Rotator Cuff Tendinopathy - Causes and Treatment

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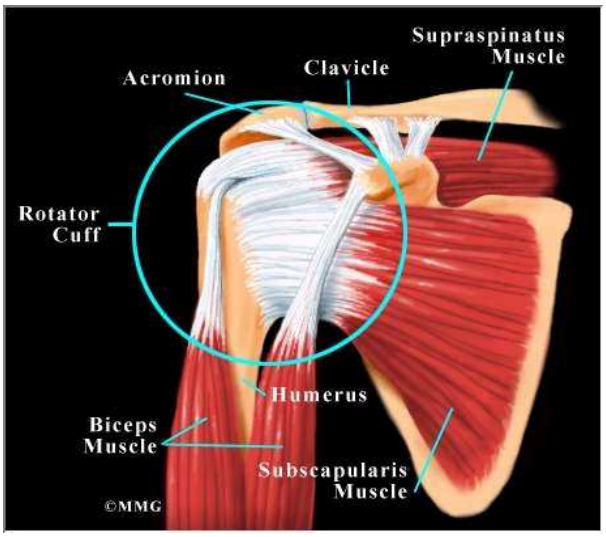
Abstract:
Problems about the shoulder are a frequent source of concern because of the high incidence and the disability that is associated with the shoulder. Shoulder pain may be a chronic condition which limits job performance, recreational activities, and interrupts sleeping.
The anatomy of the muscles and tendons are reviewed with respect to the evaluation of the shoulder. The treatment of the painful shoulder, both non-operative and operative management, is discussed.

Background

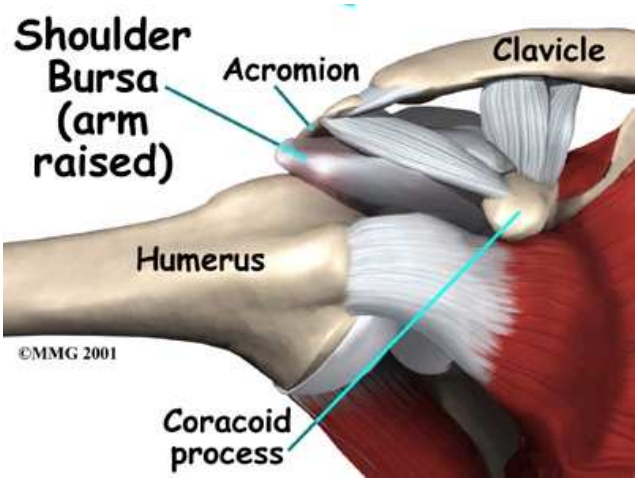
The shoulder joint is one of the most flexible joints in the human body, allowing rotation in three planes (flexion/extension, abduction/adduction, and internal/external rotation). It is this mobility that contributes to the high incidence of injury and degenerative pathology of the joint. This is particularly true with regard to instability (dislocation), which is not discussed in this paper, but also significant as it relates to rotator cuff pathology.

Figure 1



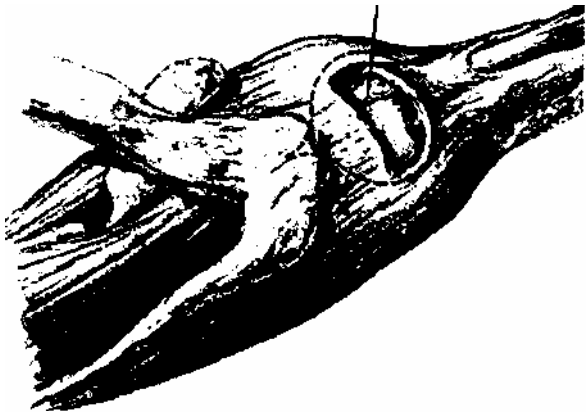
The rotator cuff is a musculotendinous structure composed of four muscles arising on the scapula (supraspinatus, infraspinatus, teres minor, and subscapularis) whose tendons are broad and form a layer around the shoulder joint as they attach at the humeral head. Its function is to stabilize the humeral head in the glenoid as well as contribute to rotation of the shoulder in all planes. As illustrated figure 1, the rotator cuff travels across the top of the head of the humerus, crossing under a bony and ligamentous structure called the coracoacromial arch. This structure is composed of the lateral acromion (a bony extension of the scapula) the acromio-clavicular (A-C) joint, and the coracoacromial ligament. As the shoulder is abducted, the rotator cuff can be pinched under this arch (Figure 2), particularly if there are inferior osteophytes or spurs on the acromion or distal clavicle or a hypertrophied coracoacromial ligament. The tendon of the long head of the biceps is intraarticular and can also be compromised with shoulder abduction. This phenomenon, called "impingement," is the general mechanism for most rotator cuff pathology.

Figure 2



Impingement syndrome was classically described and classified by Neer in 1983.[9] He divided the disease into three stages, in increasing order of severity. Stage I includes edema and hemorrhage and occurs mostly in young (< 25 years old) patients after overuse, and is reversible with conservative treatment. Stage II involves fibrosis and tendonitis, is typically seen in patients 25-40 years old, and may not respond to non-operative measures. Stage III refers to bony changes (spurs, etc.) and complete tears of the rotator cuff and/or long head of the biceps tendon. Complete tears of the rotator cuff usually require surgical treatment (Figure 3).

Figure 3



Retracted tear, commonly found at surgery. Broken line indicates extent of debridement of degenerated tendon for repair

The concept of impingement is still valid today; although treatment has evolved over the past two decades, the general principles remain the same. Rotator cuff pathology is largely a degenerative phenomenon. Overuse leads to tendonitis of the rotator cuff (especially the supraspinatus) and inflammation of the subacromial bursa (bursitis). With chronicity, this can progress to degeneration of the tendon and eventual partial or full-thickness tears. While acute injury plays a role, particularly in the case of dislocations in older individuals, most cases of impingement are a result of chronic wear-and-tear. Even when the patient recalls a discrete injury, it is often a trivial injury, which has only served to complete a partial tear in a degenerated tendon.

EVALUATION

The patient with impingement syndrome typically presents with shoulder pain of variable duration. Overhead activities as simple as reaching higher shelves can be painful or impossible. Sleeping is often affected, usually due to inability to lie down on the involved shoulder. The usual patient is over 40 years old, but occasionally a younger person is seen. It is important to know if there is neck pain or symptoms of radiculopathy, which is a separate cause of shoulder pain.

Physical exam may reveal atrophy over the scapula in chronic cases, but usually there is no significant deformity. Range of motion may be decreased, particularly with active abduction. Passive motion is better maintained unless the condition has evolved into frozen shoulder, a complex problem involving fibrotic changes in the shoulder capsule and which may involve aggressive treatment to recover. Palpation often reveals tenderness over the anterior acromion or anterior shoulder capsule in the region of the biceps tendon. Crepitus in the shoulder is often palpable and sometimes audible. It is also important to note signs of acromio-clavicular joint arthritis, namely tenderness over the A-C joint and pain in the A-C joint on cross-body adduction of the shoulder. The cervical spine should also be evaluated in terms of range of motion and neurologic status of the extremity.

There are two classic "impingement signs." The Neer impingement sign involves passive forward flexion of the shoulder, which places the cuff and biceps tendon in its provocative position.[9] Pain on this maneuver represents a positive sign. The Hawkins sign is pain on passive shoulder forward flexion with internal rotation with the elbow bent. The impingement test is a positive impingement sign followed by a lidocaine injection into the subacromial space. Relief of pain is a positive impingement test. This is to differentiate the pain from arthritis or other sources of pain.[9]

Rotator cuff strength testing should also be assessed clinically against the examiner's manual resistance. With the arms at the side and the elbows bent, internal and external rotation strength (representing subscapularis and infraspinatus, respectively) can easily be measured. Abduction strength can be tested with the arms abducted slightly, measuring supraspinatus function. Teres minor function can be assessed with resisted extreme external rotation of an abducted shoulder. Marked weakness, particularly a positive "drop arm" sign (the patient cannot maintain an abducted arm against gravity) is strongly suggestive of a large rotator cuff tear. Lesser degrees of weakness may indicate a smaller tear or inflammation of the cuff and bursa. Interestingly, patients with certain patterns of full-thickness tears, particularly smaller ones, may maintain deceptively good strength.

Plain radiographs are used to assess acromial morphology, as a hooked acromion on the lateral view is highly correlated with rotator cuff pathology. In cases of large tears, the humeral head may be elevated, decreasing the acromio-humeral interval and causing bony changes on the humerus and acromion. Chronic cases may lead to arthritis of the gleno-humeral joint. The A-C joint is also evaluated for signs of arthritis, which is often present, but may not be symptomatic (thus the importance of correlating with the physical exam).

The gold standard diagnostic test for rotator cuff tears was the arthrogram, where radioopaque contrast is injected into the glenohumeral joint and extravasation into the subacromial bursa shows a complete tear. This test has largely been replaced by the magnetic resonance imaging exam, which is less invasive and offers more information about the character of the tendon and also may define other intraarticular pathology. It is also available with intraarticular contrast for further specificity. The traditional arthrogram is still occasionally ordered, usually in patients who have contraindications to MRI, such as cardiac pacemakers.

TREATMENT

The initial treatment of impingement syndrome is usually conservative. Activity modification for a period of time is required. The mainstay of treatment is physical therapy, with the primary goal being rotator cuff rehabilitation, initially restoring range of motion and then improving strength of the rotator cuff musculature.[7] This involves stretching and the use of specialized rubber tubing and other devices to progressively increase the strength of the muscles, promoting resolution of the syndrome. Oral anti-inflammatory medication and subacromial corticosteroid injection have a role in treatment as well, mainly serving to help to decrease the inflammation associated with tendonitis and bursitis.

If a patient fails a well supervised rehabilitation program, generally after a period of months, or if a full-thickness rotator cuff tear is diagnosed, the patient may become a surgical candidate. The procedure performed for impingement syndrome is tailored to the individual patient's pathology. It generally involves anterior acromioplasty. a variation of the procedure originally described by Neer.[s] The idea is to remove the offending inferior spur or hook of the acromion, "decompressing" the subacromial space and preventing further mechanical impinge-ment. This may be performed via open surgery or using arthroscopic techniques. A partial-thickness rotator cuff tear may be treated with debridement along with acromioplasy, but more significant tears should be repaired using a variety of techniques, open or arthroscopic, in order to best give pain relief and restore function. Biceps tendon pathology, glenoid labrum (cartilage) degeneration, and A-C joint arthri-tis may also be addressed surgically at the same time. Postoperatively, a period of protection or immobilization (in the case of a repair) is followed by an intensive rehabilitation program tailored to the particular case. A period of several months is generally required for maximal recovery.

Results of conservative treatment of impingement are good, with most patients having improvement in symptoms.[2-5] Surgical treatment has similar success rates for patients who fail conservative treatment or require acute surgical treatment.[3,4] Negative prognostic factors include larger tears, chronicity of the tear, and medical comorbidities.[6]

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