

The painful shoulder

The painful shoulder is commonly managed by the non-specialist.

STEPHEN J L ROCHE, MB ChB, LMCC, FCS Orthopaedics (SA)

Senior Specialist, Department of Orthopaedics, University of Cape Town and Groote Schuur Hospital

Stephen Roche runs the shoulder and elbow unit at Princess Alice Orthopaedic Unit and heads up a Trauma Orthopaedics firm at Groote Schuur Hospital. He was the Don MacKenzie South African Shoulder and Elbow Fellow in 2003.

GERHARD GREEFF, MB ChB, MMed (Ortho)

Orthopaedic Surgeon, Free State Shoulder Unit, Rosepark Hospital, Bloemfontein

Gerhard Greeff is an orthopaedic surgeon in private practice. His main interest is in shoulders. He is actively involved in the education and training of registrars in shoulder surgery.

This article will deal with four of the most common non-traumatic conditions affecting the shoulder. These are acromioclavicular joint arthritis, calcifying tendinitis, frozen shoulder, impingement and rotator cuff tears.

These common problems are often primarily managed by general practitioners and other non-specialists and can be adequately diagnosed through a careful history, examination, a few simple investigations and possible diagnostic injections. In each condition we will highlight elements of the history, examination and investigations to distinguish between them and then give an outline of treatment.

A careful neurosensory examination is necessary as uncommon nerve entrapments and more common cervical radiculopathy may present with shoulder pain.

This article is based on the assumption that the anatomy, history taking and gambit of provocative tests required in the shoulder examination are familiar to the reader. If not, this information can be found in the suggested reading list at the end.

Shoulder pain does not always originate from the shoulder – hopefully a careful history and examination will exclude ischaemic chest pain, cholecystitis, pneumonia and so on. A careful neurosensory examination is necessary as uncommon nerve entrapments and more common cervical radiculopathy may present with shoulder pain. As always, be aware of metastatic disease, mediastinal malignancies and thoracic outlet syndrome, to prevent missing potentially devastating or embarrassing problems.

The clinical examination can be difficult because impingement signs can mimic acromioclavicular joint signs or an early frozen shoulder, so a directed injection of local anaesthetic into the area that appears to be the most likely origin of the pain can be the most important diagnostic tool. The anaesthetic will remove the pain in the rooms so a repeat examination will allow confirmation of the pathology or the need for reassessment and another injection into the second area of suspected pathology.

Acromioclavicular joint arthritis

This joint is often overlooked as a cause of shoulder pain. Two chronic conditions that commonly affect the acromioclavicular (AC) joint are degeneration (primary or post-traumatic arthropathy) and osteolysis of the distal clavicle. Arthritic degeneration usually affects older patients and osteolysis is more often seen in patients still involved in athletic activities such as weightlifting. MRI studies have shown that by the age of 30 years 60% of people have changes of arthritis in this joint.

Symptoms and signs are usually very similar and are caused by motion in this joint brought on by overhead and cross body arm movements. The degenerative conditions may be associated with impingement of the rotator cuff caused by inferior projecting spurs (Fig. 1). Pain is usually located over and anterior to the AC joint, and often radiates to the neck. Night pain is also a common complaint with difficulty lying on that side. Associated symptoms of popping, grinding or catching are sometimes noted.

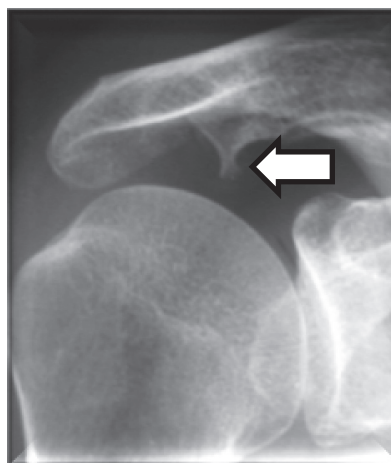


Fig. 1. AC joint osteophyte.

Physical examination may reveal asymmetry and a prominence of the AC joint. Point tenderness with direct pressure that can be accentuated by horizontal cross-body adduction and terminal abduction is commonly found. Disappearance of these symptoms after a well-directed lignocaine injection into the AC joint will confirm the diagnosis.

Radiological evaluation may reveal narrowing of the AC joint, osteophytes and subchondral cysts or demineralisation, osteopenia and distal clavicle erosion in the case of osteolysis.

Conservative management consists of avoidance of provocative activities, non-steroidal anti-inflammatory medications and a cortisone and lignocaine injection into the AC joint. Surgical excision of the AC joint may be indicated after failure of 2 - 3 injections. This will give excellent results in more than 95% of cases.

Not only does primary frozen shoulder remain a mystery to us, but the interventions remain controversial and frustrating for patients.

Frozen shoulder

Not only does primary frozen shoulder remain a mystery to us, but the interventions remain controversial and frustrating for patients. The management is expectant and is generally supportive.

Its natural history has been documented with three classic phases being described: freezing, frozen and thawing. The resolution occurs between 1 and 3 years. Fifty-nine per cent of patients can expect a normal shoulder, with 35% left with mild residual symptoms. Six per cent will have significant residual shoulder stiffness or pain. Ten to 35% will have bilateral disease but this usually occurs in different time frames.

The disease is defined on biopsy by chronic inflammatory cells and fibrosis. The arthroscopic findings are severe synovitis (Fig. 2) and capsular thickening predominantly involving the rotator interval.

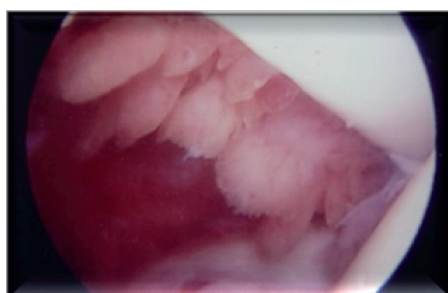


Fig. 2. Arthroscopic view of rotator interval with synovitis of a frozen shoulder.

There are several documented associated conditions:

- diabetes mellitus
- thyroid disease
- Dupuytren's contracture
- Parkinson's disease
- CVS disease/stroke
- minor upper limb trauma
- surgery to upper limb/heart/neuro-surgery
- osteoporosis.

Codman, one of the grandfathers of shoulder surgery, suggested criteria for frozen shoulder (Table I).

As seen from the above criteria, the clinical examination shows loss of active and passive range of motion. If there is punch tenderness another cause for the stiff shoulder should be sought (e.g. occult metastases, arthritis).

Table I. Codman's criteria for frozen shoulder

- The condition comes on slowly
- Pain is left near the insertion of deltoid
- Inability to sleep on the affected side
- Painful and incomplete elevation and external rotation
- Restriction of both spasmodic and adherent type
- Atrophy of the spinati
- Little local tenderness
- X-rays negative except for bony atrophy
- The pain was very trying to everyone of them but they were all able to continue their daily habits and routines

The X-ray will exclude the arthritis as the only other cause of loss of motion. A selective lignocaine and steroid injection into the glenohumeral joint should give relief of pain in the rooms with no improvement in the range of motion.

If there is a family history or symptoms of thyroid disease or diabetes, screening for these conditions by means of blood tests is advisable.

The difficulty in the diagnosis is usually in the early phase, when the loss of range of motion is not pronounced and it may look like an impingement or rotator cuff problem. These conditions usually respond to the subacromial steroid injection, while the frozen shoulder may not.

There are many different therapeutic interventions with no genuine scientific evidence that any alter the natural history of the frozen shoulder. However, there are medications which alleviate the pain. Once the usual NSAIDs and simple analgesics have been tried, steroid injections may produce temporary relief while the process runs its natural history. Amitriptyline in low doses helps the night-time pain and improves the lack of sleep. It also probably improves the mood changes that occur with the chronic pain.

Physiotherapy treatment has changed, as aggressive attempts to improve range of motion exacerbated the disease process. Now a much more gentle approach is advocated. Heat therapy gives symptomatic relief.

Surgical interventions range from brisement (blowing up the capsule with 100 ml fluid), manipulation under anaesthetic, open

release and arthroscopic release. The only randomised trial which compared surgery to an exercise programme stated there was no difference in outcome with respect to range of motion, pain and time to recovery, despite many papers advocating the benefit of surgery. Surgery is usually reserved for refractory disease or those who want to try it as a last resort when no benefit has been achieved by other means. Many surgeons are more liberal in their approach to offering surgery, as many level 4 evidence papers show pain relief and improved range of motion.

Information regarding the diagnosis, treatment options and outcomes allows the patient to be reassured that this is a self-limiting disease and that they can make their choice of pain alleviation.

Calcifying tendinitis

Calcium phosphate crystals deposits in the tendons of the rotator cuff cause the pain in this condition. The underlying cause for the deposits is unknown but it is hypothesised to be on a degenerative or vascular basis.

It occurs more commonly in women in their fifties. It is found to be bilateral in as many as 20% of patients. The incidence in asymptomatic individuals is also reported to be up to 20%. More recently an association with hormonal abnormalities has been proposed. The supraspinatus is the most commonly affected tendon.

Three phases are described: pre-calcifying, formative and resorptive. The formative is the first symptomatic phase with signs of impingement and night pain. The resorptive phase is usually the most painful, with the presentation resembling acute sepsis with severe pain, loss of motion and tenderness of the rotator cuff on palpation.



Fig. 3. Calcifying tendinitis.

Shoulder

The X-ray confirms the diagnosis (Fig. 3), as does an ultrasound scan.

Patients with impingement-type pain are treated as for impingement with NSAIDs, physiotherapy and subacromial injections of steroid. Ultrasound aspiration has been shown to possibly increase the rate of resolution of the deposit. Extracorporeal shockwave therapy has also been shown to increase resorption. Surgical removal of the deposit can be done open, or more commonly now as an arthroscopic procedure. In addition, an acromioplasty is performed in many cases where impingement signs are seen at surgery.

Those patients who present with the acute septic-like signs are usually in the resorptive phase and a steroid injection, immobilisation in a sling, local heat and NSAIDs will help to settle the pain. If not, an arthroscopic decompression is performed. It is in effect draining a sterile abscess.

The majority of patients (>90%) are treated conservatively as mentioned above. There are more recent reports that suggest that an earlier intervention is warranted in those with associated endocrine problems, as their response to conservative measures is not as predictable.

Impingement and rotator cuff tears

Subacromial impingement has been divided into three stages by Neer. These stages are broad generalisations:

- Stage I occurs in the younger patient less than 25 years old, who develops oedema and haemorrhage of the subacromial bursa and cuff. This resolves with rest, NSAIDs and subacromial steroid injection.
- Stage II occurs in the 25 - 40-year-old with fibrosis and thickening of the rotator cuff and bursa. The changes are permanent and an acromioplasty is needed more often than not for treatment.
- Stage III is in the older individual with a partial or complete tear of the cuff.

Impingement syndrome is further divided into outlet and non-outlet causes. The outlet causes are either extrinsic or intrinsic. Extrinsic impingement refers to pathological changes in the coracoacromial arch, i.e. the shape of the acromion, thickening of the coracoacromial ligament, acromioclavicular joint, os acromiale (Fig. 4) and subacromial bursa.

Intrinsic causes include vascular changes and weakness of the tendon with fraying of the tendon to frank tears, inflammatory arthritis, calcification, biceps tendinitis and posterior capsular tightness.

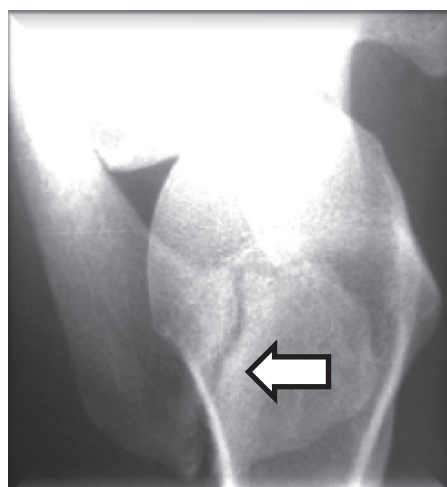


Fig. 4. Os acromiale as seen on axillary view.

Non-outlet impingement occurs in patients whose shoulder mechanics have been affected by joint laxity and nerve injuries around the shoulder.

Rotator cuff tears are at the other end of the spectrum of impingement. The incidence of rotator cuff tears increases with age: approximately 30% of people aged 60 years have tears, and 60% have tears by the age of 70. Several theories for this degeneration have been proposed, from mechanical impingement to vascular changes, neurological weakness and now genetic predisposition. The tears are probably due to a combination of these factors.

Patients present with shoulder pain that radiates to the deltoid and this very often affects sleep. They have a painful arc from 70 to 120 degrees of abduction. If they have a tear, then the degree of weakness depends on the size of the tear and the severity of their pain. The longer the patient has the pain and/or a tear the more the wasting of infraspinatus and supraspinatus may be evident.

The impingement signs are positive, and depending on the other pathologies such as biceps and AC joint involvement, their tests may also be positive and misleading. Plain X-rays will exclude arthritis, calcifying tendinitis and additional AC joint pathology, etc. The signs of impingement on X-ray are sclerosis of the tip of the acromion and cysts or sclerosis of the greater tuberosity (Fig. 5).

Ultrasound in the diagnosis of rotator cuff tears has accuracy greater than 90%, and is simple and cheap to perform. MRI is more expensive and time consuming. It is more helpful where intra-articular pathology is suspected or the chronicity of the tear



Fig. 5. Type 3 acromion with spur.

needs to be determined for prognosis and a decision regarding the reparability of the tear is necessary.

Treatment is directed at the reason for the impingement, e.g. the calcium in calcifying tendinitis. In straightforward impingement the mainstay is physiotherapy, stretching the posterior capsule, strengthening the infraspinatus and subscapularis and avoidance of the impingement position. NSAIDs and heat therapy are beneficial. Subacromial steroids are controversial but widely used. They may not alter the long-term outcome but reliably give short-term relief so that a rehabilitation programme maybe initiated with less pain. They are also diagnostic if the pain is relieved. A 6-month trial of conservative treatment is recommended prior to the surgical option of an acromioplasty.

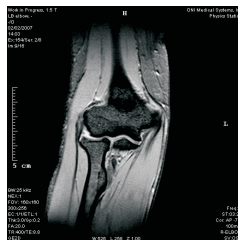
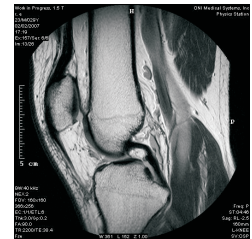
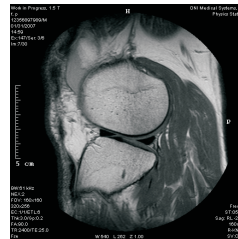
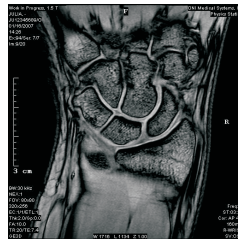
The recommendation for rotator cuff tears varies, depending on whether there is an acute traumatic tear or a chronic degenerative tear. Most surgeons would suggest surgery in acute traumatic tears and in young patients. Older patients were generally defined as those over the age of 60. The degenerative tears were all treated conservatively initially, but some of the thinking has changed, as older people are remaining a lot more active. In addition, there is more evidence showing that the longer the tear is not repaired, the more the collagen fibres and muscle undergo irreversible changes and atrophy.

A counter-argument is that many patients have asymptomatic tears and there are several studies where good results have been achieved when an acromioplasty has been performed without a rotator cuff repair.

The incidence of rotator cuff tears increases with age: approximately 30% of people aged 60 years have tears, and 60% have tears by the age of 70.

From VertecSA, a new look at orthopaedic imaging.

Two leading products, a 1.5T extremity MR with the most powerful gradients of any MR system made - 70 mT/m and 200T/m/sec slew rate, and a high resolution mini c-arm designed to be operated by surgeons.



It has been estimated that over 25% of all MR exams are of the extremities. Now in wide use, the ONI Medical Systems MSK Extreme 1.0T has proved popular with clinicians as it frees up precious time on whole body systems, is easy to operate, does not induce claustrophobia in patients, and has a very high throughput. The **new 1.5T system** adds another dimension of diagnostic confidence as it features the most powerful gradients of any MRI system made so more data is collected to give even more detail in the images.

Designed to be operated by surgeons for fast and precise location of lesions during surgery, the **Hologic InSight** brings a new dimension to high quality imaging. A market leader in the USA and UK, the InSight is easy to use, uses the minimum dose, and is fully digital so images are instant.

For more information, call us.

VertecSA

Vertec Scientific SA (Pty) Ltd

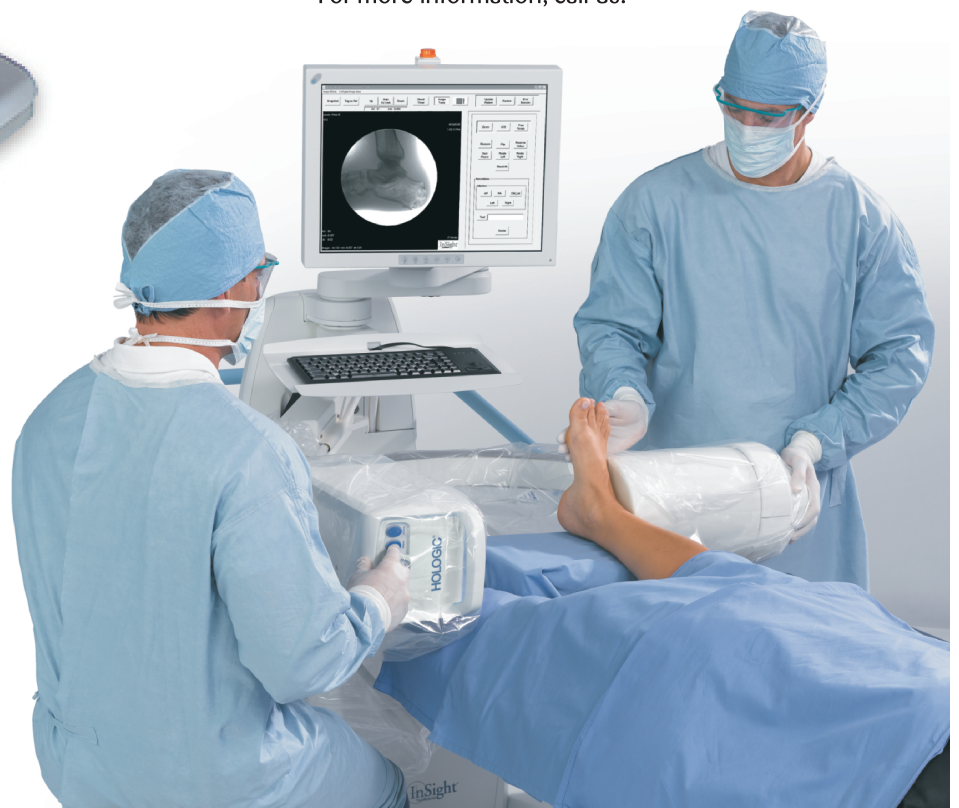
8 Charmaine Avenue,

President Ridge,

Randburg 2194, South Africa

Telephone: +27 11 789 7177 Fax: +27 11 789 7391

Email: sales@vertecsa.co.za www.vertecsa.co.za



Shoulder

There are also reports which show that less than 50% of repaired tendons in large/massive tears remain intact after 5 years. However, repaired tendons which heal have higher shoulder scores. Unfortunately the rehabilitation is slow and prolonged. A shoulder immobiliser is worn for 6 weeks and a strengthening programme is only started after 3 months.



Fig. 6. Reverse shoulder prosthesis.

If the patient is unwilling to undergo the rehabilitation programme or the tendon is not repairable, an acromioplasty, biceps tenotomy/tenodesis may be performed. In the younger patient a tendon transfer of latissimus dorsi or pectoralis major may be used to salvage an unrepairable tendon. In patients over 75 years with this problem a reverse shoulder arthroplasty (Fig. 6) may be used to restore function and relieve pain.

Notes on steroid injections

There are several reviews which suggest that steroids don't alter outcome. They do however give temporary relief and help with the diagnosis. The recommendations are to give them more than 6 weeks apart and not more than 3 in a year. There is no direct evidence that they cause tendon rupture, but they have been shown to alter the collagen and affect healing, and therefore should be used with circumspection.

A sterile technique and single-dose vials should be used, as sepsis, although very rare, is usually devastating! I also warn patients that they may experience an increase in pain for the next 24 hours before it settles.

Summary

A careful history, examination, plain X-rays, diagnostic lignocaine injection and ultrasound examination should allow one to diagnose the common conditions which afflict the shoulder and to initiate conservative management when indicated.

Recommended reading

Bigliani LU, Levine WN. Current concepts review – subacromial impingement syndrome. *J Bone Joint Surg Am* 1997; 79: 1854-1868.

Chambler AFW, Carr AJ. The role of surgery in frozen shoulder. *J Bone Joint Surg Br* 2003; 85B: 789-795.

Hand GCR, Athanasou NA, Matthews T, Carr AJ. The pathology of frozen shoulder. *J Bone Joint Surg Br* 2007; 89B: 928-932.

Harvie P, Pollard TCB, Carr AJ. Calcific tendinitis: Natural history and association with endocrine disorders. *J Shoulder Elbow Surg* 2007; 16: 169-173.

Hughes PJ, Bolton-Maggs B. Calcifying tendinitis. *Curr Orthop* 2002; 16: 389-394.

Iannotti J, Williams G. *Disorders of the Shoulder: Diagnoses and Management*. London: Lippincott Williams & Wilkins, 2006.

Rockwood CA, Matsen F, Wirth M. *The Shoulder*. Philadelphia: WB Saunders, 1998.

Williams GR, Rockwood CA, Bigliani LU, Iannotti JP, Stanwood W. Rotator cuff tears: Why do we repair them? *J Bone Joint Surg Am* 2004; 86: 2764-2776.

In a nutshell

- AC joint arthritis is characterised by local tenderness.
- A steroid injection is diagnostic and therapeutic.
- Frozen shoulder is characterised by loss of motion in all directions and a normal X-ray.
- Explanation and supportive therapy is the mainstay of treatment.
- Calcifying tendinitis is diagnosed on plain X-ray.
- Steroid injections, NSAIDs and aspiration result in resolution of 90%.
- Different causes of impingement must be identified.
- Subacromial injection is diagnostic.
- Ultrasound is accurate for identifying rotator cuff tears.