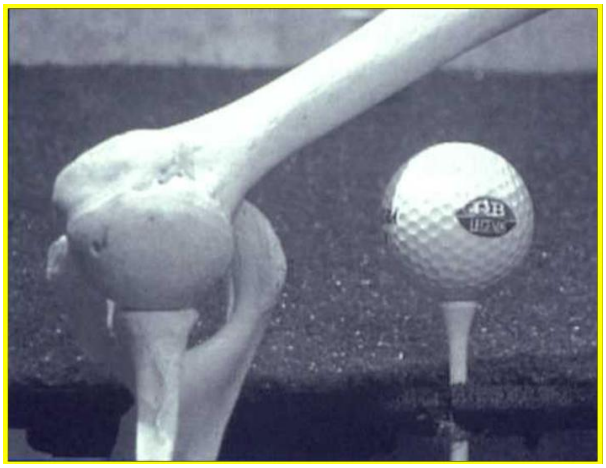
Dr Matthew Brick DR Warren Leigh

Rotator Cuff Tears

How does the shoulder work?

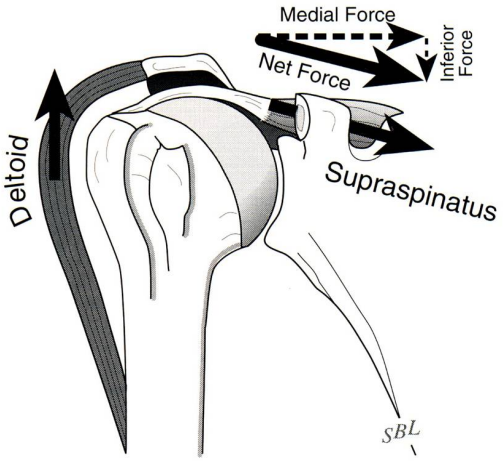
The shoulder, like the hip, is a ball and socket joint (like a tow bar). Unlike the hip however, the socket is very small and is not big enough to hold the head of the humerus in place. It is much more like a golf ball on a golf tee.



Note the similarity between the shoulder and the golf ball and tee.

This gives the joint a large range of motion but as a consequence it also means that it is potentially unstable. To function normally, muscles on both sides of the joint must work together to hold the joint in place during movement. This means that when the large deltoid muscle lifts the arm out from the side of the body (pulling the ball upward in the process), the supraspinatus and other muscles of the rotator cuff must balance this upward pull with a downward force. This causes a levering out of the humerus with the rotator cuff muscles working in conjunction with the

deltoid. The rotator cuff thus prevents the deltoid from driving the humerus up into overhanging acromion.



The large Deltoid pulls upwards while the Supraspinatus keeps the ball on the tee.

In the normal shoulder this mechanism is so finely tuned that it always keeps the reaction force of the humerus at right angles to the joint. The joint therefore is always stable unless taken unawares.

The Rotator Cuff

The rotator cuff is simply three muscles which all originate from the shoulder blade. The tendons of the three muscles are not like three ropes, but rather converge into a single flat sheet, wrapping around the humeral head (golf ball). Infraspinatus is at the back, supraspinatus is on top and subscapularis is at the front. Supraspinatus is by far the most commonly torn tendon.

The tendons fill a very narrow space, with the humeral head below and the acromion (bony roof of the shoulder) above.

Why do the cuff tendons tear?

There are a number of reasons. Like the rest of our body, the cuff tendons lose strength as we age. Cuff tears before the age of 40 years are rare. A 20 year old is more likely to break the bones of the shoulder than tear their cuff in a big accident.

Trauma: A heavy fall, a traction injury (trying to catch your fall with a trip down stairs), a twisting injury, a throwing injury or a heavy lifting injury can all result in a cuff tear.

Overuse: Workers who frequently need to use the arm overhead, such as a builder, can eventually suffer structural failure of their cuff tendons. We sometimes see cuff tears in young males who enjoy heavy weight training.

Age: The tendons can simply "wear out". We recognize in older patients that it is possible to have a cuff tear and be unaware. Provided enough of the remaining cuff is strong and balanced, the individual may still be able to function pain-free and well.

Impingement: This is the name we give to the process where the cuff tendons are repeatedly squashed between the humeral head and the edge of the acromion. This can eventually wear through the tendons. (see diagram below)

The cuff tendons are compressed between the acromion and the ball of the shoulder joint on the right.

Diagnosis:

Typically the patient has a precipitating injury that fails to settle. The pain is often felt part way down the arm but can radiate all the way to the wrist and up into the side of the neck. After the fall some patients find it hard to lift the arm at all for a few days. The pain can be severe and often feels worse in bed at night. It is difficult to sleep on the injured side. Lifting and reaching up or out can feel weak and painful.

Examination often reveals weakness in certain movements. Xrays often look normal but an ultrasound scan can show the tear. A more comprehensive imaging technique is the MRI scan. This is expensive and is only ordered by a specialist. It can help decide how old a tear is and shows other structures

that may be involved. With very obvious ultrasound scan evidence it may not be required.

Will my cuff tear heal?

Unfortunately the simple answer is no. Like a tear in a yacht sail, the cuff is under tension and the tear will only gradually get bigger. As the tear gradually increases in size, it usually becomes stiff and retracted. This can make it difficult or even impossible to fix surgically. This process can occur in months if the initial tear is sizeable but usually takes years for small tears.

What are the Treatment Options?

The first option is non-operative. Cortisone can be used to settle the inflammation and home exercises given to strengthen the remainder of the cuff tendons. This will result in a significant improvement in 75% of patients over 6-12 weeks.

A number of patients who choose this option will, however, have a relapse of their pain. Patients may still be aware the shoulder is a little weak and needs to be "looked after".

Younger patients, patients who do not respond to exercises and those with high shoulder demands in their work or recreation are more likely to want the tear fixed

Non operative treatment is often suitable for older patients or those who have medical problems which preclude surgery. The definition of "old" has more to do with health and lifestyle than date of birth. Some patients in their late 60s may already be physically very old, whereas a patient in their late 70s may be very fit and active and desire their cuff to be fixed.

The second option is surgery. This is often performed arthroscopically (keyhole surgery) or mini-open (Keyhole surgery for the initial work followed by anchoring the torn cuff down through a small 3cm incision).

The Operation

The first part of the surgery is called "acromioplasty" Through puncture holes 3-5mm of the undersurface bone is removed from the acromion with a small motorized burr.

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Where the tear is acute and due to high force it may be caused in spite of a normal acromion. This is an unusual occurrence but when it happens it could be thought that removing part of the acromion would be unnecessary. As it turns out however, tendon repair always causes some bulking up of the tendon at the repair site and this requires more space than usual if it is not going to rub on the acromion during use. Thus even in this situation sub-acromial decompression is a necessary part of the overall procedure.

The joint between the acromion and the clavicle (collar bone) can also be damaged or arthritic. If it is also giving pain, then 7-8mm of bone is removed from the end of the clavicle through a separate puncture hole at the same time.

Once the decompression has been performed, the tendons need to be repaired if possible. The tears usually retract and stiffen with time. To make things more difficult there is sometimes a loss of tendon substance. However it is usually possible to reattach the tendon to the bone. The surface of the bone is freshened to produce bleeding. This bleeding is crucial to healing as the tendons themselves have a very poor blood supply.

The anchors are placed

The sutures before repair

The sutures are passed

The sutures are tied down

The pattern of the tear is then established. Shapes include a U shape, and L shape, a reverse L shape and a crescent shape. All require a different suture pattern. Five millimeter anchors made from absorbable material are screwed into the bone. Each anchor has two very strong sutures attached. The sutures are passed through the torn tendon then are tied firmly down to the bone, often with the help of a second row of anchors.

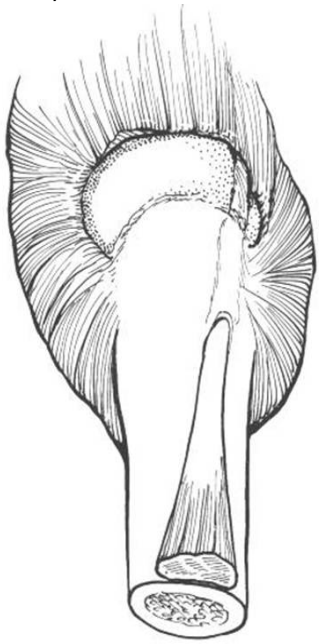


Figure 7: Massive cuff Tear

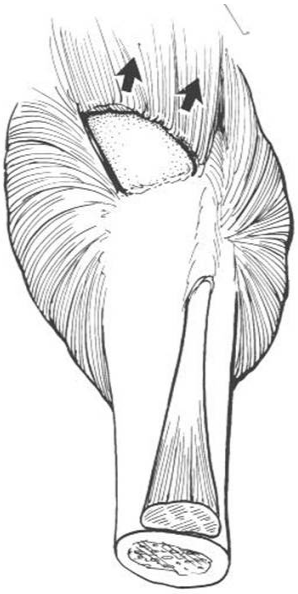
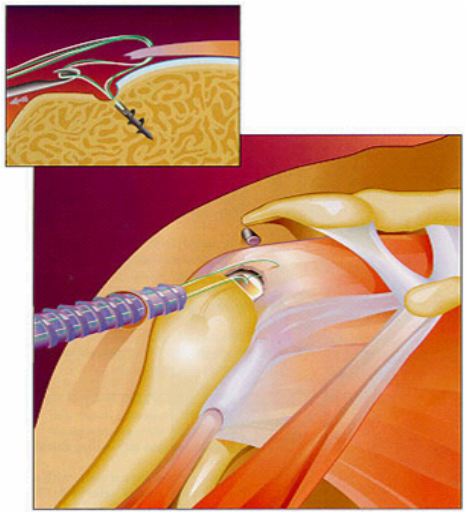


Fig 8: Medium L-shaped Tear

Healing of the tendon into the bone is slow and takes about 8 weeks before it is strong enough for the arm to be used under its own power. The poor blood supply slows healing. During this period of time it helps to keep the arm moving but obviously this has to be done using the other arm or with the help of a friend or therapist. A single strong pull by the repaired muscle-tendon unit is enough to disrupt the repair during this time. The disruption almost always occurs by the sutures pulling through the weak tendon tissue. It is very rare for the sutures to break or the anchors to pull out.



A graphic representation of anchor placement to repair the cuff

Following tendon repair the shoulder will always lose motion. The more passive motion that can be maintained during the healing phase therefore, the better. It is however, not always possible to retain a large range of motion and generally this has to be regained over several months. This may take up to 12 months in some cases, particularly if the tear was large and the repair difficult and especially if a splint was needed post-operatively to protect the repair.

In some cases the tear is so large that repair is not possible. In this case the tendon ends are cleaned up and a standard decompression performed. Despite the fact that there is little remaining rotator cuff tendon this still seems to provide some relief of pain in a majority of cases. What it cannot do however is restore power which is lost when the tendon ruptures. This may therefore mean that full motion may not be possible.

In other cases a partial repair can be achieved. Provided a good part of the front and back tendons can be repaired, pain relief and improved function can result.

Between one and five anchors are used to perform the repair. If the long head of the biceps tendon is torn or giving pain, this may need repairing at the same time.

If the tear is easily reduced and not too large, it can usually be fixed through puncture holes only. For a very large tear requiring a large number of anchors, I will sometimes make a 3cm incision to ensure the strongest possible repair.

Complications

1. Stiffness. As mentioned some patients get very stiff, forming plenty of scar tissue. Although this is a nuisance, with time these patients often form a sound repair and do well long term.

2. Infection. Thankfully this is very rare with arthroscopic surgery being around 1 in 200-300 cases.

3. Failure to heal. Because the cuff tissue has a poor blood supply and is often weak, it can fail to heal. Interestingly, even these patients are better off than prior to the surgery, but do not do as well as those who heal. If the shoulder continues to be painful, revision surgery can be considered. To put it in context, I have performed revision surgery 2-3 times in the past 5 years, so it is very uncommon

4. Re-tear. If we scan all patients 5-10 years later, up to 30% will show a re-tear. Most will not know it and will still be happy with the shoulder. The re-tear is usually smaller than the original tear and often does not require treatment.

Does it Work?

It certainly does. Cuff repair has a very high success rate of around 95%. The good news is that results can last 10, 15 years and beyond. It is a good operation with predictably good results. The main thing to remember is that being in a sling for 4 weeks is a pain and patience is required as the shoulder remains "grumpy" for the first 10-12 weeks.

Who Decides if Surgery is Necessary?

The answer is you and only you. I see my role as answering all of your questions and helping you to make the decision that you consider best for your surgery. If this information throws up any further questions for you, you can simply email me on mat@orthosports.co.nz or Dr Leigh on warren@orthosports.co.nz

If I choose to have surgery, how do we proceed?

Orthopaedic surgeons are very clear in their view that cuff tears are often caused by an accident. At present, however, the doctors employed by ACC often view this as a " Gradual Process Condition" that may be worsened or unmasked by an accident but is not the result of an accident. On this count, the surgeons and ACC doctors often disagree. Unfortunately this means that an application to ACC for this surgery can be turned down.

The alternatives are appealing the ACC decision, using health insurance (if you have it), self funding (expensive for most people) or being referred to your local public hospital (often with significant delays in treatment)

Once these issues have been dealt with, you can select a suitable day for surgery. The hospital is Southern Cross North Harbour, 232 Wairau Rd, Glenfield, North Shore City.

After Your Operation

1. It is important not to stress the repair by moving the arm under its own power. This does not mean though that the arm should not be moved.

2. Maintaining motion prevents scarring in the sub-acromial space from forming and hence prevents stiffness from setting in. If the shoulder does get stiff in the early weeks post operatively, it generally will recover but may take 6-9 months to do so.

3. It is not important how the shoulder is put through its range of motion as long as it is not under its own power. Usually it is easiest to hold the wrist with the other arm and start with circular motions and then progress to leaning forwards and letting the arm hang down with gravity. This latter can then be extended to having the arm swing or move in circles like a pendulum. As things settle a pulley can be used with a rope such that the good arm can pull the operated arm up through an increasing range of motion.

4. Despite regaining motion early on, the ache in the shoulder or upper arm may not settle for 10-12 weeks. Whilst some of the pre-operative pain may not be evident after surgery, it is common for a persisting burning pain and often a clicking to be present afterwards and these may only begin to subside when the swelling in the tendons starts to decrease at about the two month period.

5. After the initial period is over and the internal swelling has subsided the shoulder should gradually improve and should continue to improve over a 12 month period. As you have had actual damage to the rotator cuff tendons these need to heal and fully settle down. This may take many months (because tendon is slow to heal) and the overall progress of the shoulder will not be as fast as if the tendons were intact.

6. Generally no therapy is required after you leave hospital and for the first few weeks. Usually however, a rotator cuff rehabilitation programme will be necessary to enhance recovery and this will be organized for you when your shoulder is ready.

7. Until the shoulder really starts to settle it is difficult to lie on that side. It is painful at night time and it is hard to use the arm out from the side of the body. This includes driving in which both steering and gear changing can be difficult. Insurance companies will not cover you in the event of an accident if you are wearing a sling. After a few weeks it can be possible to drive an automatic car only.

8. Initially you will have a bulky dressing on but this may be changed to smaller water resistant dressings before you leave the ward. If so it means that showering is possible but care still needs to be taken early on to make sure that the wound is not getting wet. After five days all dressings can be removed and the wound can usually be wet.

9. The larger wound has dissolving stitches in it which do not require removal. Each of the small wounds has a stitch in it which will need removing at 7-10 days. If you do not have an appointment for review at that time, then please phone the office to obtain one.

10. The office telephone number is (09) 477 2080

Problems

If you are having problems with your shoulder do not hesitate to contact the office or myself. My mobile phone number will be included in your discharge pack from hospital. If I am not immediately available I will try to get back to you as soon as possible. If for some reason I am unable to be reached that you may seek advice from the hospital ward or from your general practitioner.