wants it fixed.” T2-weighted coronal (A) and sagittal (B) and T1-weighted sagittal (C) magnetic resonance images are provided. What would you do?

G. Russell Huffman, MD, MPH:
The presented case is on a 72-year-old woman who sustained a traumatic rotator cuff tear and remains symptomatic. We are told that she has chronic pain that has not responded to nonoperative care. However, her physical examination is not provided to us.

In this patient, if one is to consider operative intervention, then the available, but not necessarily indicated, options include an arthroscopic bursectomy and possible biceps tenotomy without taking down the coracoacromial ligament and arch; rotator cuff repair; or reverse shoulder replacement. The most appropriate choice is determined by several factors.

The predictors of successful rotator cuff repair include a patient’s age and general health. Typically, age older than 70 years, history of smoking, diabetes mellitus and other metabolic conditions, and poor nutritional health are each associated with decreased rates of failure after rotator cuff repair surgery. Additional factors to consider are whether the tear is attritional or traumatic and whether it is acute or chronic. Traumatic tears of normal tendons are technically easier to repair and more successfully repaired because the tendon tissue is healthier than attritional tears involving poorly vascularized, degenerative tendon. The acuity of the tear is also predictive of repair success.

Radiographic assessments have been used to determine the amount of viable muscle as a surrogate of a tendon’s potential to heal after repair. The most widely used is based on sagittal oblique computed tomography scans through the supraspinatus fossa and is known as the Goutallier classification of fatty atrophy. This has been extrapolated to interpretation of T1-weighted sagittal oblique magnetic resonance imaging (MRI).
sequences, although caution should be used when significant muscle retraction exists, as in the current patient, because the images may capture the medially retracted myotendinous junction rather than the muscle belly, which is better evaluated on T1-weighted coronal MRI medial to the base of the coracoid process and well medial to the most medial sagittal oblique images obtained during most shoulder MRI.

In patients with Goutallier fatty atrophy greater than 50% of the supraspinatus fossa (stages 3 and 4), primary rotator cuff repairs have a predictably higher failure rate. Another predictor of tendon repairability is the relationship of the humeral head to the glenoid fossa on upright plane anteroposterior radiographic images. If the humeral head is centered (ie, the Maloney’s line is intact) and no evidence exists of superior migration, then the tendon may be repaired. If the humeral head is shown to be superiorly migrated on plane radiographs, I would not consider repairing the tendons. No correlation exists between humeral head position on MRI and true superior migration because the patient is supine during MRI.

From the coronal and sagittal images provided, the tear involves both the supraspinatus and at least a portion of the infraspinatus tendons. The T1-weighted sagittal MRI shows Goutallier stage 2 fatty atrophy in the supraspinatus fossa. In addition, it demonstrates early minimal fatty atrophy of the infraspinatus muscle.

In this patient, the supraspinatus tendon is retracted to the glenoid rim, and I am not sure that the sagittal image captures the true muscle belly medial to the retracted tendon. I favor evaluation of supraspinatus muscle quality using a T1-weighted coronal MRI when tendon retraction exists so that I can see the muscle medial to the tendon more clearly. The imaging provided also shows little or no loss of articular cartilage on either the humeral or glenoid chondral surfaces.

This patient is 72 years old and has a traumatic tear of the supraspinatus tendon. The muscle quality appears adequate, although a more medial T1-weighted coronal MRI would be helpful to more accurately characterize this. If this patient has radiographs showing a well-centered joint, does not smoke or have diabetes mellitus, has a reasonable life expectancy (10 years) based on medical and family history, and is active, then I would favor an arthroscopic evaluation and rotator cuff repair. During arthroscopy, I would assess for tendon mobility and only repair if a tension-free repair could be achieved. If this is not possible, I would favor an arthroscopic debridement, including a synovectomy and bursectomy with a possible biceps tendon release. In the latter scenario, I would leave the coracoacromial arch intact to prevent anterosuperior escape of the humeral head.

Conversely, if this patient has diabetes mellitus, smokes, has a limited life expectancy of less than 5 years, has radiographs demonstrating superior humeral head migration, and has shoulder pseudoparalysis and symptomatic early arthritis (crepitus and pain with passive shoulder rotation with no abduction), I would treat her primarily with a reverse total shoulder replacement.

Anthony A. Romeo, MD:

This is a 72-year-old woman with chronic pain in her shoulder after a fall. We do not have any information with regard to her physical examination. Her MRI demonstrates a massive retracted rotator cuff tear involving the supraspinatus and infraspinatus tendons, which have retracted to the level of the glenoid. The coronal image shows proximal migration of the humeral head, suggesting an unbalanced shoulder. Grade 3 fatty infiltration of the supraspinatus muscle and grade 2 fatty infiltration of the infraspinatus muscle are seen, confirming the chronic nature of her rotator cuff problem. Unfortunately, we do not have a detailed history of her complaint of pain, a physical examination that identifies what reproduces her pain, and what her expectations are when she says she wants it “fixed.”

Conservative, nonoperative treatment is always our first choice for chronic rotator cuff tears. If she has no pain and her complaints are related to functional deficits, an ambitious program of physical therapy would be prescribed. If she has persistent discomfort affecting her daily life, I would look for focal areas of pain, such as the biceps tendon or acromioclavicular joint, in the hope of finding a simple solution for her symptoms. The coronal MRI appears to show the biceps is still intact, although an axillary view is not present for more information. This patient may have relatively isolated biceps pain and therefore could be offered an outpatient arthroscopic biceps surgery and debridement with anticipated good pain relief.

If the pain appears to be related specifically to the posterior rotator cuff deficiency, then 2 options are available: (1) outpatient surgery to attempt a rotator cuff repair, debridement, and biceps tenotomy or tenodesis or (2) a reverse shoulder arthroplasty. Rotator cuff repair surgery in this patient population can be successful. However, grade 3 fatty infiltration and superior migration of the humeral head are associated with an unpredictable ability to repair the tendon and, even if it is repaired, a high incidence (more than 50%) of retear or a lack of healing of the tendon.

Furthermore, even if it does heal, its function may be severely compromised. Therefore, management of the rotator cuff and possibly biceps-related pain could be successful with treatment of the rotator cuff (debridement, partial repair, or complete repair) and a biceps tenotomy or tenodesis, even if the repair of the tendon is ultimately unsuccessful. Adding a patch or graft does not improve the potential outcome. The patient must be informed preoperatively that improvements in function are
unpredictable and that use of her hand above shoulder level will be compromised.

Chronic rotator cuff tear without significant glenohumeral arthritis may be an indication for a reverse shoulder arthroplasty. In my practice, the lack of glenohumeral arthritis directs me toward a soft tissue solution first. However, if the cuff-related procedure fails, then I recommend proceeding with a reverse shoulder arthroplasty, which essentially replaces the function of the deficient superior rotator cuff.

The potential advantages of reverse shoulder arthroplasty include predictable outcomes with regard to pain relief and improved shoulder function. Usually patients are able to use their hand above shoulder level for activities of daily living and personal care, which will help to maintain this patient’s independence. However, reverse shoulder arthroplasty has been associated with high complication rates in publications from shoulder experts when compared with other joint arthroplasty procedures. Therefore, even higher complication rates can be anticipated for surgeons who infrequently perform this procedure.

Patients must be counseled that postoperative problems may include instability, higher infection rates than standard total shoulder replacements, intraoperative fracture, hardware loosening, and medical complications such as deep venous thrombosis and pulmonary embolism. Contraindications to reverse total shoulder arthroplasty include deltoid dysfunction, insufficient glenoid bone stock, use of the arms for weight bearing or ambulation, or active infection; this patient has no history of any of these conditions.

My treatment would begin with providing thorough non-operative management specifically targeting the source of pain and impairment. If this option failed, an arthroscopic approach to her condition may be associated with successful pain relief and a low incidence of complications but unpredictable improvement in function. If pain and dysfunction persist, then reverse shoulder arthroplasty is recommended.

REFERENCES


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