

Shoulder Pain

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Latest Research on Rotator Cuff Tendinopathy

The most important role of the rotator cuff (RC) is to counterbalance the translatory forces imparted on the head of the humerus by the prime movers, particularly deltoid. This control is most important during shoulder flexion, abduction and extension.

Pathoetiology

Rotator cuff tendinopathy (RCT) is commonly referred to as subacromial impingement syndrome. Neer (1972) felt 95% of RC pathology resulted from irritation of the tendon from the overlying acromion or coracoacromial ligament. Support for this theory is now equivocal, with recent evidence suggesting subacromial impingement may not be the primary mechanism. Consider the following:

- The vast majority of RC tears are undersurface, suggesting impingement between the tendon and glenoid or head of humerus, not the acromion.
- There is a poor association between symptoms and structural failure observed on imaging. Frost et al found 55% of people diagnosed with subacromial impingement had evidence of tendon pathology compared to 52% in people without symptoms, with the incidence increasing in both groups with advancing age. Asymptomatic partial & full thick RC tears have been reported in 50% of people in the 7th decade, & 80% in those over 80. In an MRI study there was a very high incidence of RC pathology (79% for the pitching shoulder & 86% for the catching shoulder) in asymptomatic professional

baseball pitchers. In recent study, 96% of men without shoulder symptoms were reported to have some form of structural abnormality identified on US, including subacromial bursal thickening, supraspinatus tendinosis or tears. This challenges the validity of imaging to identify the source of the symptoms.

- Evidence of inflammatory markers in the subacromial bursa is not a consistent finding.
- Variations that have been described in acromial shape may not be morphological but may develop over time, or be a secondary consequence of RC failure. This may represent a form of bony spur, just as spurs can develop in other joints around the body.

Secondary mechanisms potentially involve attrition of the RC tendons from contact with structures such as the humeral head below & the coracoacromial arch above, possibly due to poor functioning of the muscles responsible for controlling the position of humeral head, secondary to weakness, fatigue, pain-related inhibition, or structural incompetence.

Diagnostic ultrasound can be used to measure the subacromial space & acromiohumeral distance. Around 45% people diagnosed with RC disease tend have a reduction in the subacromial space during arm elevation, which rehab has the potential to normalise. Studies suggest the subacromial space decreases under fatigue, & recovery to normal was delayed in people with RCT. In EMG studies, there is reduced RC muscle activation in people with RCT, as well as delayed onset of activation of muscles controlling the

position and movement of the scapula.

Excess tissue load remains the most substantial causative factor. RCT is known to occur more frequently in the dominant limb & in occupations & sports with higher rates of upper limb loading. Under-loading may also disrupt tendon function, through the mechanism of 'stress shielding' that has been described for other tendons. Obesity, metabolic syndromes, & smoking may increase the risk & detrimentally impact recovery of RCT.

Central sensitisation & cortical changes

This may be a factor in a proportion of patients with RCT. One study showed a significant proportion of individuals with RCT have pain radiating down the arm & hyperalgesia to pinprick. The presence of hyperalgesia or referred pain pre-operatively was found to be predictive of a worse outcome from subacromial decompression surgery at 3 months.

Traditional Assessment

Rotator cuff tests: The value of traditional RC tests is questionable. The capability of standard RC tests to assess & implicate the RC as the source of symptoms can't be achieved with the certainty and confidence required to meaningfully inform clinical decision making. For a clinical procedure to implicate a structure, it needs to be able to assess the structure in isolation. RC morphology doesn't allow for this. Infraspinatus and supraspinatus can't be separated, neither can intraspinatus or teres minor. The RC tendons are also confluent with the capsule & coracohumeral & glenohumeral ligaments.

During the 'full can test', 8 other shoulder muscles were found to be equally activated along with supraspinatus, and during the 'empty can test' – 9 other shoulder muscles were equally activated. This challenges the validity & clinical utility of these tests. All shoulder special tests will stretch & compress multiple structures including bursae, so the use of orthopaedic special tests to isolate tendon is unreliable.

Physiotherapy Assessment

This will include tests of active & passive ROM, shoulder capsule extensibility, & muscle function, strength & endurance.

The kinetic chain is also assessed. Pain, weakness, or reduced flexibility through the legs or trunk are possible deficits with the potential to detrimentally impact shoulder function. Lewis (2015) has developed an assessment algorithm to systematically investigate the influence of thoracic posture, three planes of scapular posture, head of humerus (HOH) position, and the cervical spine on

shoulder symptoms.

The 1st stage of the assessment is to identify 1-3 aggravating movements, activities or postures. These are then assessed for their ability to be modified using the following procedures:

1. Altering thoracic kyphosis: the immediate effect of active thoracic extension (& possibly flexion) is assessed. If effective, this forms part of treatment, using a combination of postural awareness, exercise (including motor control during provocative activity), & manual therapy.
2. Scapular procedures. Scapular position is manually corrected at the start of the movement and the effect on symptoms assessed. Three positions are tested: elevation; protraction / retraction; and depression - with or without posterior tilt.
3. Humeral head procedures: three positions are tested: depression, elevation, & anterior or posterior glide.
4. Neuromodulation: pressure based procedures (aimed at the soft tissues and joints) throughout the cervical, thoracic & shoulder regions.

Mechanisms whereby these procedures may reduce symptoms include alterations in scapular position, changes in length-tension relationship of rotator cuff muscles / tendons, increasing subacromial space, stabilising or optimising the position of the HOH or scapula, or neuromodulation of the sensation of pain. These procedures form part of treatment if found to be effective. The treatment will often include a graded rotator cuff strengthening programme.

Conservative RC Management. Overall management includes relative rest, modification of painful activities, an exercise strategy that doesn't aggravate pain over time, controlled reloading, graduated progression from simple to complex shoulder movements, & hopefully prevention of future recurrence. Current research evidence indicates that a well-structured & graduated exercise programme will give an equivalent outcome to surgery. There was no additional benefit with surgery at 1, 2 or 5 years follow-up (see refs ^{43,44,56,57} in Lewis 2015).

If the results of physiotherapy are not acceptable, alternative approaches are considered, including subacromial injection, and surgery.

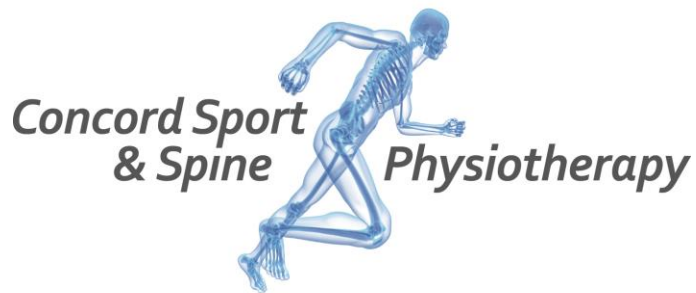
References:

1. Lewis, J et al (2015). Rotator cuff tendinopathy. JOSPT, Epub.
2. Neer, C (1972). Anterior acromioplasty for the chronic impingement syndrome in the shoulder. JBJS, 54, 41-50.

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