

ROTATOR CUFF DISEASE AND IMPINGEMENT

Irritation and injury of the rotator cuff are the most common shoulder problems encountered in the sports medicine community. While these problems can occur after a specific traumatic injury, they are more commonly associated with repetitive use. "Wear and tear" over time leads to the development of rotator cuff symptoms in a large portion of the population as they enter their 40's and 50's. We will briefly attempt to review the main principles involved in rotator cuff disease and to outline treatment options.

ANATOMY:

The rotator cuff is composed of the supraspinatus, infraspinatus, subscapularis, and teres minor muscles. The tendon of the long head of the biceps muscle is also closely associated with a rotator cuff. The muscles of the rotator cuff originate from the shoulder blade and attach to the ball of the shoulder. A tendon is the attachment of a muscle to a bone.

When the rotator cuff tears, its tendon usually pulls away from the ball of the shoulder (humeral head). After a tear, the tendon often retracts and leaves a large hole which uncovers the ball of the shoulder.

A portion of the shoulder blade lies directly over the rotator cuff. This structure is known as the acromion. The acromion protects the rotator cuff from the outside world. It also creates a very small space in which the rotator cuff passes to attach to the humeral head. In addition, there is a ligament (coracoacromial ligament) which passes from the acromion to another portion of the shoulder blade (the coracoid) and further reduces the amount of space available for the rotator cuff to pass to the humeral head. As we shall see, abnormalities of the acromion and coracoacromial ligament are thought to cause compression of the rotator cuff and to be associated with rotator cuff inflammation and tearing.

The space between the undersurface of the acromion and the rotator cuff is known as the subacromial bursa. The term "bursitis" is commonly used to describe inflammation of this area. Bursitis is a term which can be thought of as synonymous with early rotator cuff inflammation. In medical terms, the phrase "subacromial impingement" is also used to describe early inflammation of the rotator cuff with associated bursitis. This term has evolved from the belief that the rotator cuff impinges on the undersurface of the acromion when the arm is elevated and that this is related to rotator cuff pathology.

ACROMIAL SHAPE AND SLOPE:

The shape of the acromion can be seen on a specific X-ray view known as an outlet view. The acromion has been described as having three general configurations: **(Type I)** flat, **(Type II)** curved, **(Type III)** hooked.

Patients with flat acromions are very unlikely to develop rotator cuff symptoms. On the other hand, patients with hooked acromions frequently have rotator cuff disease. The hook on the acromion may rub on the rotator cuff with arm elevation.

FUNCTION OF THE ROTATOR CUFF:

The rotator cuff generally functions to elevate and rotate the upper arm. The rotator cuff compresses the shoulder in the socket and allows other shoulder muscles to work on the upper arm by providing a stable fulcrum. Loss of rotator cuff function may allow the humeral head to ride out of the shoulder socket and eventually may result in severe osteoarthritis involving the shoulder.

Rotator cuff symptoms are unusual, but not unheard of, in patients under forty years of age. In general, the patient with rotator cuff disease presents at fifty or later with a history of pain and weakness in the shoulder. The pain tends to be worse with overhead. It may be exacerbated by overhead strokes in tennis, for instance. The pain also may be severe at night and may prevent the patient from sleeping. In some patients, a specific traumatic event may have triggered the onset of symptoms. However, it is much more common for the pain to come on gradually and to gradually worsen with time.

In severe cases, the patient may be completely unable to elevate the arm. However, this is seen in only extreme cases and many patients with rotator cuff tears can lift the arm over their head with some difficulty.

TREATMENT OPTIONS:

Rotator cuff disease may be thought of as a progressive disease which begins with inflammation of the tendons and which often will progress to tendon breakdown and eventually to a complete tear. The patient is advised of this possibility from the outset. If clinical examination and radiographs are consistent with rotator cuff disease, the patient is usually started on the least invasive form of treatment and then progressed to the most invasive as symptoms warrant.

I. Rotator Cuff Strengthening and Anti-inflammatory Medication

Many patients with early rotator cuff disease will respond to a simple exercise program and to the use of nonsteroidal anti-inflammatory medications which are derivatives of aspirin. During the office visit, the patient will be instructed on some simple exercises which they can then perform on their own at home. These exercises are designed to strengthen the rotator cuff. In theory, they will increase a compressive force which contains the ball within the shoulder socket. The hope is that by increasing this compressive force, the ball of the shoulder will be less likely to rise out of the socket with arm elevation. In this way, it is hoped that the space between the ball of the shoulder and the acromion will not be

compromised and that the rotator cuff will not sustain further injury. In most patients, these exercises initially increase pain. However, if they are performed regularly, they appear to result in symptomatic relief in 60 to 70% of patients. It has been our opinion that patients with hooked acromions are less likely to respond to an exercise program than those who have relatively small curves in their acromions.

II. Subacromial Injections

Injections into the subacromial space perform two basic functions: (1) to confirm the presence of rotator cuff disease and (2) to help ameliorate symptoms. Injection of a local anesthetic into the subacromial space may confirm that the patient's pathology is localized to the rotator cuff area. This can be extremely helpful in patients who have a history of neck problems or in whom the clinical presentation is equivocal. When a local anesthetic alone is administered, relief from the injection is short-lived.

III. Corticosteroids

Corticosteroids (forms of cortisone) can also be placed in the subacromial space. However, these medications can have a significant down side affect on rotator cuff integrity. Particularly, if used recurrently, these may mask a continuing problem and may eventually lead to further rotator cuff deterioration. For that reason, corticosteroid injections are use selectively. The best candidates tend to be patients who are over 60 years of age and who are poor surgical candidates or who have undergone a study which shows that the rotator cuff is intact.

Radiographic Imaging

The MRI has become our standard imaging tool for evaluating the rotator cuff in patients who do not respond to an exercise program. The MRI is a noninvasive tool which utilizes a large magnet to provide images of the rotator cuff musculature. Plain X-rays show only bones and do not show soft tissues. Therefore, the MRI provides much more anatomic detail and can often differentiate between tendonitis and a frank rotator cuff tear. This information can be used to decide whether or not to perform an injection on in the planning of a surgical procedure.

We are fortunate to have an excellent team of MRI radiologists who work in close association with us at Nashville Knee & Shoulder Center. As a result, we can be extremely confident that what is reported on the MRI is consistent with what is actually going on in the shoulder. At times, MRI's which are obtained from other centers can be less accurate in their interpretation and, in these cases, it may be difficult to compare, for instance, an incomplete tear with a complete tear of the rotator cuff.

In general, we will consider an injection into the subacromial space using a corticosteroid preparation in a patient who does not demonstrate frank rotator cuff tearing on an MRI. The patient is then returned to physical therapy in the

hope that the injection will resolve his or her symptoms over the long-term. Our general rule is to limit the number of these injections to three in a lifetime and to space them apart by at least six months.

In patients with demonstrated tears of the rotator cuff, we usually do not recommend subacromial injections unless the patient is an extremely poor operative risk or if it is our belief that the tear is so large that it cannot be repaired.

IV. Rotator Cuff Repair

It is our belief that complete tears of the rotator cuff are best treated surgically. Untreated tears of the rotator cuff can, in our experience, enlarge. If they are observed for a significant length of time, they may progress to the point where they can no longer be repaired. Patients with irreparable rotator cuff tears often are forced to live with severe pain since there are very few good treatment options for this group. As a result, we prefer to attempt to repair the rotator cuff when the tear is relatively small. Most patients with small rotator cuff tears tend to fare very well after surgical treatment.

In our practice, rotator cuff surgery is always preceded by an arthroscopic examination of the shoulder. The arthroscope is a small fiberoptic tube which may be inserted into the shoulder through a small puncture wound. The arthroscope may be used to confirm the presence or absence of a rotator cuff tear. In some cases, the rotator cuff may be repaired by a completely arthroscopic method. The arthroscopic method is reserved for patients with small tears who place low demands on the shoulder. More commonly, bone spurs and other offending pathology is removed from the shoulder using the arthroscope. The arthroscope is used to identify the tear. In some cases, the rotator cuff can be repaired using the arthroscope without the need for additional incisions. In other cases, a small incision is made on the outside part of the shoulder and the rotator cuff is then repaired back into bone by passing sutures into drill holes in the ball of the shoulder. Use of the arthroscope has greatly facilitated our ability to visualize rotator cuff tears. It has also allowed us to perform the procedure using a much smaller incisions with significantly less pain after surgery.

In patients with large or massive tears of the rotator cuff, traditional large open incisions are generally used. Results of rotator cuff repair appear to be directly proportional with the size of the tear. Patients with small tears do quite well with surgical treatment. However, some patients with large tears may do poorly even if surgical repair is attempted. This may have to do with chronic deterioration of the rotator cuff tissue in patients with long-standing tears, scarring and retraction of the tendon in patients with large tears and overstretching of nerves which supply muscles when large tears are brought back to their normal position.

After rotator cuff surgery, most patients are started immediately on gentle range of motion exercises. A sling is worn, except during exercise, for the first month after surgery. The patient can expect to be in formal physical therapy for a full

three to four month period after surgery. Gradual improvement in strength and pain relief may be expected for up to a year after the initial procedure.

CUFF TEAR ARTHROPATHY

Cuff tear arthropathy is a term which is used to describe the changes which occur in patients who have suffered a large tear of the rotator cuff which has gone untreated. In many of these patients, repeated corticosteroid injections have been given over the years. They may have been told repeatedly that they simply had bursitis and no further evaluation may have been given.

Generally, X-rays of these patients reveal that the ball of the shoulder has arisen out of the socket and now communicates directly with the undersurface of the acromion.

Often, a new socket will form on the undersurface of the acromion. Since the space which is normally occupied by the rotator cuff is no longer present, it is obvious on X-ray that the rotator cuff has been torn for some time.

Surgical repair of the rotator cuff on these patients is impossible. The only treatment options are attempts to palliate the patient's symptoms. These may involve repeated injections. Since there is little risk of further damage to the shoulder with these injections, they may be given as frequently as the patient desires. Another option for pain relief may be to simply try to clean the shoulder out with an arthroscope. This seems to provide at least temporary relief in some patients. The last resort for patients with this type of pain is to replace the ball of the shoulder with a metal prosthesis. The results of this procedure in our experience are often unpredictable with some patients having significant pain relief and other patients continuing to experience pain despite the procedure.

As a result of the poor results of surgical treatment of cuff tear arthropathy, we tend to be quite aggressive in treating early rotator cuff disease in the hope that very few of our patients will reach the point where only palliative measures are available.