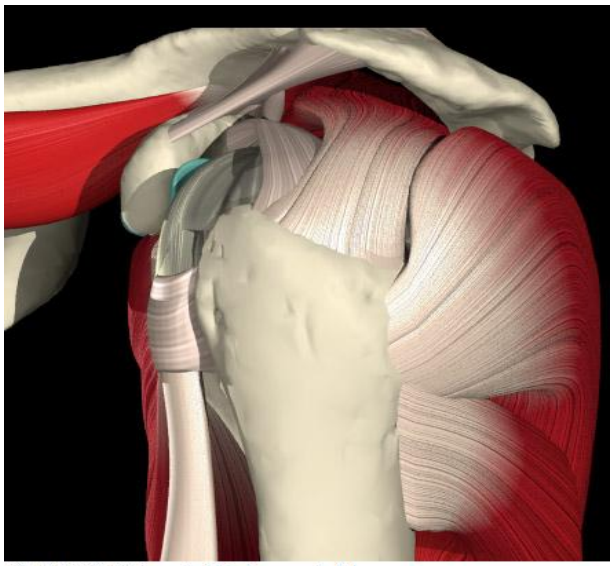
ROTATOR CUFF INJURIES

TREATMENT OPTIONS & REHABILITATION



Prepared for you by
Edwin M. Tingstad, M. D.

Inland Orthopaedics &
Sports Medicine Clinic
825 SE Bishop Blvd, Ste 120
Pullman, WA 99163

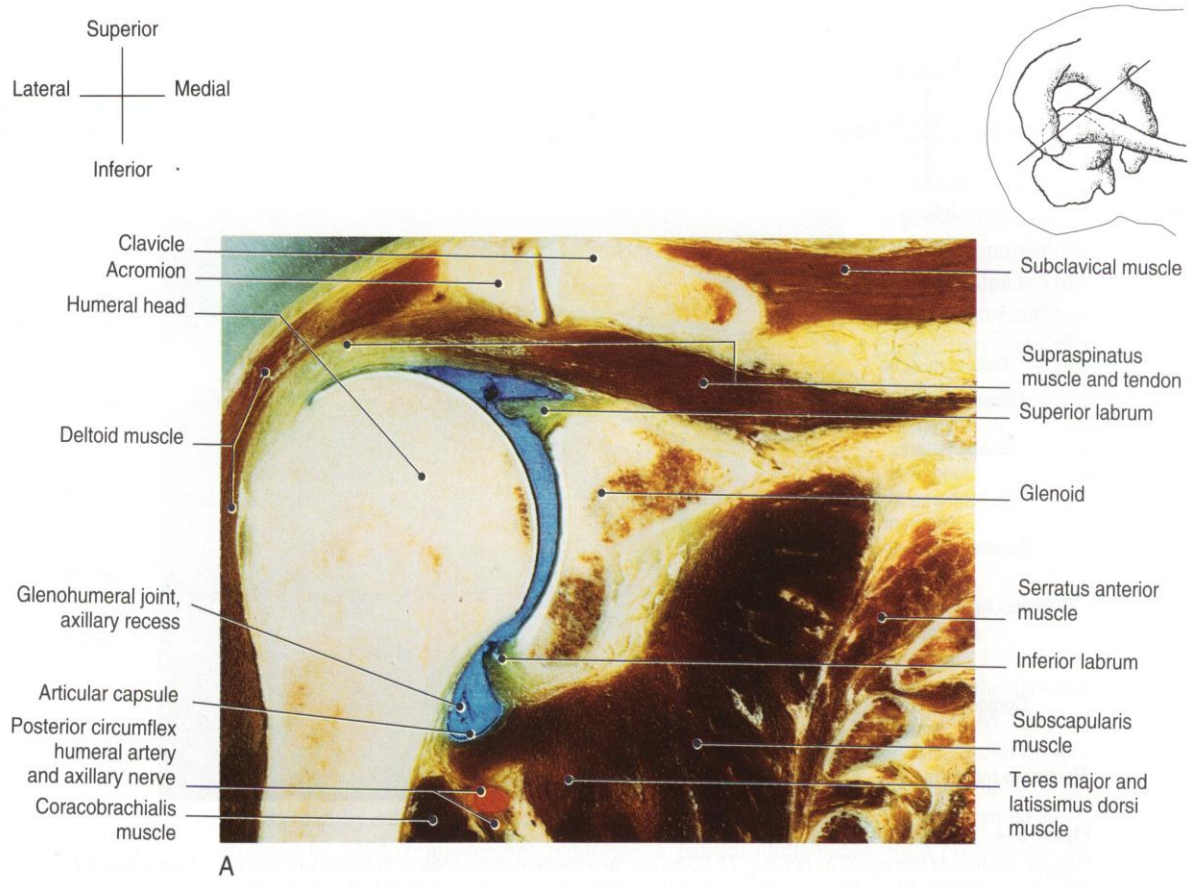
(509) 332-2828

Rotator Cuff Injuries

Rotator cuff disorders are one the most common musculoskeletal disorders and felt by many to be the most common source of shoulder discomfort. Over 15 million patients in the United States are at risk from disability related to rotator cuff injuries.[1]

Anatomy

The anatomy of the shoulder is depicted below. (Figure 1) The rotator cuff is a group of four muscles that attach into the humeral head. The supraspinatus, infraspinatus, teres minor and subscapularis are the four rotator cuff muscles. Figure -1 is a section cut through the shoulder showing the humeral head (ball) articulating with the glenoid (socket). The supraspinatus, one part of the rotator cuff, comes over the top of the humerus and attaches via a tendon into the humerus. It is typically the tendon portion that tears or wears away from the attachment on the humerus.



The acromion and distal clavicle are bony structures that overlie the rotator cuff

and serve as attachments for muscles and actually form a joint (acromioclavicular joint) that can be a source of pain due to injury or arthritis. The shoulder is actually comprised of four joints or articulations (glenohumeral, acromioclavicular, sternoclavicular, scapulothoracic).

Discomfort can come from a variety of sources, and many rotator cuff tears do not cause pain. Many patients have rotator cuff tears and are not aware of them. Sher et al(1995) found on MRIs that 54% percent of asymptomatic patients over the age of sixty had rotator cuff tears. Fortunately, many patients can live asymptomatically with a torn rotator cuff, though for many, once torn, the rotator cuff does cause problems, and the tears tend to enlarge over time.

Rotator cuff tears can be divided into partial and full thickness tears. Partial tears are more common in younger patients and have variable rates of progression. Though once torn, the rotator cuff has little capacity to heal; most (90%) will not heal. Many parts of the rotator cuff have a marginal blood supply. Full thickness tears tend to enlarge over time, and some feel the full thickness tears progress faster in younger patients. In one study (Yamaguchi, 2001), patients who had a symptomatic tear on one side and an asymptomatic tear on the other became symptomatic within two years in 38% of cases.

Common symptoms and complaints of patients with torn rotator cuff are pain, often with sleeping, weakness, limited mobility and difficulty with overhead activities. This is variable for each patient, but part of your assessment often includes a series of questions (Simple Shoulder Test or ASES form) that gives an outline of the functional problems you are noticing.

The diagnosis of rotator cuff tears can be made by your physician by an exam; xrays and an ultrasound or MRI are often included as part of the workup. The timing of when these are done is variable depending on the patient's individual symptoms and situation.

Initial Management

The initial management of a patient with a rotator cuff injury/tear is highly individualized, but some general principles exist. Restoring motion and healthy biomechanics are critical to the success of whichever treatment is chosen. Motion and the coordination of the many components of the shoulder play a large role in pressure and symptoms that a patient experiences. Some studies have suggested improved neovascularization (blood supply) in the mobile shoulder.

Non-Surgical versus Surgical Managment

A variety of factors are considered when deciding on surgical or non-surgical treatment. Symptoms (night pain, inability to work, difficulty doing daily activities) age, expectations, activity level, size of tear, presence of atrophy or fatty replacement of muscle all contribute to which type of treatment is recommended.

Full thickness tears in patients in their fourth or fifth decades who have a tear amenable to repair, surgery is typically recommended. The age, size of the tear and the quality of the tendon/muscle are important factors in whether or not the repaired tendon will heal. Smoking and other medical problems can lessen the chance of a successful result. Acute, smaller tears tend to do better than chronic tears. The definition of acute and chronic is variable, but most acute tears are those seen within three to six months. Over time full thickness tears tend to retract and enlarge. It may be difficult to restore function in a large retracted tear, and this tends to worsen with age. Each patient has their own unique set of variables that play a role in deciding which course is chosen. Often non-operative measures are tried before surgery is recommended.

Chronic tears in some patients often demonstrate poor quality of the tendon and muscle which can preclude a successful repair. However, many of these patients do well with a non-operative program.

Irreparable rotator cuff tears can be treated with non-operative methods, though arthroscopic surgical debridement and muscle transfer procedures can be helpful in certain situations. A limited goals surgical debridement may be utilized to assist in pain control and motion though often does not improve strength. Muscle transfers tend to be salvage procedures aimed at improving but not normalizing functional motion and discomfort. Joint replacement can be an option in some patients and is typically done for pain relief.

Non-Operative Treatment

As mentioned previously, restoration of motion and correcting the mechanics of the shoulder are a key part of any treatment. Pain relief with acetaminophen (Tylenol), anti-inflammatories, ice/heat and occasionally injections are important in achieving a successful result as well. Injections can be helpful but can be detrimental if done too often. The corticosteroids that are often employed can

cause further degradation of the tear. In my patients, I ideally prefer no more than two injections in a twelve-month period.

Restoring motion, passive more important than active, periscapular strengthening and coordinated rotator cuff mechanics are the mainstay of the non-surgical treatment. Initially, patients are expected to be do this 3-4 times a day 6-7 days a week. Once a level of function and comfort has been reached, a maintenance program is utilized. Most of this program is done individually with the assistance of a physical therapist.

The program typically is divided in four phases as outlined by Rockwood.

I. Pain control
II. Stretching Exercises
III. Strengthening
IV. Maintenance Program

Transition into the next phase is variable for each patient, and the equipment needed for this program is limited. Often the use of moist heat prior to exercises and ice after is helpful particularly initially. The use of pulleys, therabands and aqua therapy may be useful and are used at home.

Stretching is the single most important part of the long term program. The posterior and inferior shoulder capsule is commonly tight in many patients with rotator cuff tears. Specific stretches are aimed at these areas in an attempt improve the mechanical couples of the shoulder. Strengthening of particular muscles (anterior deltoid, serratus, lower trapezius) is typically instituted but may not be required in every patient.

Surgical Treatment

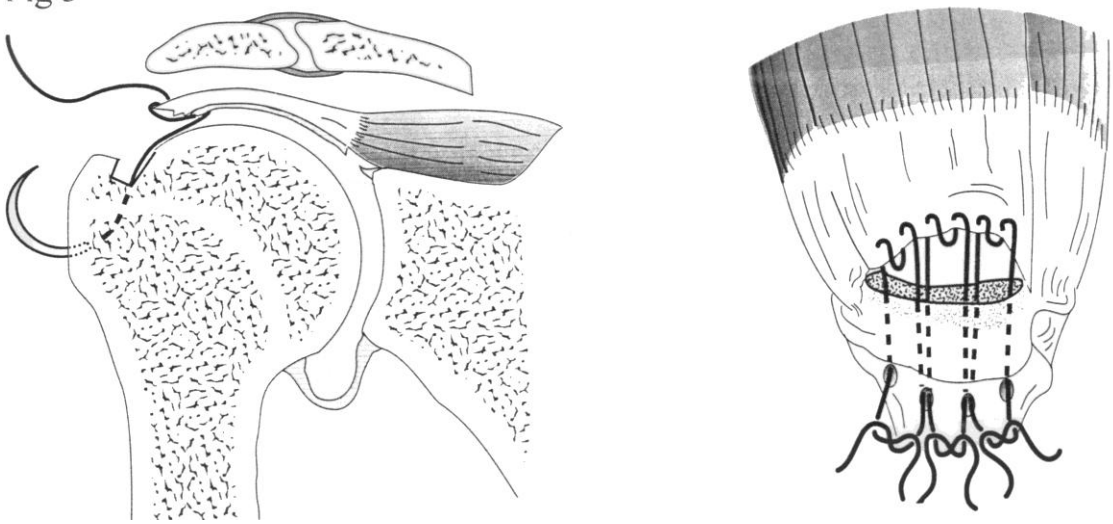
Many patients with rotator cuff tears do not require surgery. If this becomes necessary, it is important to understand why tears are repaired. The natural history of rotator cuff tears is they progressively enlarge and retract over time. The tendon pulls further away from its bony attachment over time, and the muscle is replaced with fat. The rate of progression is variable, but surgical treatment of small tears consistently shows better results than the results for large tears. Repairs with minimal fatty infiltration within the rotator cuff muscles tend to do better than those with greater fatty replacement. Goutaillier (1994) and others who have followed rotator cuff tears note that the degree fatty infiltration of the muscle tends to parallel the duration of symptoms. Thus, surgical intervention in those with

rotator cuff tears is often prudent. Over time some tears become irreparable and can lead in some patients to significant degenerative arthritis.

Surgery repairs the torn rotator cuff tendon(s) back to its bony attachment on the humerus. (Figure -3) The entire shoulder is evaluated at the time of surgery and this is typically done arthroscopically. Some or all portions of the repair are done arthroscopically through 'poke hole' incisions. The decision whether or not to make a larger incision is made at the time of surgery. Repairs done arthroscopically or through open incisions heal at the same rate. Either option has advantages, though patients with arthroscopic repairs tend to have less discomfort after surgery. Some tears are better done arthroscopically, some through larger incisions. This depends on the character and size of the tear. Currently, many larger tears are often easier if done via the arthroscope. Whichever method is employed, the repairs heal at the same rate, and the success rates tend to be comparable with either form of surgery. Often a smoothing of the bony and cartilage structures is carried out at the time surgery to optimize all portions of the shoulder.

The success of surgery is dependent on many factors, tear size, age of the tear, medical comorbidities (ie. smoking, diabetes, and others). Most studies suggest that satifactory outcomes are seen in 70% to 95% of cases with an average of 85%. (Williams/Rockwood, 2004). These studies include open, mini-open and all arthroscopically performed surgeries. The techniques of rotator cuff surgery steadily move toward more minimally invasive procedures. Most patients receive good pain relief and motion, though restoration of strength is variable and can take one to two years to regain. Overall, the decision to repair a rotator cuff in a young (actual or physiologic) is a wise one in the majority of situations.

Fig 3



Rotator Cuff Repair Surgery

Pre-operative

The initial evaluation and treatment is used to discuss treatment options and outline a rehabilitation plan. Often therapy is arranged initially to facilitate regaining motion and strength. Regardless of the treatment chosen, this is a critical component of treatment program. If the decision is made to proceed to surgery then the timing of this is decided upon. Further appointments are arranged around the rehabilitation and surgery dates if chosen.

If surgery is chosen, a separate pre-operative visit is scheduled a few days before the surgery. You will be given a paperwork packet containing your insurance information, surgical consent form, and pre-operative orders for the hospital. Take these with you when you go to the hospital for your pre-operative visit.

You will also be given a specific time to arrive at the pre-operative surgery desk at the hospital on the day of surgery. Not uncommonly, however, the operative schedule proceeds either slower or faster than we anticipate. For this reason it is important that we have a means of contacting you on the day of surgery in case there is a last minute change of schedule. We know changes in schedules are frustrating, and we will try diligently not to alter yours. **REMEMBER, eat or drink nothing after midnight on the day of surgery**.

The Day of Surgery

When you arrive in the pre-operative holding area, you will be asked to change into hospital attire and make yourself comfortable on a gurney; (most patients prefer to leave their underwear on during the procedure, and this is fine). You will meet your anesthesiologist in the pre-operative holding area, and options for anesthesia will be discussed. Doctor Tingstad will ask to initial your shoulder with a marker, and compressive stockings will be placed on your legs, lessening the chance of blood clots and to keep you warm. Your shoulder will be prepared for surgery first by shaving the hair from the operative site and then by scrubbing it with an antibacterial soap. We ask that we do the shaving just before the surgery as it may reduce the chance of infection. From the pre-operative holding area, you will be taken to the operating room. Your extremity will be draped in a sterile manner that allows us to work in a completely sterile field.

The surgical time is approximately two hours. The surgery can be shorter or longer depending on other factors involved in your particular case. Often patients require

treatment of other problems, such as cartilage or bony problems at the same time thus factors into the length of the surgery. Both shoulders are examined before the procedure while you are in the operating room. This allows comparison side to side. The positioning, set up and waking up often take an hour. Therefore, you will be gone from your room for longer than two hours in many cases. After the reconstruction is completed, a light dressing, ice and a brace may be applied.

From the operating room you will be transferred to a recovery area for approximately one or two hours. Local anesthetics will be injected into the shoulder joint at the end of the operation to reduce post-operative discomfort. Often pain patches are applied. On a few occasions a pain pump will be placed. Pain medications as needed are available in the recovery room. Occasionally, nausea may occur from the anesthesia, and medication is available to help control it. The decision of whether to stay in the hospital will be discussed prior to your surgery. Some patients are able to go home the same day; others stay overnight. This will depend on the time of day of surgery, patient and family comfort.

During the first 48 hours the goal is to control inflammation. Icing for 25 minutes 4-5 times a day is helpful. In many cases anti-inflammatory pain medications are prescribed and are used with narcotic pain medications. The shoulder should be maintained in the sling at all times unless doing your prescribed exercises or putting on your clothes. ***Keep your incision and dressing dry***. It is common to experience some bloody drainage from incisions for the first 24-36 hours. If this occurs, simply reinforce the dressing with a sterile gauze if the fluid is bothersome.

Another common occurrence after anesthesia is a low-grade fever during the first 24-48 hours post-operatively. The fever is usually below 100° and slowly abates. Tylenol works quite well to keep it in check. If your fever is greater than 100º and associated with shaking chills and increasing pain, please let us know, as this may be an early indicator of infection. It's also important to cough and take deep breaths regularly during the first 24 hours (we recommend 10 deep breaths per hour during waking hours). Movement of wrist and fingers also assists in decreasing swelling and is recommended. Gentle straightening of the elbow can also help relieve muscle spasms that many patients experience.

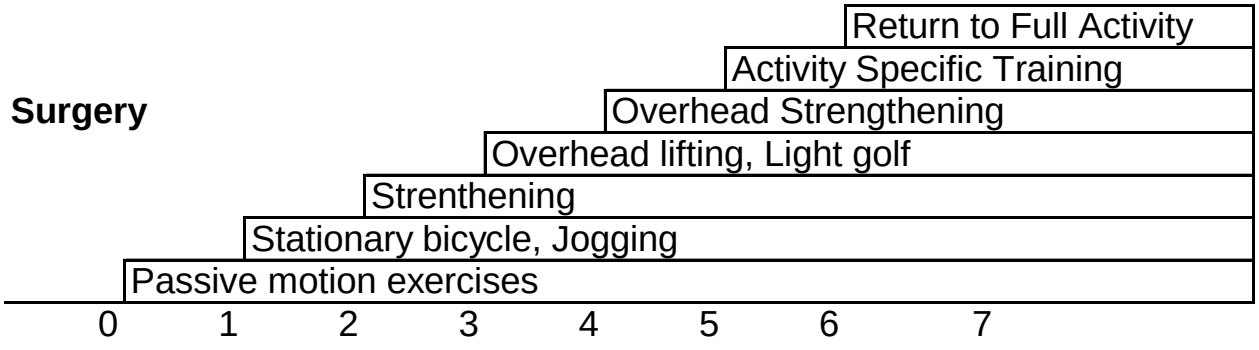
Post-operative Rehabilitation
Rotator Cuff Repair

A. General Overview: The months following surgery

Recovery and healing after a rotator cuff repair is a slow process. Your newly repaired rotator cuff undergoes a biologic transformation from the time of repair to almost one year post-operatively. Studies indicate that rotator cuff repairs often take 6-12 months to heal. Some do not completely heal; in fact, many patients do extremely well in spite of incompletely healed rotator cuffs. In several studies the healing rate is about 70%. We do not completely understand why some patients heal and others do not, but tear size and muscle/tendon quality at the time of surgery are important factors in the healing rates.

Your rehabilitation after surgery is designed to re-establish motion and strength during this remodeling. Initially, activities are permitted which cause the least strain on the repaired cuff. Gradually, over time, activities are increased ultimately leading to activity-specific training. The priority is to obtain range of motion (ROM) first followed by strengthening. The following time-line summarizes our approach to your rehabilitation and can serve as a quick reference guide. The concept is to permit mild load to promote normal healing and avoid excessive load that might be harmful. This is an **outline** and some patients move through phases quicker or slower depending on their situation.

Quick Reference Chart (in Months)



1. Immediate Post-op Period: 1st Week

The main goals in the first week after surgery are to allow incisions to heal and for you to recover from the overall effects of the surgery. We suggest ice to help minimize swelling and gentle passive motion exercises. A high priority in motion is to **let the muscles of the <u>other arm</u> do all the work**. We begin shoulder rehabilitation right after surgery. It takes 6 weeks for the repair to get started and typically takes at least 12 weeks for a good healing reponse to mature. Your ability to incorporate your exercises into your daily routine depends on your general recovery. Your sutures are usually removed between one and two weeks post-surgery.

1st Week Summary	
Goals	1. Recovery from surgery 2. Decrease swelling 3. Achieve gentle passive motion
General Instructions	1. Keep dressings clean and dry 2. Brace at all times, unless showering or doing exercises 3. May remove brace for exercise 4. When sitting, place roll under heal to promote full extension
Exercises	1. **<u>Passive</u>** range of motion (ROM) from 0-140°forward elevation 2. Wrist and hand mobilization/ Full elbow extension. 3. Ice treatment 4. Regular walking

2. Early Protective Phase: 2nd – 8th Week

The early protective phase occurs from the second to the eighth week and corresponds to a time when your repair is undergoing large biologic transformations. The repair is typically at its weakest point at this time. It is a transition period where the emphasis shifts from controlling swelling to maintaining motion. We would like to see you have no swelling and a full range of motion by the end of week 8, but not everyone achieves this goal. Physical therapy is typically begun between the 6-8 week time frame.

Summary: Weeks 2 – 6	
Goals	1. Progressive decrease in swelling 2. Progressive increase in ROM (goal 0-140) 3. Aerobic fitness (walking, stationary bicycle 4-5x a week)

General Instructions	1. May take brace off for 30 minutes a day.
Exercises	1. Continue passive exercises 2. Elbow/wrist exercises (check with doctor on elbow limits) 3. Isometric exercises of deltoid
Conditioning	1. Stationary bike/ Brisk walking 25- 30 minutes

Summary: Weeks 5 – 8	
General Instructions	1. Discontinue brace
Exercises	1. Begin Physical Therapy 2. Deltoid Isometrics 3. Push motion limits
Conditioning	1. Stationary bike 2. Nordic Track / Stairmaster 3 Light jogging

After six to eight weeks, outpatient physical therapy is initiated. A specific protocol is followed which I have set up with your therapist. The therapist will share this program with you, and each patient's program may be a little different from others.

Recovery of motion and strength takes time and this varies from person to person, The goal of full motion by the three month mark is what we strive to achieve.

Rotator Cuff Surgery
Frequently Asked Questions

1. When can I shower?

You may shower as long as you cover the incisions with plastic and keep it dry until your sutures are removed in the office. After this, you may shower without covering the incision.

2. How many incisions will I have?

The answer to this question depends on what type of repair you had; most will have several small incisions that will be covered with bandaids.

3. Why do I have to wear the brace for so long?

The rotator cuff repair relies on healing into bone, and in most studies it take at least 6 weeks for the attachments to reach 70% tensile strength. The brace takes pressure off the repair, so wearing it is important, but not very comfortable or convenient.

4. Will I need pain medication?

Most patient use pain medication for the first one to two weeks after surgery. The goal is to be off all pain medications by the 6-8 week mark. Acetaminophen (Tylenol) is often required intermittently.

5. When can I drive? (2-6 weeks)

Driving depends on which shoulder is operated upon and whether your car has an automatic or manual transmission. If it is your right shoulder, and you have an automatic, you may drive when you are comfortable and off all narcotic medications. If it is your left shoulder or a manual transmission, it takes longer, perhaps two-ten weeks depending on the individual. We ask that you practice in a vacant area to be sure you are safe before driving on the main road. Reflexes are slowed for a prolonged period after surgery, so having someone else drive in the first six weeks in recommended.

6. How long will I be stiff?

Some patients get very little stiffness. This depends on your motion pre-operatively, medical conditions, diligence with your home program and extent of surgery. Internal rotation (reaching up your back) often takes 5-6 months to restore. In some patients over a year is required.

7. Will my shoulder ever be normal?

I tell patients their shoulder will typically be better but not new. Unfortunately, some patients continue to note problems. Because we can not yet replace your rotator cuff, the wearing process can continue. However, for most patients they are quite pleased with overall outcome and agree it takes a long time.

Additional References:

Rotator cuff tears: Why do we repair them? Williams GR, Rockwood, CA Bigliani, Stanwood, W, Iannotti JP. JBJS-A (12)2004, 2764-2776.

American Academy of Orthopaedic Surgeons. Found at www.aaos.org

The Shoulder, 2nd edition Rockwood and Matsen, 2004.

San Diego Shoulder 21st Annual Arthroplasty/Arthroplasty/Fractures, July 7-10, 2004