

Patient Information Guide

Rotator Cuff Tear

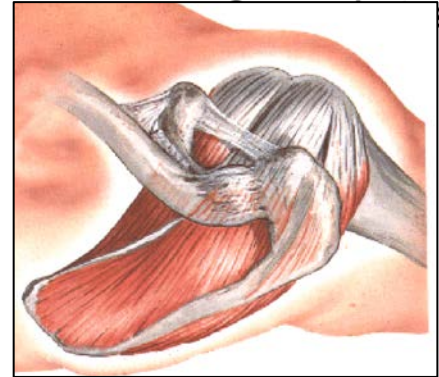


THE
KNEE • HIP • SHOULDER
CENTER

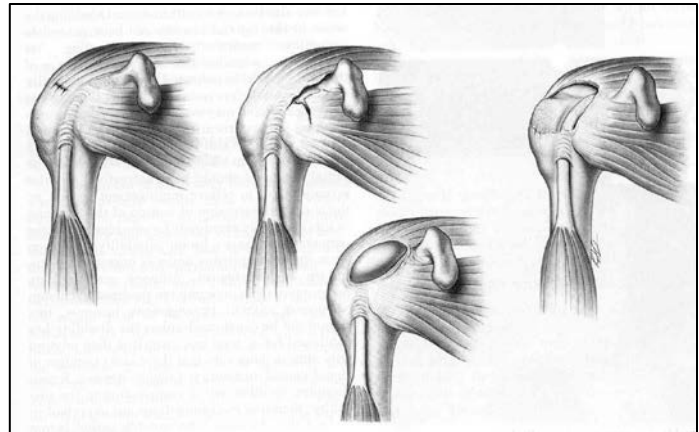


Rotator Cuff Tear Anatomy

The rotator cuff is comprised of four tendons that attach to the humeral head (ball). These tendons serve two functions. First, they move the shoulder so that the arm can be placed into a wide variety of positions. Second, they keep the ball centered in the socket so that the shoulder joint remains stable throughout the range of motion. Almost all activities that involve the arm require the rotator cuff to stabilize and position the shoulder. Thus, these tendon must be able to provide both strength and endurance.



Definition: A rotator cuff tear involves a disruption of the tendon fibers from their insertion into the humeral head. Tears can either be partial thickness or full thickness, depending on whether or not the tear extends all the way through the tendon substance. Full thickness tears likely represent the end result of a partial thickness tear that “wears through.”

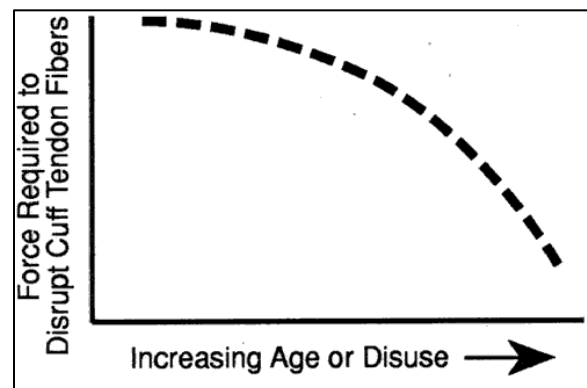


Any one of the rotator cuff tendons can tear. The most common tendon involved

in rotator cuff tears is the supraspinatus tendon. This tendon is positioned between the humeral head and the acromion bone which provides a roof above the ball and socket joint. If tears progress and enlarge, they may extend either to the back (infraspinatus tendon) or the front (subscapularis tendon). The biceps tendon also courses over the humeral head and may secondarily be injured by the same factors that cause a rotator cuff tear.

Causes/Risk Factors

- **Age:** as we age, our tendons lose strength because their internal ability to heal and regenerate decreases. Damage that accumulates from repetitive use therefore is more likely to result in a tear compared to younger patients whose tendons are stronger. The graph to the right shows the relationship of tendon strength to age indicating that the amount of force required to tear the tendon decreases as one ages.



- **Overuse:** repetitive use of the arms, especially at or above shoulder level may cause fatigue and damage to the rotator cuff tendons. If the rate of tissue breakdown exceeds the rate of tissue healing, tendon degeneration and tear may occur.
- **Injury:** rotator cuff tears may occur from an acute injury. Shoulder dislocations in persons over age 40 are commonly associated with tears. Traction injuries such as when the arm is forcefully pulled may cause traumatic tears. Tendon overload may cause a tear if a weight exceeds the tendon's strength. Tears that occur in this fashion are often associated with an audible pop.
- **Smoking:** as with many other tissues in the body, the connective tissues of the musculoskeletal system are adversely affected by smoking. Specifically, smoking damages the circulation to tendons and bones. This not only places the rotator cuff at risk for tear but also slows or prevents their healing during a recovery period.

Symptoms and Signs

Symptoms: Progressively worsening pain both with use and at night are typical features of rotator cuff tear. Most patients cannot recall a single incident that caused the onset of pain. Pain with reaching and lifting, especially at or above shoulder height, are common complaints. Many patients may be unable to sleep on the affected side or may be awoken at night when they roll onto the that side. Most patients are relatively comfortable at rest with the arm at the side. Some patients have pain that radiates into the neck, back or upper arm due to shoulder fatigue. As tear sizes progresses, patients develop weakness and may be unable to actively lift the arm away from the side.

Signs: the physical exam of rotator cuff tear typically reveals pain when the arm is passively elevated in front of the body. This called an "arc of pain." Strength testing generally indicates weakness in the involved tendons or giving way secondary to pain. In some patients, the shoulder blade begins to move abnormally on the chest wall because the trapezius muscle attempts to raise the shoulder in place of the torn rotator cuff. If scar tissue builds up in the bursa above the rotator cuff, patients may notice grating or catching or grinding during shoulder motion.

While these are the typical features of a rotator cuff tear, every patient may be affected differently. Some patients have very little pain despite a large tear while others may have severe pain with a small tear. Similarly, some patients with large tears have well compensated shoulder function while others are severely disabled. The table below shows the spectrum of how rotator cuff tears may present.

Good function, minimal pain	Good function, severe pain
Poor function, minimal pain	Poor function, severe pain

How is a Rotator Cuff Tear Diagnosed?

In straight forward cases, the patient's history and physical exam may be all that is necessary to make a diagnosis of a rotator cuff tear. In some patients, extreme pain may make it difficult to adequately assess the degree of tendon disease and further testing may be necessary to distinguish between tendinosis, a partial thickness and a full thickness tear.

Plain X-rays are generally obtained to screen for other possible causes of shoulder pain including arthritis or calcific tendonitis. These films also show the shape of the acromion

bone, presence of abnormal bone spurs, the relationship of the ball to the socket and the presence of arthritis involving the joint between the end of the collar bone and acromion bone. In many cases, these films will be essentially normal because tendons cannot be directly visualized by x-ray.

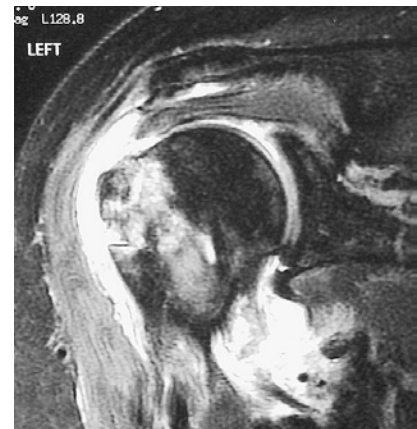
If the clinical history and exam are suspicious of a possible rotator cuff tear, and MRI is the most accurate diagnostic study to assess the tendon for partial or full thickness tear. MRI's are also very useful for assessing factors of the rotator cuff tear that may affect the prognosis. These factors may include: which tendon is torn; the degree of tendon retraction away from the bone; the quality of tendon fibers; the amount of muscle atrophy and any simultaneous involvement of the biceps tendon.



X-ray showing bone spur at tip of acromion



MRI showing partial thickness cuff tear



MRI showing full thickness cuff tear

What is the Natural History of a Rotator Cuff Tear?

In the majority of cases tears progress from partial thickness to full thickness tears. Similarly, if left untreated, full thickness tears progress from small to large over time. The larger the tear, the more effect it has on shoulder function. The rate at which tears progress is variable and cannot be predicted in any one case. Untreated rotator cuff tears also lead to atrophy of the rotator cuff muscles, degeneration of the tendon tissue and retraction of the tendon end away from the bone. All of these factors may complicate treatment because muscle atrophy may not be reversible.

How is a Rotator Cuff Tear Treated?

The optimal treatment for rotator cuff tears depends on many factors. These include:

- patient age
- physical demands
- ability to tolerate and comply with the necessary rehabilitation
- tear size and degree of retraction
- amount of functional disability
- presence of other medical problems that might complicate the effectiveness of surgical treatment.

Each case must be individually assessed in terms of these factors to define a treatment regimen that best restores quality of life while minimizing risk to the patient.

Partial Thickness Tears

Treatment of partial thickness tears depends on symptoms and disability. Many people may have partial tears and do not even know it. Others may have severe pain that limits daily function. In symptomatic cases, a trial of non-operative treatment is generally recommended. This includes, rest, temporary avoidance of aggravating activities, non-steroidal anti-inflammatory medications and physical therapy. Therapy aims to restore full flexibility to the shoulder, to improve shoulder mechanics through muscle strengthening and to improve muscle endurance and fatigue resistance.

If non-operative treatment is unsuccessful, surgery may be necessary. The type of surgery depends on degree of tendon tear. Generally, these procedures can be done arthroscopically. Through small incisions, special instruments are inserted into the shoulder that allow the surgeon to clean up and/or fix the torn tendon without making large incisions. These techniques are minimally invasive and tend to cause less postoperative discomfort.

When tears involves less than 30% of the tendon thickness, the torn fibers are debrided or cleaned up. The bone adjacent to the tendon may be roughened up to promote a healing surface. Occasionally, if examination reveals significant bursitis and scuffing or fraying of the top portion of the rotator cuff, the acromion bone is smoothed off to prevent abrasion of the rotator cuff.

When tears involve greater than 30% of the tendon thickness, repair of the torn portion back to bone is generally recommended. This is done by placing anchors in the insertion site of the tendon that allow the tendon to be sutured and secured while it heals. During this time the tendon repair must be protected by limiting use of the arm for several weeks.

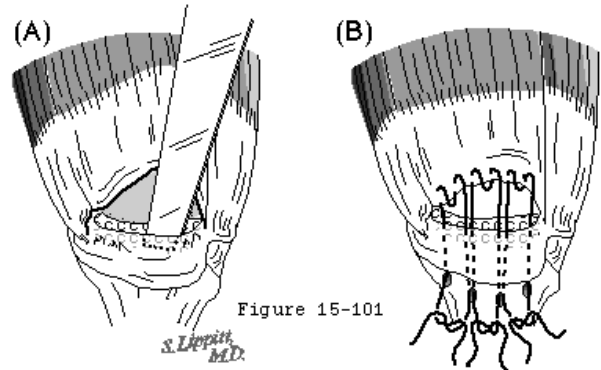
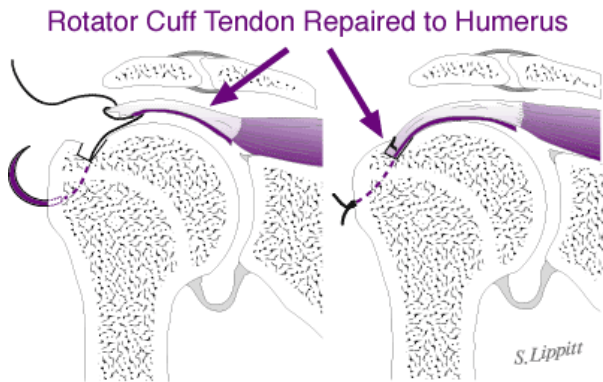
Full Thickness Tears

Full thickness tears do not spontaneously heal because the muscle pulls the torn tendon away from the bone. It is generally recommended that acute tears in healthy patients be fixed in a timely fashion. This ensures the highest likelihood of a secure repair back to bone with healthy tendon tissue and healthy muscle. This is especially true in younger patients and in those with physical demands that require strength in the upper extremities. In older patients, patients who are sedentary or those with medical problems that place them at a high risk for surgery, non-operative treatment remains an option. The goal of non-operative treatment is to keep the shoulder flexible and to improve strength in the shoulder girdle muscles that can compensate for the torn rotator cuff tendon.

In long-standing tears, surgery should be undertaken if pain and loss of function interfere with a patients quality of life. The prognosis for a full recovery is less predictable in these cases because of muscle atrophy and tendon degeneration. These factors can make a secure, tension-free repair back to bone difficult. The MRI can help define these factors allowing the surgeon to determine the potential effectiveness of surgery. If tears remain small, a secure repair is likely. In tears which have extended to involve more than one tendon, full recovery of strength may be difficult. Despite this, repair is often the preferred option to prevent arthritis from developing.

The technique of rotator cuff repair depends on the size and configuration of the tear. Some tears are amenable to arthroscopic repair while some are best fixed through an open incision. In either case the outcomes and recovery are exactly the same.

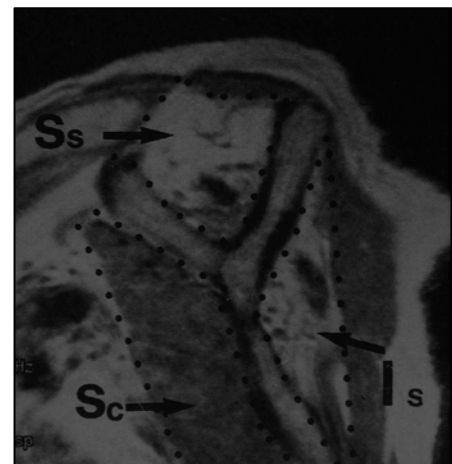
The goal of a rotator cuff repair is to recreate the tendon insertion into the humerus bone. This is done by using a combination of bone anchors and stitches to pull the tendon down to the bone and hold it there while it heals. Modern technique of rotator cuff repair can usually accomplish this goal while preserving the important deltoid muscle insertion.



Rotator cuff repair is best performed in patients who are sufficiently healthy to undergo surgery, who are motivated to succeed, who understand the process of surgery and recovery, and who will comply with a well-designed rehabilitation program. While obtaining a secure repair at surgery is critically important to outcome, it is only part of the equation for a successful result.

Can all tears be fixed?

Not all rotator cuff tears can be fixed. Large retracted tears and those with significant muscle atrophy may be repairable. The MRI to the right shows severe muscle atrophy involving the supraspinatus (Ss) and infraspinatus (Is) tendons. When the muscle is replaced fat, as in this case, recovery of strength and function is possible. Studies have shown that muscle atrophy of this degree is not reversible. If repair in such cases is attempted, the likelihood of rerupture is high and the chance of significant functional improvement is small.



not
by
not

In long-standing massive rotator cuff tears, the ball may migrate upwards in the socket and come to rest against the acromion bone. When this is seen on x-rays, it signifies an irreparable tear. Attempts at repair in such cases have proven ineffective in recentering the ball in the socket.

What are the treatment options for irreparable tears?

The treatment for an irreparable tear depends on the patients symptoms and functional demands. In patients who require recovery of strength for daily activities, tendon transfer procedures can replace the absent rotator cuff tendons using adjacent shoulder girdle

muscles. For tears involving the supraspinatus and infraspinatus tendons, transfer of the latissimus dorsi muscle may improve one's ability to raise the arm. For tears involving the subscapularis tendon, transfer of part of the pectoralis major muscle may improve internal rotation power. Muscle transfer operations require extensive rehabilitation and cannot promise normal shoulder strength and function. These operations are also not designed to relieve pain. Their primary goal is to improve shoulder strength in the face of absent rotator cuff tissue.

If pain predominates the picture, patients may benefit from procedures to debride inflamed and degenerated bursa and tendon tissue that causes abrasion with shoulder use. These debridement operations also remove scar tissue that limits shoulder motion and aim to restore full flexibility. These measures are often successful in alleviating pain but cannot restore strength or function to the shoulder.

What kind of anesthesia is used?

Rotator cuff surgery is typically performed using a technique called regional anesthesia with a scalene block. This technique involves numbing the nerves that provide sensation to the arm by injecting local anesthesia into the regional between the neck and shoulder. The local anesthesia provides for pain relief that lasts several hours following the surgery so that when patients awaken from surgery, they are comfortable.

General anesthesia may be provided in patients who do not wish to be awake for the surgery. General anesthesia may be given in addition to the scalene block, or if patients do not wish to have a block, general anesthesia may be given alone. One advantage of the scalene block is that it reduces the amount of general anesthesia necessary to keep someone asleep during the surgery. This speeds up the recovery time so that patients awaken sooner and may have fewer side effects from anesthesia.

The patient may wish to discuss their preferences with the anesthesiologist before surgery.

What preparations are necessary for surgery?

The success of surgery depends on a partnership between the patient and the experienced shoulder surgeon. Patients should optimize their health so that they will be in the best possible condition for this procedure. Smoking should be stopped a month before surgery and not resumed for at least three months afterwards to maximize the body's healing potential. Any major medical problems, especially those involving the heart or lungs, should be managed before surgery to reduce the risk of medical complications. Any infection may be a reason to delay the operation including coughs, colds, fevers, sinus problems or other airways infections. The shoulder surgeon needs to be aware of all health issues, including allergies and the non-prescription and prescription medications being taken. Some of these may need to be modified or stopped. For instance, aspirin and anti-inflammatory medication may affect the way the blood clots. If patients take blood-thinning medications, they should check with their primary care physician about the safety of stopping their use prior to the procedure. These medications can usually be resumed the day following surgery.

Plans for necessary assistance need to be made before surgery. For individuals who live alone or those without readily available help, arrangements for home help during the early recovery period should be made well in advance. Because active use of the arm for lifting,

pushing, pulling and other daily activities is not allowed for several weeks following surgery, assistance is often necessary even for simple tasks. This includes driving as active use of the arm is not allowed while the tendon is healing.

Length of surgery

The procedure usually takes approximately one to two hours depending on the size of the tear. In some circumstances of extremely large tears that require a major reconstruction procedure, surgery may take longer than 3 hours. The preoperative preparation and the postoperative recovery may add several hours to this time. Patients often spend an hour in the recovery room prior to returning to the Day Surgery Suite.

What are the risks of surgery?

The risks of rotator cuff repair include but are not limited to the following: infection, injury to nerves and blood vessels, stiffness, rupture of the rotator cuff repair, pain, and the need for additional surgeries. There are also risks to anesthesia. An experienced shoulder surgeon will use special techniques to minimize these risks, but cannot totally eliminate them.

Wound infection is very uncommon and usually occurs between one and three weeks following surgery. Symptoms include fever, weakness, fatigue and nausea. Signs include redness, swelling and wound drainage. Superficial infections may respond to a course of oral antibiotics. Deeper infections may require an irrigation and debridement operation followed by a course of intravenous antibiotics.

The rate of tendon rerupture is small but it can occur either in the early postoperative period or remote from surgery. Depending on a patient's symptoms, a revision rotator cuff repair may be necessary.

Stiffness may also occur during the recovery period following a tendon repair. Scar tissue from the surgery and limited use during the healing process may cause motion loss. For this reason, early physical therapy is critical to keeping the shoulder flexible. Depending the tear configuration, the therapist will provide guidelines about range of motion exercises including a home exercise program. It is critical that home exercises be done every day and thus, patients must be willing to commit a substantial effort to the recovery.

Recovering from surgery

Recovery of comfort and function after rotator cuff repair continues for the first year after surgery. Adequate pain control is an important part of the postoperative management because it facilitates rehabilitation and allows recovery of motion. We use a multimodal pain management program that involves several different medications to treat pain at different points along the pain pathway. This has proven successful in reducing the amount of narcotic pain medications that are needed.

Narcotic pain medications can be very powerful and effective. Their proper use lies in balancing their pain relieving effect and their other, less desirable effects, such as sedation. Pain medications can cause drowsiness, slowness of breathing, difficulties in emptying the bladder and bowel, nausea, vomiting and allergic reactions. Patients who have taken

substantial narcotic medications in the recent past may find that usual doses of pain medication are less effective. For some patients, balancing the benefit and the side effects of pain medication is challenging. Patients should notify their surgeon if they have had previous difficulties with pain medication or pain control. It is critical to try to wean off narcotic pain medications as quickly as possible as they can be addictive when use for longer periods of time.

Ice is used to decrease pain and inflammation during the initial recovery and for several weeks during rehabilitation.

Rehabilitation

Recovery of mobility, strength and function is a graduated process that follows tissue healing. We have developed comprehensive therapy protocols that are designed to prevent recurrent stiffness and re-educate the muscles about the shoulder girdle to function in a smooth and coordinated fashion. These protocols are designed in such a way for the therapist to educate the patients about home exercises throughout the recovery process. The exercises that a patient does on his/her own between therapy sessions are equally as important as the sessions themselves, and patient adherence to this program is critical to preventing early stiffness while protecting the tendon repair. A properly performed home exercise program ensures that the exercises are done frequently, effectively and comfortably.

The early recovery period focuses on maintaining the range of motion. Strengthening exercises are not performed for the 6-8 weeks to prevent stress on the tendon repair. A sling is worn between exercise sessions for the first month and then may be discontinued. Patients may use the hand for holding objects like a cup of coffee or newspaper but nothing more than 1-2 lb.

By 8 weeks, gentle active use of the arm for daily activities may be resumed but no heavy lifting, pushing or pulling is allowed. Therapy focuses on a continued flexibility program with aim of a progressive return to full range of motion. Muscle re-education begins with light resistance exercises for the rotator cuff and the muscles that stabilize the shoulder blade.

By 3 months, patients may resume full use of the extremity provided they have achieved a functional active range of motion. Progressive strengthening exercises with increased resistance and endurance exercises like swimming, rowing, and upper body ergometer are encouraged. In addition, we strongly encourage an aerobic conditioning program for the lower extremities to promote general health and fitness.

By following this exercise program, patients are almost always satisfied with the increases in range of motion, comfort and function that they achieve during the recovery period. If the exercises are uncomfortable, difficult, or painful, the patient should contact the therapist or surgeon promptly.

Maintenance Rehabilitation

Once the range of motion and strength goals are achieved, the exercise program can be cut back to a minimal level. However, gentle stretching is recommended on an ongoing basis. In

addition, a maintenance program to keep the rotator cuff muscles strong and healthy will ensure proper function of the artificial joint and may help prolong its benefit.

Return to Functional and Recreational Activities

With the consent of their surgeon, patients can often return to activities such as swimming, golf and tennis at 4-6 months after their surgery. It is critical that patients achieve sufficient range of motion and strength in advance to prevent muscle fatigue and to undue stress on the artificial components.

Disclaimer

This resource has been provided by the Knee Hip and Shoulder Center as general information only. This information may not apply to a specific patient.