

## **Rotator Cuff Tendon Problems** **Patient Information**

The following information is intended to give patients a better understanding of rotator cuff tendon problems. This advance information may help you in the short-term, and may also allow for a more meaningful and beneficial consultation.

The information below is extensive. Not all of it may apply to your situation. You may have some understanding of the problem already. The information is categorized with appropriate titles so that you can select relevant topics.

Our goal is to answer all of your questions to enable you to fully understand your shoulder problem and all treatment options. You may find it helpful to come with a written list of questions so that nothing is overlooked. After your consultation, if more questions arise, please feel free to book a follow-up appointment for further clarification.

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### **Anatomy**

Shoulder anatomy is complex, but there are three main muscle groups:

1. muscles around the shoulder blade supporting the shoulder blade to the chest wall
2. the deltoid muscle on the outside of the shoulder, which serves as the most powerful mover of the shoulder joint.
3. the rotator cuff, which lies below the deltoid muscle. The rotator cuff is a group of four muscles and tendons that surround the shoulder joint. While they are four muscle groups, the tendons all blend together as they attach to the humerus (ball part). They are not distinct tubular tendons as you might notice on the back of your hand. Rather, the rotator cuff tendons all blend together to form one broad band of tendinous tissue around the shoulder joint. As an analogy, think of the rotator cuff tendon as a pair of jeans covering a bent knee. The knee would be the shoulder, and the jeans the rotator cuff tendons. A tear of the rotator cuff tendons looks similar to a tear in a pair of jeans draped over a bent knee.

## **Function of the Rotator Cuff**

The deltoid muscle is the prime mover, or most important muscle, providing strength to the shoulder. The rotator cuff muscles also contribute significantly to shoulder strength, but their most important function is to keep the ball part of the shoulder centered on the socket. If the deltoid muscle alone is pulling on the humerus (upper arm bone) to move the shoulder, without a rotator cuff, the ball part would slide up on the socket and the arm might not go up at all. If the rotator cuff is weak and painful, then it might not do its job as well. Some very subtle shoulder shifting can occur and this can lead to worsening pain. Maintaining the strength of the rotator cuff is very important. If the injured or painful rotator cuff becomes weak, the mechanics of the shoulder get worse and the pain increases. The rotator cuff is virtually never completely or totally torn. There is always some remaining attachment and it is always beneficial to try to strengthen the muscles.

The other really important muscles, which are sometimes overlooked, are all the muscles around the shoulder blade (scapular). When you raise your arm, one third of that motion comes from the shoulder blade sliding along the chest wall. If your shoulder blade muscles are weak, or if your posture is poor, the shoulder joint can be painful. The shoulder blade muscles need to be in top form to position the shoulder socket to allow the best shoulder function. True paralysis of some shoulder blade muscles does occur, but it is very rare. Most shoulder blade problems are the result of pain and postural issues. This is why physiotherapy and exercises are critical for treating problems around the shoulder blade.

## **Degenerative Changes in the Rotator Cuff**

In adulthood, the human body starts a gradual process of degenerative change. Shoulder problems have a lot in common with back or neck problems. For instance, it becomes increasingly common to see signs of back arthritis or disc degeneration on x-rays in patients even although they have no symptoms. It is also normal for someone to have an episode of back pain at some point in their lifetime.

Rarely will the report of an MRI of the shoulder of a patient over forty be “normal.” The MRI is so sensitive it will pick up wear and tear changes in joints and tendons without the patient being aware. The wear and tear changes that occur in an intact (not torn) rotator cuff tendon are termed tendinopathy. Other common terms for this include tendinitis, impingement, or bursitis.

With age, rotator cuff tendons do wear down and many may tear. An MRI or an ultrasound of the rotator cuff tendons in a group of volunteers who stated that they had no shoulder problems or pain, revealed that many had rotator cuff tears that they did not know about.

For patients in their 50's, 5% to 10% will have a tear they know nothing about.

For patients in their 60's, 15% to 20% will have a tear they know nothing about.

For patients in their 70's, 20% to 30% will have a tear they know nothing about.

For patients over 80, at least 50% will have a tear they know nothing about. Therefore, after age 80, a rotator cuff tear becomes a variation of normal.

The analogy of the rotator cuff tendons behaving like an older pair of jeans may help you to

understand this problem. You may be wearing a pair of jeans that seem fine until one day you notice a slight hole. Then you may have a minor fall or simply kneel down and the jeans suddenly tear.

## **Rotator Cuff Tears**

Orthopaedic surgeons measure tendon size in order to categorize ease of repair and potential outcome or benefit from surgery.

- i) **Partial thickness tears.** A partial thickness tear, as opposed to a full thickness tear, means that there is not a complete hole on the tendon. The rotator cuff tendon attaches to bone on the humerus over a width of about 14 mm. A partial thickness tear simply means that the tendon has peeled away a little in one area, but there is no hole all the way through the tendon. These findings are very common on ultrasound and MRI and require an initial course of nonsurgical care (see below) as many will eventually settle. Although structurally these tears are minor, unfortunately there is no correlation between pain and tear size. Small tears and large tears can be equally painful.
  
- ii) **Small to medium size full thickness tears (less than 3 cm).** These tears are usually repairable after months or even years of symptoms. The surgical outcome is more favourable than for large or massive tears discussed below. Over years, they can increase in size or stay the same size. We are not able to predict which ones will tear further, but it may be the ones that tend to be persistently painful. Initial treatment should be nonsurgical (see below). A recent study in patients with an average age of sixty-five showed no long-term difference in the pain level and function of their shoulder whether they had their tear fixed surgically or had continued non-operative care (i.e. exercises). However, studies on younger patients have shown they may be less likely to be satisfied with the pain level and function of their shoulder with nonsurgical care.

Surgical care can still be an option for some healthy older patients with repairable tears who have not had relief with non-operative measures and who are willing to undergo the prolonged and painful post-operative course (see below).

- iii) **Large (3 to 5 cm) to massive (greater than 5 cm) full thickness tears.** A massive tear usually involves more than one rotator cuff tendon. These tears can be a challenge as the tendon quality is often poor, and they are often retracted and not repairable. Most of the time, I see patients who have a tear that is longstanding (three months or much longer) and/or one that occurred with no trauma or very minor trauma (e.g. lifting a grocery bag or simply reaching into the back seat of the car). These definitely need a long course of non-operative care (see below). Much less common is the younger patient who has had a significant trauma (e.g. a major fall or a dislocated shoulder) and sustains a large massive tear. These patients require an urgent ultrasound or MRI, and often do benefit from early surgical care (ideally within six weeks from the time of injury). Your family doctor can call the Radiologist if an urgent ultrasound is needed. Many family doctors and physiotherapists can tell by examining patients the size and urgency of a tear.

## Other Issues Often Discussed

- i) **Bone spurs.** This term usually refers to a spur on the acromion (the bone at the top of the shoulder where the deltoid muscle attaches). A bone spur is deep, and cannot be felt by the hand. Historically, it was thought that the spur was digging into the tendon causing the pain. In fact, several studies now show that removing the spur offers no long term benefit as the origin of the pain is likely the rotator cuff tendon itself. Many shoulder surgeons agree that there is no benefit to removing shoulder bone spurs.
- ii) **AC joint arthritis.** The AC joint (acromioclavicular joint) is a small joint at the top of the shoulder, and often appears as a little prominent bump. This joint moves very little, and as early as the age of twenty, the cartilage often starts to undergo degenerative changes. By the time most people are in their forties, it will show arthritic changes on x-ray. However, it is uncommon for this joint to be a significant or isolated source of symptoms. The most common scenario is that patients are aware of an x-ray report stating “AC joint arthritis”, but in fact it is usually not the problem at all and is a normal finding in their age group.
- iii) **Calcium in the tendon.** Calcium in a tendon (called calcific tendinopathy) usually eventually resolves on its own in at least 90% of cases. However, the resulting pain can wax and wane from months to years. Most commonly, the calcium eventually dissipates, and normal tendon replaces it. It is not associated with tendon tearing.
- iv) **Biceps tendon pain.** Biceps tendon pain in regards to the shoulder refers to the long head of the biceps. Biceps tendon pain and rotator cuff pain often occur simultaneously. It is usually difficult to sort out which one might be causing most of the pain, but more often it is the rotator cuff tendon. If a long head of biceps ruptures, it is treated non-surgically with physiotherapy and exercises for at least six months. The vast majority never require surgical care. In the long term, the rupture is usually just a cosmetic issue with 'Popeye muscle' deformity. A famous football quarterback, John Elway, had biceps tendon pain. His biceps ruptured, and after a period of time, his pain started to settle. He went on to win two Superbowls with his long head of biceps ruptured.
- v) **Labral tears.** The labrum is a small fibrous tissue ring that surrounds the shoulder. Repair is usually done when it is torn and the shoulder is truly dislocating (coming completely out of the joint). With wear and tear changes, most patients develop some fissuring (cracking) or degenerative tearing of the labrum, but labral problems are not usually the source of pain. When I perform rotator cuff surgery on patients in their fifties, virtually everybody has some labral wear and tear changes, but they are not the clinical problem. With the introduction of shoulder arthroscopy (poke hole, or key hole surgery with a camera), there were many well-intentioned efforts to fix all types of labral pathology. However, we have learned that many shoulders become stiff and painful, and risk becoming worse with labral repair surgery. This is particularly true after the age of forty when it becomes normal for an individual to have some wear and tear changes in the labrum. In a recent study, volunteers in their forties who had absolutely no shoulder pain were given an MR arthrogram (an MRI which includes injecting dye into the shoulder). The results showed that radiologists diagnosed a labral tear in 50% to

70% of these people who had no symptoms. In patients over the age of forty, as labral wear and tear changes are normal and usually go unnoticed by the patient, MR arthrograms are usually not done.

## **Treatment Options**

- i) **Physiotherapy with home exercises.** This is the mainstay of initial treatment for virtually all rotator cuff problems. Even when a significant injury occurs, if there are no fractures (broken bones) or concerns about joint stability, then early motion exercises can begin and strengthening introduced as pain subsides. Motion and strengthening will not make a tear worse. Exercises will prevent progressive stiffness and muscle wasting – both of which can worsen shoulder pain. A stiff shoulder can be a painful one, and stretching is important to improve motion recovery. Posture and muscle control are very important for shoulder comfort. A weak shoulder with awkward motions will be a painful one. Physiotherapists can educate patients on a range of motion and strengthening programs, and patients should do these exercises on their own daily. Although there may be a tendon tear, there are several muscles around the shoulder, and strengthening all the intact muscles will help compensate for the painful one(s). In many cases, physiotherapy and home exercises are the definitive treatment. It is important to be patient. It can take up to two years for maximum recovery of a shoulder that is slowly responding well to exercises.
- ii) **Activity modification.** It is important that you do not stop using your arm completely, but that you decrease the intensity of forceful activities, and decrease the number of repetitions for repetitive activities. In the early phases of a painful episode, use your arm for simple daily life activities that are light and predictable. Work on frequent stretching and introduce strengthening slowly and gradually. Activities requiring more force can be reintroduced slowly and gradually as pain and comfort allows.
- iii) **Injections.** The scientific evidence on steroid (cortisone) injections demonstrates that there is no long-term benefit. They will not change how much pain a patient has in six months or a year, but they may be helpful to reduce pain in the shorter term while most rotator cuff problem eventually settle. Injections are not strictly necessary, and should be seen as a treatment option. You can discuss this option with your family doctor, who should be able to give you an injection at your request. An injection carries a small risk of infection which would require surgical drainage. Repeated injections may weaken tendons. There is no scientific evidence to guide the safe number of injections. Typically, many doctors suggest not more than three for a given episode of pain for patients who choose this option.

You may have read about newer injections like stem cells or platelet rich plasma (PRP). These are controversial in the medical community as there is a lack of unbiased studies showing long-term benefit. Patients need to know that these injections are costly, and there is a potential conflict of interest for doctors who offer them since they earn significantly more money than for a routine injection. I do not undertake these injections in my practice and patients interested in this option will need to be referred elsewhere.

#### iv) **Surgery**

1. **Acromioplasty / subacromial decompression / shaving away bone spurs.** In the past, doctors thought that a bone spur was digging in to the rotator cuff tendon. Surgical treatments were created to remove these spurs. However, it is now understood that it is the rotator cuff tendon itself that is the painful structure, and that shaving away bone spurs does not offer any long-term benefit. In my practice, I no longer perform these procedures. There are good scientific studies showing that two years and beyond after having these procedures, there is no benefit compared to having done no surgery. The key is to continue with home stretching and strengthening. Many patients will typically improve with time. Unfortunately some do have residual pain from an intact but painful rotator cuff tendon.
2. **Diagnostic arthroscopy.** For patients with no rotator cuff tears identified, as noted above, clean-up or bone spur removal procedures do not provide patients with any long-term benefit. Occasionally, ultrasound or MRI can miss a small tendon tear, or patients may have pain coming from their biceps tendon. Arthroscopy, or poke hole surgery can sometimes be offered to look for other problems. Patients need to understand that every operation poses some risks. The procedure is potentially diagnostic only and may not result in any benefit.
3. **Rotator cuff repair.** Repairing a rotator cuff tendon can be done as arthroscopic or open approach depending on tear circumstances and surgeon preferences. The rehabilitation period is the same regardless of type of surgery since time is needed for the torn tendon to heal after surgery. Pain after surgery is unfortunately often prolonged and significant. The experiences are all individual, but most patients report quite significant pain for two to six weeks after the surgery. A sling is typically worn for six weeks with very limited exercises during this time. Patients cannot use their arm for six weeks, and then are allowed to use it for light activities only for the next six weeks. Any strenuous activity is discouraged for six months. It takes at least a year for maximum recovery in terms of pain relief, motion, and strength.

Overall, one year after surgery, approximately 85% of patients will report that surgery helped them with their shoulder pain and thought that surgery was worth doing. However, the degree of improvement can be highly variable. Some patients will report feeling almost normal, but many others will still notice some pain with repetitive activities (particularly overhead) or with strenuous activities. About 15% of patients will be unsatisfied with the outcome of surgical care. Some large or massive tendon tears with poor tendon quality are not repairable. The success rate at improving upon symptoms of large or massive tears that undergo a repair is much lower at about 70%, and residual symptoms are more common.

There are many factors that will alter the success rate of rotator cuff surgery:

- Smoking increases infection rates and decreases rates of tendon healing.
- Anti-inflammatories (e.g. Advil/ibuprofen, Aleve/naprosyn) can lower the healing rates when taken after surgery.
- Patients with diabetes have higher complication rates and lower rates of tendon healing and surgical success.
- Patients with inflammatory conditions such as rheumatoid arthritis tend to have weaker soft tissues and have a lower surgical success rate.

- As the body ages, the ability for the tendon to heal does decrease. The exact impact of age is not yet clear, but patients over seventy do tend to have larger tears with poorer tendon quality and can have a very high failure rate with attempts at repair
- Tear size and tendon quality will affect the ability to repair the tendon and the subsequent outcome

Some of the risks of surgery include infection, nerve or blood vessel injury, persistent or worsening shoulder pain, shoulder stiffness, motion loss, deformity of the biceps muscle, risks of general anaesthesia, and general medical risks.

One of the greatest challenges for an orthopaedic surgeon is communicating to patients the nature of the problem and understanding the limitations of rotator cuff surgery. The problem is that the tendon has undergone degenerative changes, and it cannot be made normal again. Many patients will have residual pain because of these degenerative changes. The analogy of the rotator cuff tendon being like an older pair of jeans is sometimes helpful for a patient's understanding. Over time, the jeans wear out. Ripped jeans can be repaired but they cannot become as good as new.

Although there are no restrictions after six months, any activity should be progressed only as pain and comfort permit. Often, pain may limit what someone is able to accomplish in the longer term. Unfortunately some patients may have occupational demands that surgery will not be able to help. Generally, the main objective for pursuing rotator cuff surgery should be pain relief with daily life activities and at night. Pain relief with high demand physical activities is very unpredictable, and should not be the focus of seeking surgical care since this often leads to disappointment. The guidelines noted above (no use of arm for six weeks then light activities only for four to six months with no restrictions after six months) apply to daily life activities, recreation and work. Patients and employers need to find suitable alternatives to fit in to these guidelines.

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