



Functional rehab for shoulder impingement

Chris Norris provides an introduction to shoulder impingement, before discussing a number of treatment techniques for functional rehabilitation

Shoulder impingement is a common condition causing pain and movement dysfunction, but it can also be the underlying symptom of many other shoulder problems – such as frozen shoulder, tendinopathy and instability. Essentially, shoulder impingement occurs when soft tissue structures (most commonly the supraspinatus tendon and the long head of the biceps) become trapped between the humerus and the coracoacromial arch.

Shoulder impingement and the abduction cycle

One of the main reasons shoulder impingement commonly occurs is because the ball of the shoulder is too big for the socket; the head of the humerus is far larger than the shoulder glenoid cavity. In fact, at any time only about one third of the head is in contact with the socket of the glenoid. For this reason, we have two sets of shoulder muscles.

The first set of muscles, the rotator cuff, lie close to the joint and work to hold the centre of the ball in the socket; they are the shoulder stabilisers. These continually adjust the position of the ball within the socket as we reach forward or overhead and, most importantly, act to hold the two parts of the joint together. The second set are the shoulder movement muscles and include the deltoid, pectoralis major, and latissimus dorsi; they are the shoulder mobilisers.

For the shoulder to function correctly the muscles must be balanced in terms of strength and stretch, and coordinated so that the right muscle works at the right time.

As the arm is lifted, the deltoid pulls the humerus upwards (proximal shift) and outwards (abduction), closer to the roof of the joint, which increases the risk of impingement. To balance this, the rotator cuff muscles firstly draw the ball of the joint downwards and inwards, reducing the chance of impingement and stabilising the

joint. Secondly, the rotator cuff laterally rotates the humerus, and in doing so moves the greater tuberosity of the humerus to the side of the acromion, and thus avoids contact. One of the lateral rotators is the supraspinatus, which also abducts the arm. By increasing the activity of the supraspinatus and reducing the activity of the deltoid in the first few degrees of abduction, proximal shift of the humerus is reduced, but power is maintained.

Providing there is a balance between the strength of the rotator cuff muscles and the other shoulder muscles, and providing the rotator cuff muscles work properly at the start of – and throughout – the movement, the shoulder will function correctly without any pain.

However, tightness is often present in the front of the shoulders, particularly the pectoralis major and minor and anterior deltoid, often due to everyday poor posture from working on computers. Anterior tightness causes anterior glide of the humeral head (moving forwards relative to the glenoid) and medial rotation, which both place the greater tuberosity much closer to the acromion and thus increase the risk of impingement. This means the rotator cuff muscles not only have to work to position the shoulder bones, but now also have to pull against this postural tightness, which hinders their effective physiological functioning.

Treatment for impingement

There are a number of techniques that can be incorporated into a treatment plan to address shoulder impingement. In general, chronic conditions take longer to resolve and require a greater frequency of treatment, and, in some cases, two or three sessions may be required a week initially and then reduced as the client learns home management procedures. Chronic conditions can take many months of intervention, often three to four months combining intense periods with merely progress monitoring.

Acute conditions tend to require less manual intervention because the tissues are more irritable and the body may require more recovery time between treatments. Weekly sessions may be more appropriate, again with guidance given for home care. Some of the most effective techniques include the following.

Trigger point release

Impingement often results in the formation of trigger points in the rotator cuff muscles, which remain for some time even after the impingement has cleared. Trigger points can occur quite quickly, with causes ranging from the ball of the joint being pressed on to the cuff tendon through sleeping awkwardly, to a tweak to the tendon during an overhead shot in badminton. Actions such as these can cause a small amount of swelling and

pain, which can cause temporary muscle inhibition in order to protect the shoulder, increasing the risk of further injury from a change in the abduction cycle.

Trigger points are commonly developed in the broad flat bellies of the supraspinatus and infraspinatus muscles, and the middle fibres of the thick trapezius muscle, and the therapist can initially work these using their fingertips or a massage tool.

To release the trigger point, massage techniques such as ischaemic release can be used. The sports therapist presses their fingers deeply into the painful area (without exceeding the client's pain threshold), and the pressure is held for 30 to 60 seconds. Fluids are released out of the tissues and as the therapist removes the pressure, fresh fluids flood back in, clearing the area of chemical waste products formed at the trigger point. Sustained pressure will also affect local tissues, stimulating the development of electrical signals that promote healing during the process of mechanotransduction.

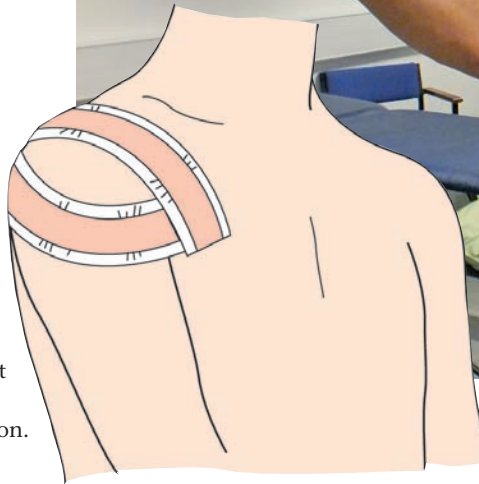
Trigger points may be either active or latent. An active trigger point causes localised pain the client can pinpoint, for example, a rhomboid trigger point identifiable by a sensation of burning in a spot between the shoulder blades, or a trapezius trigger point indicated by pain between the point of the shoulder and the neck.

Latent trigger points can cause pain referral, and the client may be aware of a general pain, but not be able to specifically identify its source. For example, a supraspinatus trigger point may refer pain through to the front of the shoulder and in to the upper arm. Therefore, the therapist's knowledge of muscle anatomy is vital to identify and treat the source of pain.

Deep transverse friction massage

Where impingement has occurred, the rotator cuff tendon will most commonly have been trapped at the front of the shoulder beneath the acromion. This area can be effectively targeted with deep transverse friction massage (DTF). To access the tendon, the client should be sitting at the front of a chair, and advised to place their hand behind their back on the painful side. As the supraspinatus muscle rotates the shoulder outwards (lateral rotation), placing the hand behind the back (medial rotation) will tighten it. Reaching the arm backwards also presses the head of the humerus forwards, drawing the tendon out from beneath the subacromial arch.

The therapist can then massage the tendon at the painful spot, normally located just below the acromion tip. For general friction massage, the therapist's fingers focus on the affected area and move over the skin, but for DTF massage the therapist should apply a deeper pressure and aim to move their



fingers and the client's skin as a single unit. This causes the friction force to be moved from the skin into the deeper tissues.

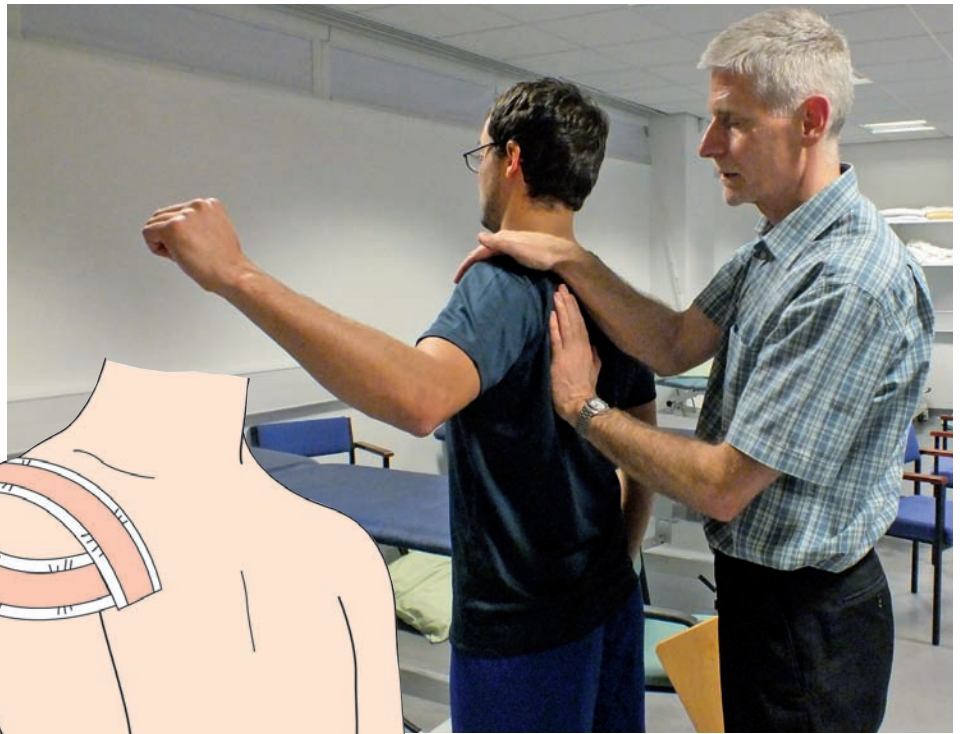
Following massage, the client should be advised to move their shoulder blades up and down (shrugging motion), and inwards and outwards (bracing motion), to tense and relax the muscles and enhance local blood flow.

Exercise

To correct any movement dysfunction, one of the main goals is to optimise the physiological functioning of the client's shoulder during the abduction cycle as they move their arm out sideways.

If pain presents as the client approaches the horizontal position, the therapist can try to gently guide the joint to work properly. As mentioned previously, the correct action involves the rotator cuff muscles drawing the ball of the socket down and back slightly to offset the action of the larger deltoid muscle, which, as well as lifting the arm, also pulls the ball of the joint upwards. If the rotator cuff has not worked properly for some time it will need to be re-educated to correct the habitual movement dysfunction.

To correct the dysfunction, the therapist needs to physically perform the work of the client's rotator cuff muscles by drawing back the client's shoulder as they lift their arm. Initially, the client is asked to lift the arm unaided and to register any presenting tissue tension or pain. The therapist then asks the client to lift their arm again as the therapist guides the joint. If this helps to reduce the pain, effective exercises may include the guided arm lift, lateral rotation with dumbbell, and abduction with lateral rotation using a band.



Above: A guided arm lift being performed
Left: An example of how to tape a shoulder following a guided arm lift

i) Guided arm lift

Purpose

To reduce pain from impingement and re-educate correct physiological movement of the shoulder.

Preparation

Standing behind the client, the therapist cups their right hand over the client's left shoulder (for left-sided pain), and places their left hand over the client's scapular.

Action

The client is advised to raise their arm out to the side, and as they do so the therapist pulls their right hand to draw the client's shoulder backwards slightly. At the same time, the therapist presses the flat of their left hand gently against the client's scapula to push it onto their ribcage. Three to five repetitions are performed, followed by rest.

Tips

The therapist's hands should follow the client's shoulder as it moves. As the condition improves, the therapist gradually pulls less with their hands so that the client's muscles work harder. The exercise is stopped immediately if the client experiences pain.

Taping may be used to maintain and reinforce the effects of the guided arm lift in between treatment sessions by drawing the ball of the joint backwards and reminding the client of the action performed:

- A mesh underwrap is placed over the shoulder from the front of the joint diagonally over the top of the shoulder to the inferior angle of the scapula.
- One or two pieces of non-elastic tape are then placed over the underwrap, beginning on the front of the shoulder, and the tape is pulled tight (up and back) as the therapist attaches it to the scapula region.



Left above and left: Lateral rotation performed with a water bottle in place of a dumbbell
Above: Abduction and lateral rotation performed with a band

horizontal position, they stop and then slowly lower their arm. Eight to 10 repetitions are performed, followed by rest.

Tips

As the condition improves, the client can slowly increase the movement range from lifting the arm into the horizontal position, to lifting the arm overhead. It may be easier and less painful to lift the arm forwards (20 degrees to the bodyplane) and upwards in a movement called scaption.

ii) Lateral rotation with dumbbell

Purpose

To re-strengthen the supraspinatus muscle and restore balance between the rotator cuff and deltoid.

Preparation

To exercise the left arm (for left-sided pain), the client lies on their right side and holds a light (2kg) dumbbell in their left hand, tucking their left elbow into their side.

Action

Keeping their upper arm in contact with their ribs, the client is asked to twist their arm (lateral rotation) in order to move their forearm towards the vertical position. The client lifts as high as they can, holding the top position for two to three seconds before lowering slowly.

Tips

If the client allows their elbow to lift away from their ribcage, the exercise is less effective as work is taken away from the supraspinatus muscle.

iii) Abduction with lateral rotation using band

Purpose

To work the shoulder-stabilising muscles (rotator cuff) and movement muscles (deltoid especially) sequentially.

Preparation

The client holds a band with its lower end attached to the bottom of a door or other low point.

Action

The client raises their arm out sideways (abduction) and turns the arm outwards so their thumb faces the ceiling (lateral rotation). Once the client reaches the



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