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Impingement Syndrome and Tears of the Rotator Cuff

Impingement is a very common problem in which the tendons of the rotator cuff (predominantly supraspinatus) rub on the underside of the acromion (the bony roof of the shoulder easily felt at the point of the shoulder). This causes pain due to the repeated rubbing of those tendons and it is especially bad in certain positions of the arm. In particular it is difficult to put the arm behind the back (reaching a bag in the back seat of the car) and to use it in the elevated position. This makes it difficult to drive, reach a bag in the back seat, change gears, hang clothes, comb one's hair and even to lie on the affected shoulder.

The cause of this problem can be:

1. A muscle imbalance problem due to poor functioning of the rotator cuff tendons themselves; thus allowing the ball of the shoulder joint to ride up and rub on the acromion squashing the rotator cuff tendons in the process, or
2. A mechanical problem where the space for the tendon is inadequate. One way this can occur is with an injury to the tendon itself which causes swelling of that tendon such that it becomes too large for the space at hand (primary tendonitis with secondary impingement). Alternatively the space itself can be narrowed, usually where the acromion itself is large and prominent (primary impingement with secondary tendonitis). A large acromion can occur as part of normal growth or later in life, spurs can develop along the front of the bone and can stick into the tendon. If this is bad enough, these spurs can actually dig into the tendon to such an extent that the tendon becomes eroded away and ruptures. When we are young the undersurface of the acromion is flat (type 1) but as we get older it often curves down (type 2) or even develops a downward hook (type 3)

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.

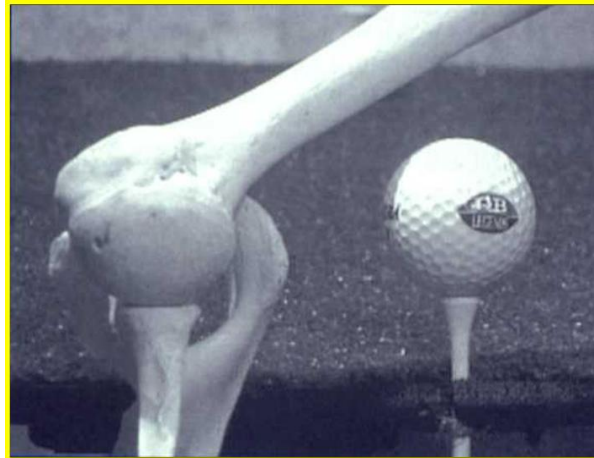


Figure 1: Note the similarity between the shoulder and the golf ball and tee.

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.

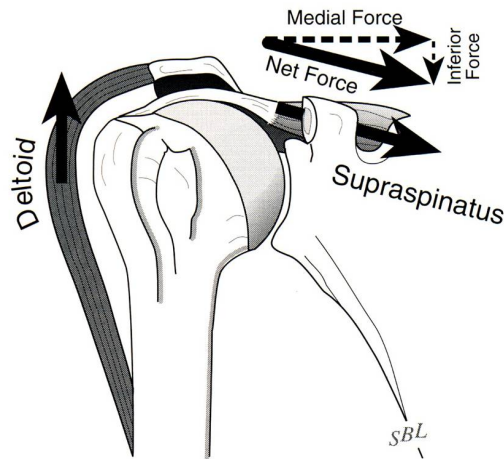


Figure 2:The large Deltoid pulls upwards while the Supraspinatus keeps the ball on the tee.

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.

How does the problem start?

The rotator cuff tendons can be injured by a single traumatic event such as a fall onto the point of the elbow (which drives the humerus up into the acromion and squashes the tendons), a fall onto the point of the shoulder, or a traction injury (slipping on the stairs and saving oneself by grabbing the hand rail). A single incident may not always be the cause however, and the tendons can be injured by overuse activities such as swimming, or jobs involving using the arms in a raised position for long periods of time (ceiling fixing or plastering, builders using a hammer).

As the rotator cuff muscles are small in comparison to the deltoid, they fatigue easily and hence can no longer resist the upward thrust of that muscle. With the deltoid now overpowering the rotator cuff muscles the reaction force starts to be upward rather than across the joint. This means that the cuff tendons start to become squashed when the arm is raised. Thus damage to the tendons begins, and the symptoms, like the damage, may come on slowly, gradually becoming worse.

Why does it progress?

Once the tendons have been damaged they become inflamed and swollen and thus narrow the gap between the head of the humerus and the acromion even further.

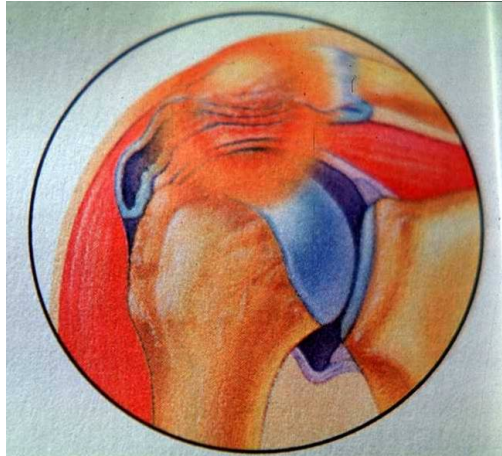


Figure 3: The inflamed cuff tendons swell, making the pinching even worse.

As this progresses impingement occurs more easily and with less movement. The ache may thus become worse and may occur with smaller movements or even constantly. It is especially noticeable at night. With time the problem becomes compounded as a tendon previously mildly damaged now impinges and becomes increasingly inflamed and sore. With this increase in pain there is a decrease in function, thus causing more and more muscle imbalance, further impingement and a spiralling of problems.



Figure 4: The vicious cycle of impingement and loss of function

Is age a factor?

Although not strictly age related, it can generally be said that different age groups tend to have different types of pathology at presentation even though we believe that the course of the disease is similar in each case. Usually those under 25 years present at the stage of swelling and

inflammation, those between 25 and 35 present with tendon degeneration and sometimes tendon rupture. The problem becomes increasingly common with age as spurs develop on the anterior acromion and by the age of 65 years this is an extremely common condition.

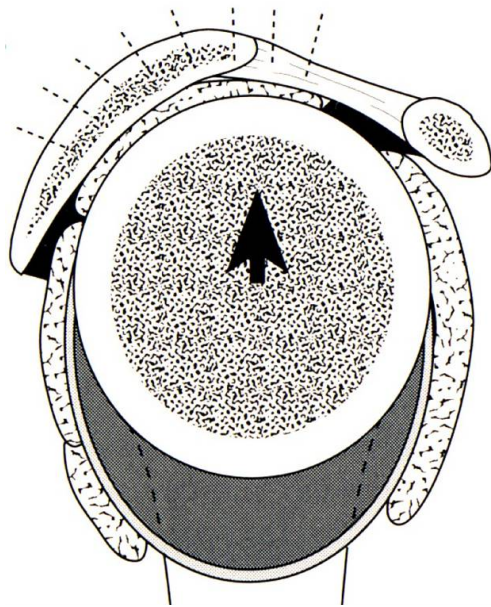


Figure 5: Impingement with no spur

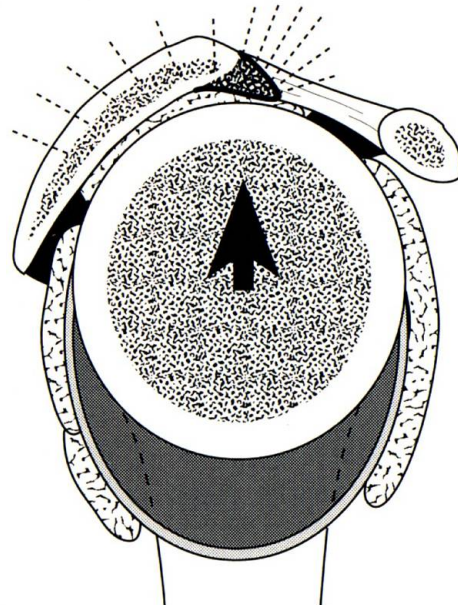


Figure 6: Impingement with a spur

What about the other shoulder?

In cases where the primary problem is the shape or size of the acromion (primary impingement) it would seem reasonable that the opposite shoulder might be similar. Studies in fact show that this is the case 60% of the time and hence the chances of the other shoulder becoming involved to some degree is of that order.

If the primary problem is an injury to the tendon rather than a narrow gap for the tendon (primary tendonitis) then the other shoulder is likely also to have a normal gap. In this situation therefore the other shoulder is almost never involved.

What is the treatment?

All those in stage 1 (swelling and inflammation – an acute injury) and about half of those in stage 2 (fibrosis and scarring – chronic problem) can be treated by conservative means. This means treatment for the local pain and swelling (which may include injection of an anti-inflammatory such as cortisone), and a therapy programme to rebalance the shoulder by strengthening the supraspinatus and other rotator cuff muscles. The first step is to ensure that the shoulder has a full range of

motion. Once this has been achieved, the cuff muscles will respond to a strengthening programme. Once these muscles are functioning again they will hold the shoulder down and prevent further impingement. The tendon injury will then gradually resolve or settle.

Those with more advanced disease generally will come to operative treatment. This includes long standing problems, rotator cuff tears and cases where the acromion is so large that impingement will clearly continue unless the bone is trimmed to widen the gap for the tendons.

Subacromial Decompression

The surgery for this condition is called sub-acromial decompression. The main part of this procedure is called an acromioplasty whereby the acromion is reshaped and the prominent areas underneath are removed to increase the size of the space beneath it. This is done as an arthroscopy (through a telescope) which means that the shoulder itself is never actually opened. The arm will often have a full range of motion within 12 hours of surgery and the surgery is performed as a daystay procedure. Despite this good early range of motion, it has been found that most shoulder do not show marked improvement for two or three months and thereafter they gradually improve over 6-9 months. It is thought that the reason for the delay in recovery is that the tendons still have to recover even after any rubbing has ceased and like tendons elsewhere this takes several months and involves rest followed by rehabilitation.

Where impingement (a narrow gap) is the primary problem the tendon recovers well and hence the chances that a normal shoulder will result is about 95%. Where tendonitis (a tendon injury or tendon inflammation) is the primary problem and the impingement develops because of the swelling of those tendons, surgery seems less effective. A successful outcome here is still achieved in about 85% of cases or less. Here the tendons seem to have more intrinsic damage and take longer to recover. That recovery may also be less complete leaving minor symptoms.

What is the surgery like?

The operation requires two small puncture holes only. The first is at the back of the shoulder and the second at the side. A motorized burr about as thick as a ball point pen is introduced to carefully shave the undersurface of the acromion, removing 3-5mm of bone. Any bursitis (inflammation and scarring of the sack between the cuff tendons and the acromion) is also removed.

The rest of the shoulder joint is also thoroughly checked at photographed. I keep an electronic copy and printed copies are provided for the patient.

After the surgery each puncture is closed with a single suture (stitch) and waterproof dressings are applied that allow showering. The arm is placed in a sling but this need only be used for 1-2 days.

Will it be painful?

Arthroscopic surgery has made this much less painful. Often medium strength tablets like Tramadol are required in the first 48 hours then simple anti-inflammatories and paracetamol are sufficient.

The estimate is that you will be roughly at the pre-operative state by 6 weeks and much better by 12 weeks.

Most people with office jobs or light jobs can be back at work in one week. For heavy work, especially with overhead lifting, 4-6 weeks may be required.

Non-Operative Treatment

Therapy consists of two factors. The first is to avoid further damage to the tendons and the second is to strengthen the rotator cuff tendons and make them functional. This means stopping all activities that cause pain and for swimmers and throwing athletes, this may also mean a style modification if that is possible.

Resting the injured shoulder may be accompanied by local heat or ultrasound and sometimes an anti-inflammatory agent. A gentle stretching programme is very important for patients who have any stiffness in the shoulder. As pain settles a strengthening programme is begun with emphasis on strengthening subscapularis, supraspinatus and infraspinatus which are the main three muscles involved in this process. Often it is not possible to work on these muscles straight away and supraspinatus exercises particularly may cause pain. If this is the case then scapula (shoulder blade) stabilising exercises will need to be done first and this will require the supervision of a therapist skilled in this area.

The therapist will be your guide, but the exercises must be undertaken twice daily. This usually means a home programme with supervision once or twice per week with the therapist.

I have prepared a home programme with pictures to make it easy to follow. The only equipment required is theraband (medical stretch tubing). This can be provided by your physio.

Is cortisone required?

Many patients are apprehensive about cortisone. They have heard stories that it is damaging and simply masks the pain. It is true that, if misused, cortisone can cause problems. The most common is perhaps using it too often. One or two injections into the space above the tendons is very well tolerated and can make the difference between success and failure. It does not "cure" the impingement but acts as a strong anti-inflammatory, taking the swelling and pain out of the tendons and giving the patient a pain-free window of opportunity to get the cuff muscles strong. Yes, it is the exercises that cure, not the cortisone. The exercises are necessary even if the shoulder becomes pain-free within 48 hours.

How long should this treatment last?

I advise my patients to return to see me if the shoulder is still painful 6 weeks later. At that time, if agreed, we will try one more cortisone injection. If the second 6 week period fails to make a difference, then it is time to consider keyhole surgery.

If the problem relapses later on, again patients are urged to return. The simple reason is that, the longer a shoulder is painful with impingement and the worse the pain, the lower are the final results of surgery. There is a cost to waiting too long and putting up with severe pain.

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 Dr Brick mat@orthosports.co.nz or Dr Leigh: warren@orthosports.co.nz

The factors that sway me towards recommending surgery are

- Symptoms present for 6 months or more
- Failure of the rehab programme
- Two cortisone injections already
- A poor acromion shape with a downward curve or large spur

All of these factors make non-operative treatment less likely to succeed.

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

Orthopaedic surgeons are very clear in their view that cuff impingement can be triggered by an accident. Often the doctors employed by ACC 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 sometimes disagree. Unfortunately this means that any application to ACC for this surgery is often turned down.

The alternatives are 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.