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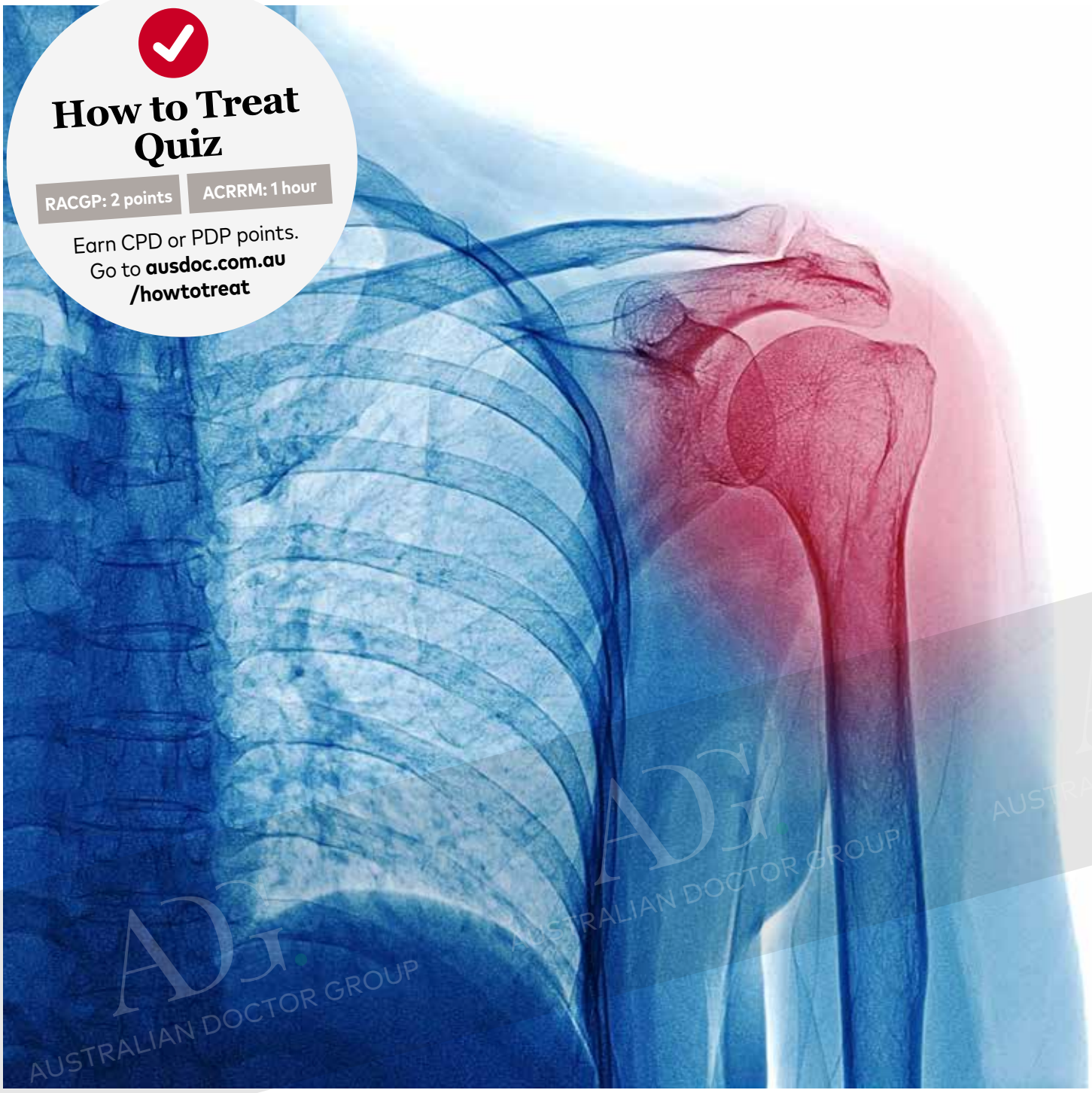

NEED TO KNOW

- It is important to ask whether there has been a traumatic event.
- Testing external rotation with the arm at the side is useful to rule stiffness in or out.
- Stiffness is caused by adhesive capsulitis/frozen shoulder or arthritis; these can be differentiated on X-ray.
- Acromioclavicular joint pain is the only pain in the shoulder that can be localised; the diagnosis can be confirmed with a Bell cross arm type test.
- A tear of the rotator cuff can be ruled in or out by testing external rotator power, supraspinatus power and impingement signs.
- Ultrasound is very helpful to confirm or exclude rotator cuff tears.
- Shoulder instability can be managed with an arthroscopic shoulder stabilisation procedure.
- Shoulder stiffness can be managed with an arthroscopic capsular release.
- Rotator cuff tears can be managed with an arthroscopic rotator cuff repair.
- Glenohumeral joint arthritis or long-standing rotator cuff tears with secondary arthritis are best managed with a shoulder replacement or a reverse total shoulder replacement, respectively.

The painful shoulder

Professor George Murrell
Orthopaedic shoulder surgeon and Director of the Orthopaedic Research Institute, St George Hospital Campus, Kogarah, Sydney, NSW.

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INTRODUCTION

SHOULDER pain is common and often disabling. Disorders of the shoulder affect all ages but are particularly common in individuals who are active in sport, and in work or recreation that involves overhead activities. The clinical tests and imaging modalities used to diagnose shoulder pain have advanced significantly, as have methods to treat shoulder problems. We are moving out of the era of a 'black box' for shoulder pain into an era where the condition can be diagnosed specifically and treated rapidly and effectively.

This How to Treat discusses the major conditions affecting the shoulder. It aims to ensure GPs can perform the appropriate clinical tests and radiological assessments to accurately diagnose these conditions.

ANATOMY OF THE SHOULDER JOINT

THE shoulder is a complex joint that consists of articulations between the clavicle and the sternum, the clavicle and the acromion, and the scapula and the ribcage as well as the glenohumeral articulation. The glenohumeral articulation provides the greatest range of motion of any joint in the body. It is stabilised by a shoulder capsule and ligaments, that can get torn when the shoulder dislocates, and by a set of muscles, the rotator cuff, that helps secure the humeral head in the glenoid and allows overhead function. The rotator cuff, particularly the supraspinatus, is a relative weak point in the system and is prone to failing, particularly as we get older.

MAJOR CONDITIONS AFFECTING THE SHOULDER

THERE are relatively few differential diagnoses to entertain when considering shoulder dysfunction. The shoulder can be too loose (shoulder instability) or too stiff (frozen shoulder), the rotator cuff can dysfunction or there may be a fracture or arthritis. In the author's experience, these four disorders account for over 95% of all shoulder conditions (see table 1).

Instability

The shoulder is the most mobile of all joints. Most of the stability is provided by the labrum – a fibrocartilaginous rim – and the capsule, with its associated thickenings (glenohumeral ligaments). When the shoulder is forcibly dislocated, the capsule and labrum usually become detached from the glenoid neck creating a 'Bankart lesion'. Treatment of traumatic instability is directed at repairing this lesion.

Table 1. Common problems affecting the shoulder, the structures predominantly involved and the relevant age group

Problem	Structure	Age group
Instability	Labrum/capsule	17-30
Stiffness	Capsule	40-60
Impingement	Rotator cuff fatigue	30-60
Rotator cuff tear	Rotator cuff, especially supraspinatus	50+
Acromioclavicular (AC) joint pain	AC joint cartilage	20-40
Arthritis	Glenohumeral joint cartilage	70+

Frozen shoulder

Also known as idiopathic adhesive capsulitis, this condition occurs predominantly in 40-60-year-olds, is slightly more common in women (1.3:1) and in the left shoulder (1.3:1).[1] Why it occurs in this age group and why it usually occurs spontaneously are currently undetermined.[1]

For reasons we do not understand, idiopathic adhesive capsulitis or frozen shoulder, is characterised by a very vascular and painful lining of the shoulder capsule. The capsule becomes thickened, fibrotic and contracted and is populated by a number of small blood vessels and accompanying nerves.[2] While the capsule is normally elastic and less than ▸

Table 2. Common problems of the shoulder, their symptoms and major diagnostic features

Problem	Age group	Symptoms	Diagnostic Features
Instability	17-30	Dislocations	History of dislocation Apprehension sign
Stiffness	40-60	Pain	Loss of external rotation Pain
Impingement	30-60	Pain with overhead activities Pain at night	Impingement signs
Rotator cuff tear	50+	Pain and difficulty performing overhead activities	Impingement signs Weakness of external rotation Weakness of supraspinatus
AC joint pain	20-40	Localised AC joint pain	Bell test (modified O'Brien test) positive
Arthritis	70+	Pain Loss of movement	Crepitus

◂ 2mm thick, in frozen shoulders it becomes up to 7mm thick and rigid. Loss of the normal laxity of the shoulder capsule results in a loss of glenohumeral joint motion. Eventually, at an average of two and a half years, this pathological process reverses and shoulder motion is restored – although not completely.[3]

Rotator cuff

The most important muscles in the shoulder are in the rotator cuff, formed by the subscapularis, infraspinatus, supraspinatus and teres minor. The rotator cuff tendons blend together, surrounding the humeral head to hold it within the glenoid when performing overhead activities. Injury or fatigue of the rotator cuff results in the loss of this ability to hold the humeral head in the glenoid, and the larger deltoid muscle pulls the humeral head upwards causing 'impingement' of the rotator cuff tendons by the acromion. Thickening of the subacromial bursa and tendinosis of supraspinatus occur as part of this 'impingement syndrome'. Persistent impingement leads to ossification, with spur formation of the coracoacromial ligament – a 'hooked' acromion and sclerosis of the greater tuberosity.

DIAGNOSIS

THE first and most important step to take when managing shoulder dysfunction is to make a specific diagnosis (see table 2).

EXAMINATION

Neck

CERVICAL nerve compression may cause shoulder pain. It is useful to rule out significant neck dysfunction by simply asking the patient to flex and extend their neck and look from one side to the other to see if this produces pain or if there is restriction of movement. Bear in mind, however, that shoulder pain can cause neck pain. Patients often activate their trapezius and peri-scapular muscles to move their scapula if they have a painful shoulder. Over-activation of the trapezius and peri-scapular muscles often leads to fatigue and pain in those muscles, which is reflected by pain in the neck and behind the shoulder, and even headaches.

Stiffness

Stiffness can be ruled in or out as a cause of a shoulder problem early in the examination by simply having the patient place their elbow by their side while the examiner gently externally rotates the arm. A block to external rotation, especially if it is rubbery or bony, implies either adhesive capsulitis or osteoarthritis. This can be confirmed by moving the arm in the other planes of movement (see figure 1). In adhesive capsulitis and osteoarthritis movements in all planes will be restricted. Pay particular attention to the movement of the scapula, as in stiff shoulders the scapula will move with the humerus and give the false impression of movement at the glenohumeral joint.

Box 1. The three most useful signs for detecting a rotator cuff tear

- Weakness in external rotation (see figure 2A).
- Weakness in supraspinatus (see figure 2B).
- A positive impingement sign (see figures 3A and 3B).

Rotator cuff tear

The Orthopaedic Research Institute at St George Hospital has carried out a number of studies to determine which diagnostic tests are the most effective in ruling a rotator cuff tear in or out (see box 1).

If two of the tests described in box 1 are positive and the patient is over 60, there is a 98% chance of having a rotator cuff tear. If all three tests are positive the patient also has a 98% chance of having a rotator cuff tear. If two are positive and the patient is under 60, or if one is positive, then the examination is indeterminate. Perhaps most importantly, if none of these tests are positive a rotator cuff tear can be ruled out.[4]

Specific signs

IMPINGEMENT SIGNS

Impingement signs are useful to identify pain in the subacromial space. For the external rotation impingement sign, the arm is abducted to 90 degrees and externally rotated. For internal rotation impingement, the arm is abducted to 90 degrees, brought across the body and then internally rotated. The aim of both manoeuvres is to impinge the rotator cuff and bursa underneath the acromion. A positive sign occurs when the patient has pain. However, these impingement signs are not particularly helpful in making a specific diagnosis as almost any cause of shoulder pain can lead to a positive impingement sign (see figure 3).[5]

Figure 1. Testing passive external rotation with the elbow at the side is a useful means to rule in/rule out stiffness in the shoulder.

Figure 2A. External rotation power.

Figure 2B. Supraspinatus power.

Figure 3A. Impingement test with the arm externally rotated.

Figure 3B. Impingement test with the arm internally rotated.

THE O'BRIEN TEST

The O'Brien test is useful for identifying a superior labral (SLAP, superior labrum anterior and posterior) lesion.[6] The patient is asked to resist the examiner while holding the arm in the illustrated position (90° forward flexion, 15° adduction and the thumb pointing down). A positive test occurs when pain is elicited, and that pain is reduced when retested with the patient's palm facing upwards (see figure 4).

BELL TEST

The modified O'Brien or Bell test is useful for acromioclavicular (AC) joint pathology.[7] With the arm in the O'Brien test position (see figure 4), when the patient has their thumb down, the examiner should stand in front of the patient, put one hand on the arm of affected shoulder (resisting the movement) and the other on opposite shoulder and then ask them to push the affected arm upwards and outwards towards the top corner of the room against resistance (see figure 5). This manoeuvre loads the AC joint and is a very effective test for evaluating AC joint pathology. It is helpful to palpate the AC joint to confirm this is the location of the pain.

If the AC joint tests are positive, the next step is to perform an image guided injection (via ultrasound or X-ray) into the AC joint with local anaesthetic and corticosteroid. The local anaesthetic should relieve the pain, confirming the diagnosis of AC joint pain. A corticosteroid injection is often a good first step measure for managing AC joint pain.

Instability

History is important for instability. The patient will almost always say if the shoulder has dislocated. If the practitioner is concerned about joint instability, there are several tests that can be performed. A useful sign is the sulcus sign – pulling the arm distally and looking for a sulcus underneath the acromion. A sulcus sign of two centimetres or more is an indicator of multidirectional instability.[8] It is an indication that there is gross laxity in the shoulder capsule.

The apprehension sign and its variants – augmentation and relocation signs – are very useful for confirming the diagnosis of traumatic anterior instability.[9]

To carry out the apprehension test, place the patient supine and the arm in external rotation. The test is most reliable when the patient expresses apprehension that the shoulder will 'come out', rather than pain. There are several variants that are helpful: augmentation – increased apprehension when the humeral head is translated anteriorly; and relocation – decreased apprehension when the humeral head is translated posteriorly (see figure 6).

INVESTIGATIONS

X-ray

A PLAIN X-ray is important, as it will identify calcific tendonitis, a very painful condition that can be treated simply, if identified early (see figure 7).[9,10] An X-ray will also rule arthritis in or out as a cause of pain and stiffness. Spur formation on the acromion and/or sclerosis of the greater tuberosity on X-ray can often be a guide to identifying rotator cuff dysfunction.

Ultrasound

Ultrasound is an easy and relatively inexpensive method of confirming or denying the presence of a rotator cuff tear. Shoulder ultrasound is, however, operator dependent, and centres that perform large volumes of musculoskeletal ultrasound are more accurate than those that do not.[11-13] The author uses ultrasound extensively to diagnose rotator cuff tears, frozen shoulder and to follow up rotator cuff repairs.[14]

MRI

A good centre ultrasound is better at identifying the presence and size of rotator cuff tears than MRI.[11,13] If metal anchors have been used to repair the tendon, metal artefacts make determination of the repair difficult on MRI. MRI is helpful when evaluating suprascapular nerve dysfunction, as it can identify a ganglion compressing the suprascapular nerve in the spinoglenoid notch (see figure 8).

MANAGEMENT

THE management of shoulder pain includes both non-operative and operative treatment. Table 3 outlines the management of common disorders of the shoulder.

Table 3. Management of common disorders of the shoulder

Problem	Non-operative treatment	Operative treatment
Instability (traumatic) Instability (multidirectional)	External rotation splint Watson-Warby rehab for scapular stabilisation[16-18]	Surgical stabilisation
Stiffness	Wait two and a half years	Arthroscopic capsular release
Impingement	Corticosteroid injection	Arthroscopic acromioplasty
Rotator cuff tear		Surgical repair
AC joint pain AC joint instability	Corticosteroid injection Wait and see	Distal clavicle excision AC stabilisation
Arthritis Cuff tear arthropathy	Paracetamol, NSAIDs	Total shoulder replacement

Instability

Carefully evaluate the patient presenting in middle age, or older, with a shoulder dislocation for a tear or an avulsion fracture of the rotator cuff. Test for supraspinatus weakness, perform an X-ray, and if concerned, an ultrasound. If there are no tendon injuries or fractures, manage patients who are advancing in age, particularly those over 40, non-operatively as the shoulder becomes tighter with advancing age and recurrence rates are low.[19]

In younger patients (17-40 years) recurrence rates after traumatic instability are high.[19] If immobilisation is considered, place the arm in external rotation using an external rotation pillow or brace as this will force the Bankart lesion to re-appose to the glenoid neck (see figure 9). Do not use a traditional sling. Placing the arm in internal rotation will open up the Bankart lesion and increase recurrence rates.[20]

The ease and technology for repairing Bankart lesions has advanced significantly. The detached labrum can be reattached using suture anchors; these lodge in bone and the attached sutures can be passed through the labrum and capsule to reattach it to the anterior and inferior glenoid margins. The procedure can be performed arthroscopically under local anaesthetic as day surgery, with minimal morbidity.[21]

Multidirectional instability is a problem of capsular laxity and is particularly prevalent in young girls.[22] The first-line management is rehabilitation focusing on scapular control.[16]

Frozen shoulder

The natural history of idiopathic adhesive capsulitis is that it will resolve on its own over two-and-a-half years.[1] One option is, therefore, to wait it out as it will almost always get better. Non-interventional modalities, including physiotherapy, drugs and injections, have not been shown to improve the outcome of frozen shoulder.[24]

An alternative approach is an arthroscopic capsular release. In this procedure, the thickened capsule is divided under direct vision in a circumferential manner around the glenoid (see figure 10). This is very effective at restoring the range of motion and removes pain immediately.[25,26] It is important to combine the surgery with an aggressive post-operative rehabilitation program to maintain motion.[27]

Impingement syndrome and subacromial bursitis

Once a rotator cuff tear has been ruled out, the author recommends counselling the patient to avoid overhead activities.

A single injection of corticosteroid and local anaesthetic into the subacromial space is helpful for relieving pain and decreasing inflammation.[28] The position of insertion of the needle is 1cm medial and 1cm inferior to the postero-lateral corner of the acromion. The needle should be directed upwards towards the anterior edge of the acromion. Redirect the needle downwards if it hits the bone or upwards if it hits tendon (see figure 11). The solution for injection should include a corticosteroid (for example, 1ml of Depo-Medrol 40mg/ml) and 5-10 ml of local anaesthetic (such as 1% lidocaine).

Once the pain has settled down, usually at 3-4 weeks, institute a rehabilitation exercise regimen focusing on external rotation power and endurance (for example, rowing).

In the author's experience, the first injection of corticosteroid is the most helpful, and the response from subsequent injections reduces by 50% on each further injection. The author would not recommend more than three injections of corticosteroid to a given area.

Calcific tendonitis

If identified early, the calcific material can be aspirated under ultrasound guidance.[29] Ultrasound-guided arthroscopic removal of calcific material is a very effective way of resolving the problem.[29] After anaesthesia, ultrasound can be used to place a needle within the calcific material. The surgeon can then follow the path of the ▸

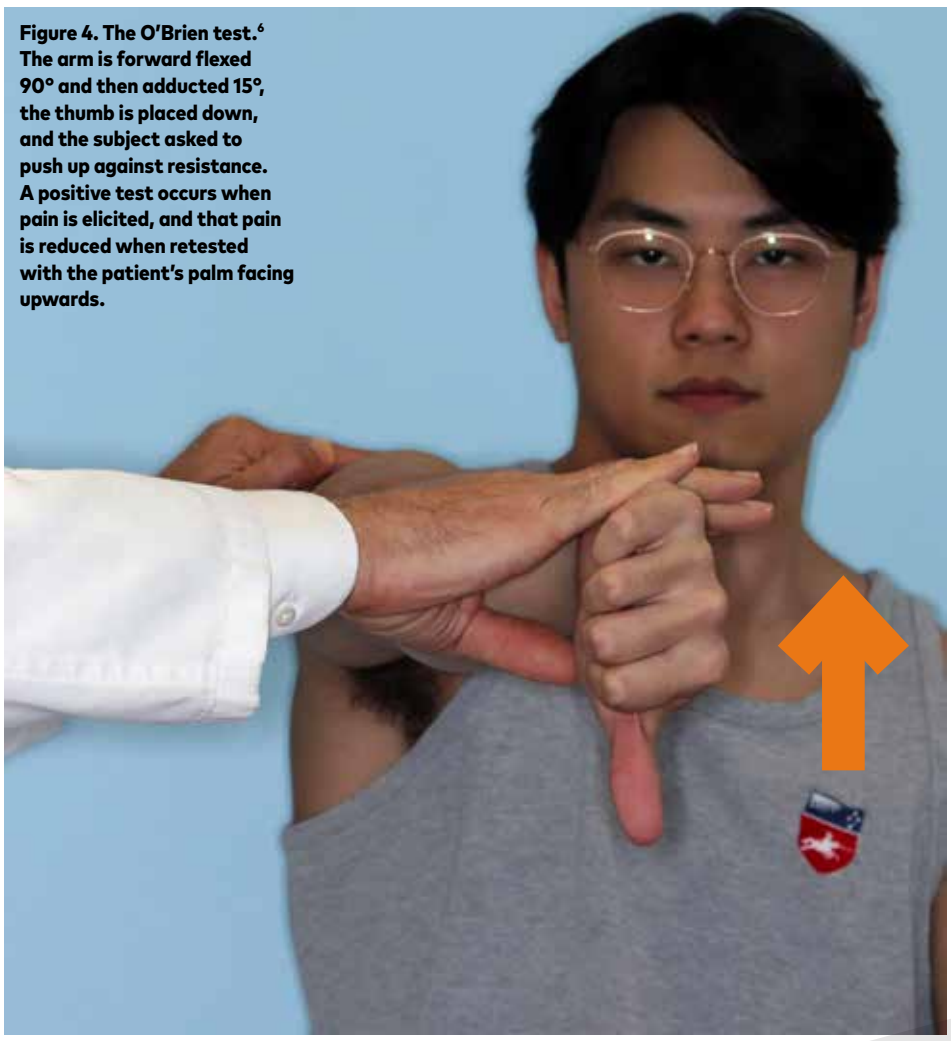


Figure 4. The O'Brien test.[6] The arm is forward flexed 90° and then adducted 15°, the thumb is placed down, and the subject asked to push up against resistance. A positive test occurs when pain is elicited, and that pain is reduced when retested with the patient's palm facing upwards.

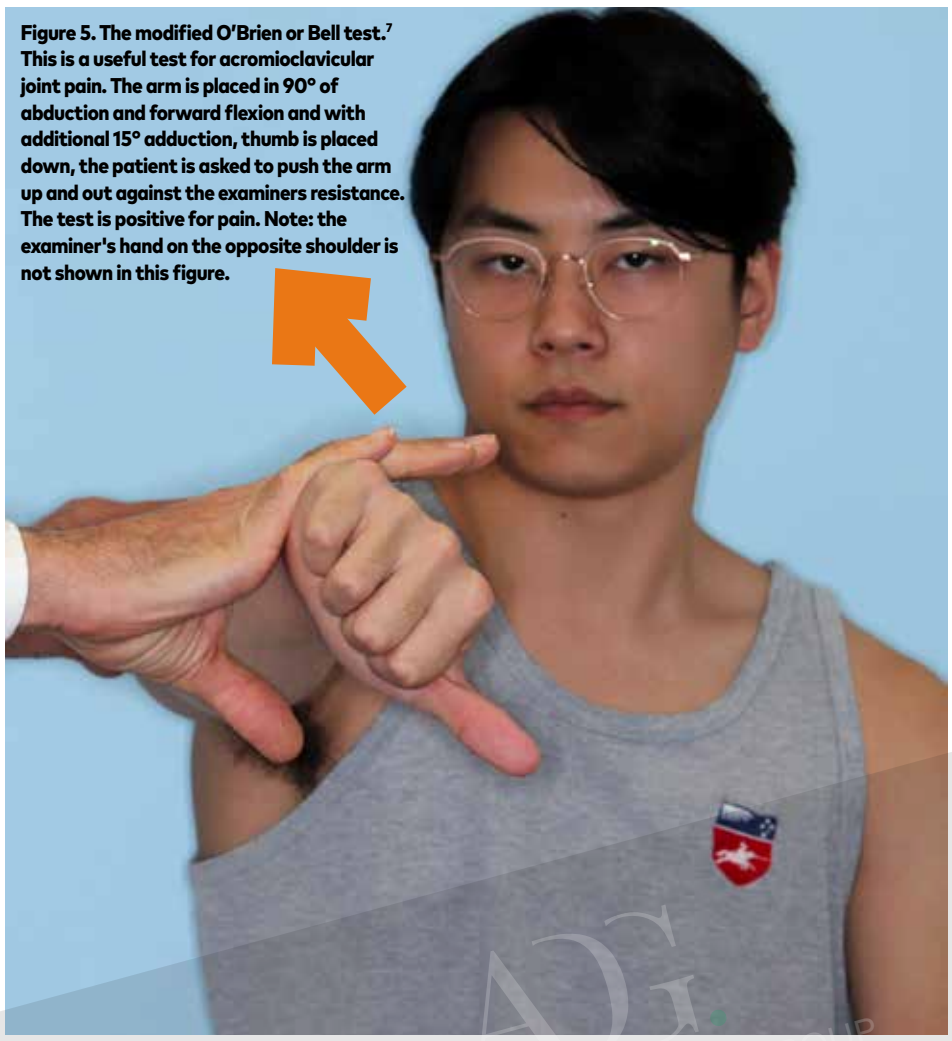


Figure 5. The modified O'Brien or Bell test.[7] This is a useful test for acromioclavicular joint pain. The arm is placed in 90° of abduction and forward flexion and with additional 15° adduction, thumb is placed down, the patient is asked to push the arm up and out against the examiners resistance. The test is positive for pain. Note: the examiner's hand on the opposite shoulder is not shown in this figure.

Figure 6. The apprehension sign for traumatic anterior instability. The patient is supine, ideally with the shoulder slightly hanging off the edge of the table. The arm is placed in external abduction, external rotation position — which would normally cause the shoulder to dislocate. A positive sign is apprehension in this position. Modifications of this are the relocation sign where the pressure is placed down to relocate the humerus in the glenoid which should cause less apprehension and the augmentation sign where the humeral head is translated anteriorly, and this should cause more apprehension.

Figure 7. Radiographic illustration of calcific tendonitis in supraspinatus.

◂ needle into the calcific material and suck it out with a shaver.

Rotator cuff tear

Partial thickness tears (less than 50% of the thickness of the tendon) are initially treated the same way as impingement, with a corticosteroid injection in the subacromial space followed by rehabilitation.[30] Full thickness tears enlarge with time, and the author recommends early surgical repair. Technological advances have made it easier and easier to repair rotator cuff tears under regional anaesthesia as half-day cases.[31,32] The tear is repaired through keyholes using sutures and suture anchors (small metal or plastic anchors that go into bone and stay there permanently, see figure 12). If the tear is too big to fix by direct repair, the defect can be bridged with a synthetic or biological patch. The results of surgery for small tears are outstanding.[31,33] Larger tears, particularly in older individuals, are more likely to fail to heal/tear again.[31]

CUFF TEAR ARTHROPATHY

Small tears often progress to larger tears; when the tear gets so large that it does not hold the humeral head in the glenoid, secondary arthritis or cuff arthropathy develops. Traditionally, cuff tear arthropathy has been hard to manage. However there have recently been major advances in shoulder arthroplasty, whereby a ball is placed in the glenoid socket and a socket is placed in the proximal humerus (reverse total shoulder repair, see figure 13). The mechanics of this design allow the deltoid to function as the rotator cuff and, as such, reverse total shoulder procedures allow patients to regain overhead function. This procedure is proving to be a very effective way of managing severe rotator cuff dysfunction and/or cuff tear arthropathy.[35,36]

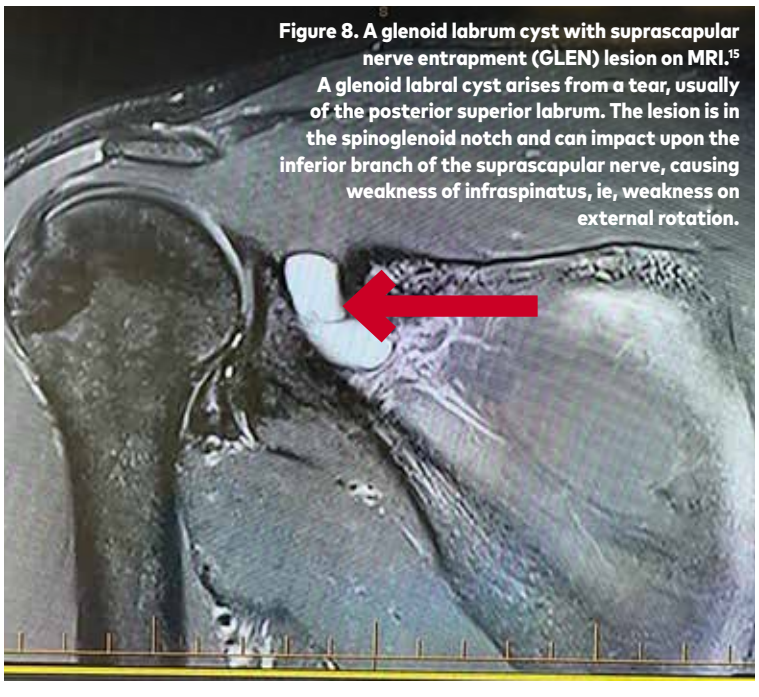


Figure 8. A glenoid labrum cyst with suprascapular nerve entrapment (GLEN) lesion on MRI.[15] A glenoid labral cyst arises from a tear, usually of the posterior superior labrum. The lesion is in the spinoglenoid notch and can impact upon the inferior branch of the suprascapular nerve, causing weakness of infraspinatus, ie, weakness on external rotation.

Biceps tendon rupture

Rupture of the long head of biceps tendon in the bicipital groove can be treated with benign neglect, that is, return to full activities as soon as pain resolves. The only significant adverse outcome is the cosmetic deformity of a 'Popeye' sign (see figure 14). Elbow flexion strength is rarely affected; however, patients may lose power of supination (for example, using a screwdriver). Distal biceps tendon rupture in a young individual is more problematic and early surgical repair should be considered.[37]

Arthritis

The Australian Orthopaedic Association National Joint Replacement Registry notes that arthritis in the shoulder is much less common than in the hip and knee. The treatment for arthritis in the shoulder is the same as for other joints (see figure 15). NSAIDs may be helpful initially. In the later stages, a shoulder replacement is a very effective means of improving pain.

CASE STUDIES

Case study one

AMY, 45, a clothing retail worker presents with pain in her left shoulder. She says the problem began around three months ago, after a long day at work hanging up clothes on overhead racks. The pain is particularly bad at night. She has recently started having difficulty doing up her bra.

Examination shows a restricted range of motion, particularly in external rotation. The shoulder is painful and globally weak. X-rays are unremarkable. Ultrasound shows blocking on abduction.

Amy is diagnosed with adhesive capsulitis or frozen shoulder.

The specialist discusses Amy's options with her. She can either wait it out and the condition will gradually get better on its own over, on average, two and a half years, or she can undergo an arthroscopic capsular release. The advantage of arthroscopic capsular release is that it will provide almost immediate pain relief and almost immediate return of range of motion.

PAGE 20 ▸

Figures 9A and B. External rotation brace is a method to treat traumatic anterior instability non-operatively. The patient wears this brace, day and night, for three weeks. It is important to ensure that there is maximal external rotation of the shoulder.[23]

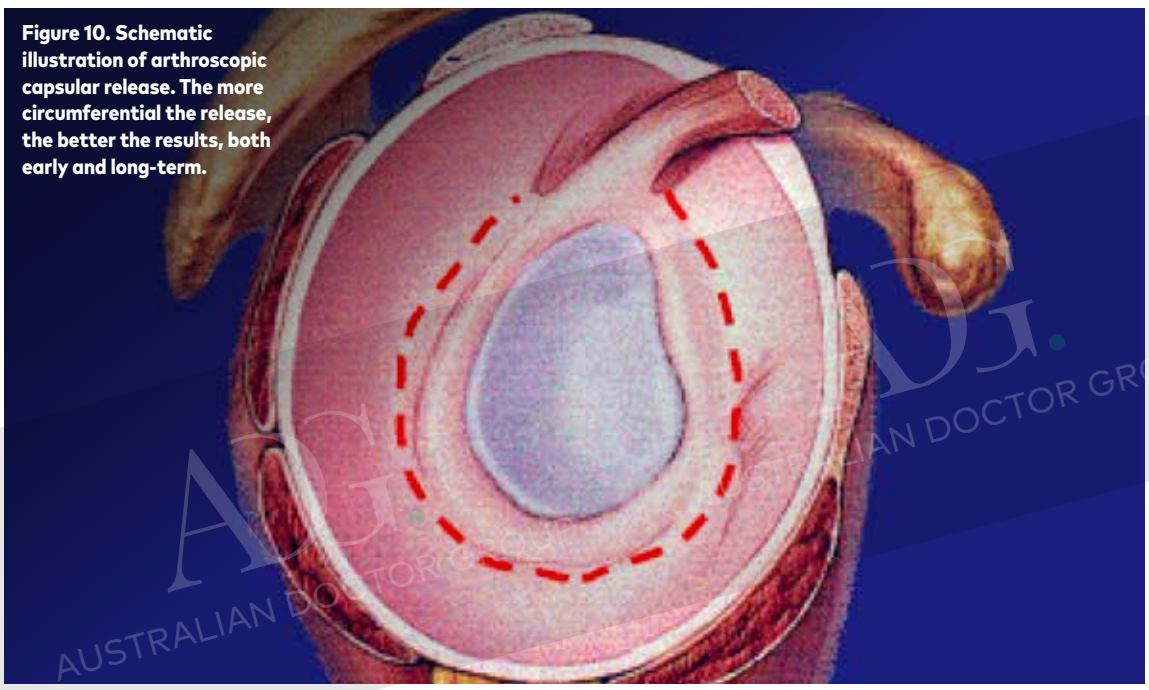


Figure 10. Schematic illustration of arthroscopic capsular release. The more circumferential the release, the better the results, both early and long-term.

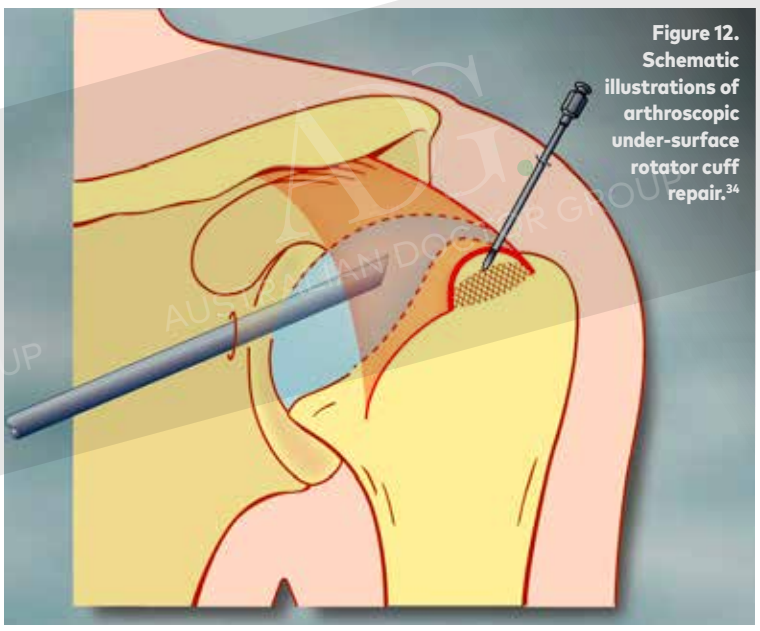


Figure 12. Schematic illustrations of arthroscopic under-surface rotator cuff repair.[34]

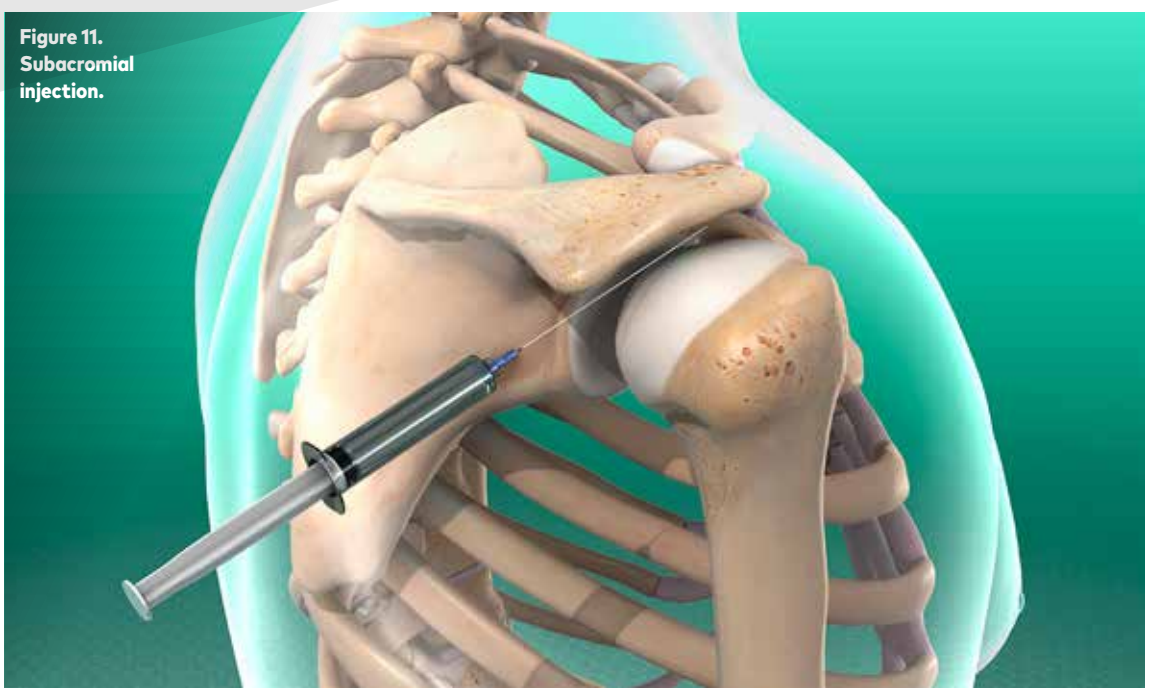
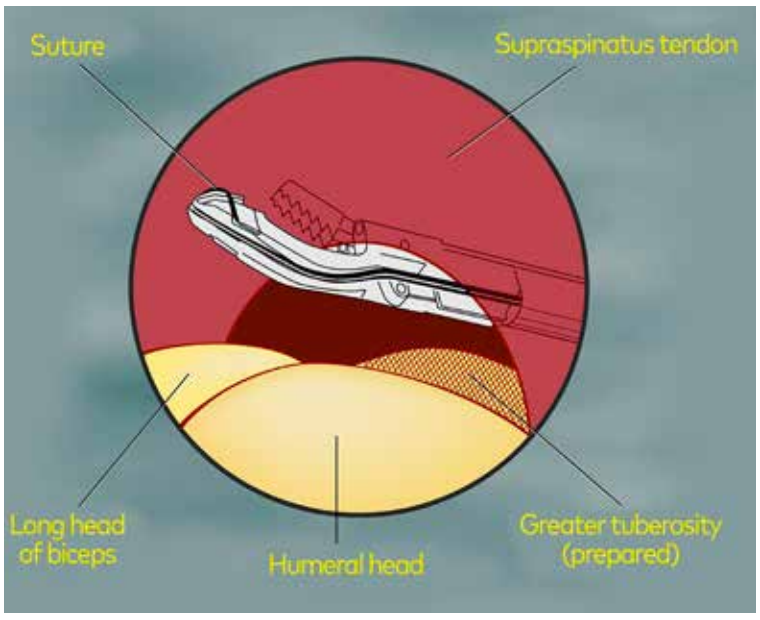
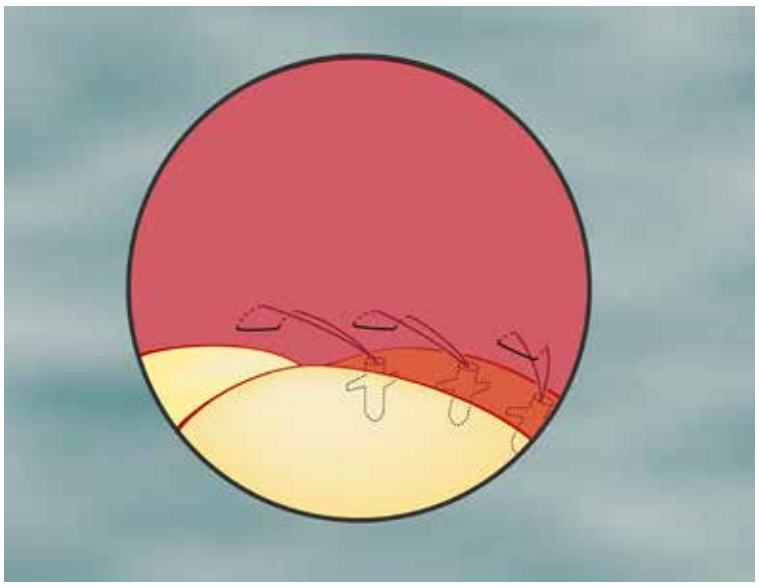


Figure 11. Subacromial injection.





◂PAGE 18

Case study two

Owen, 85, is a former coal worker who presents with a right shoulder problem. He had fallen at work 20 years earlier and experienced pain at that time which had settled with no active treatment. He has recently noticed that he has difficulty performing overhead activities.

Examination shows weakness on external rotation as well as weakness on supraspinatus testing. There is some crepitation and a restricted range of motion.

X-rays show severe glenohumeral joint arthritis, with proximal humeral head migration (see figure 16).

Ultrasound shows massive, irreparable rotator tears involving supraspinatus and infraspinatus.

Owen is diagnosed with cuff tear arthropathy.

The procedure that would be of most benefit is a reverse total shoulder repair. This is likely to restore his overhead function and remove the pain.

CONCLUSION

SHOULDER pain is common, affecting all age groups. Shoulder dysfunction is usually caused by the shoulder capsule being too tight or too loose, by the rotator cuff musculotendinous unit being damaged or fatigued, and, less frequently, from damage to the articular cartilage of the glenohumeral joint or acromioclavicular joint.

The most important approach in understanding shoulder pain is to make the right diagnosis. A clinical examination can rule many of the PAGE 22 ▸

Figure 13. An X-ray of a reverse total shoulder repair.

Figure 15A. X-ray is a critical investigation to rule in/rule out arthritis. Note the loss of joint space, osteophytes (arrow), subchondral sclerosis. Note the metallic anchor in the greater tuberosity from a previous successful rotator cuff repair.

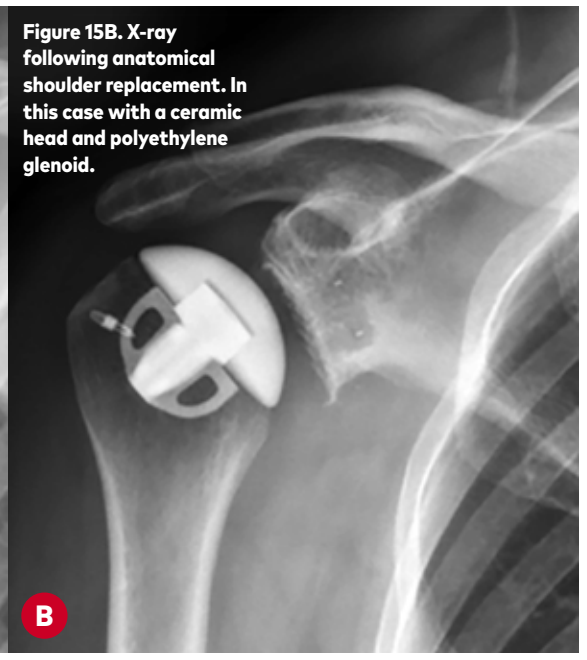


Figure 15B. X-ray following anatomical shoulder replacement. In this case with a ceramic head and polyethylene glenoid.

Figure 14. Rupture of the tendon of the long head of biceps, the so-called Popeye sign.

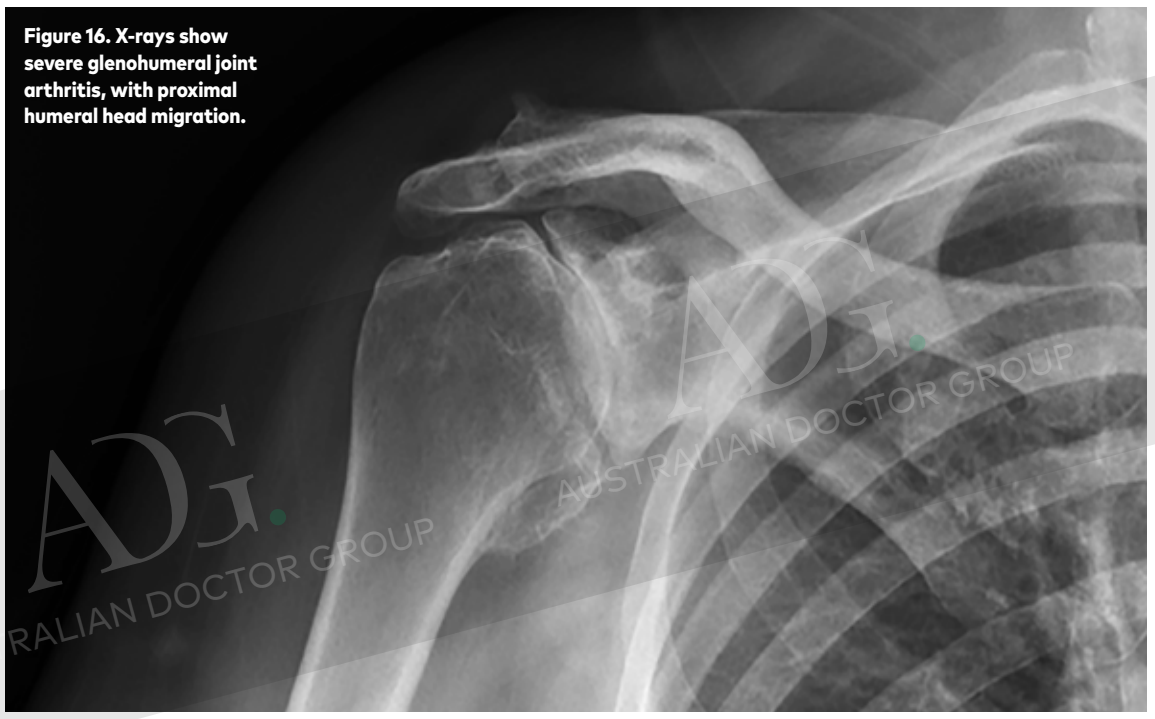


Figure 16. X-rays show severe glenohumeral joint arthritis, with proximal humeral head migration.

How to Treat Quiz.

THE PAINFUL SHOULDER

GO ONLINE TO COMPLETE THE QUIZ **ausdoc.com.au/howtotreat**

1. **Which THREE groups of people are more vulnerable to shoulder injuries?**
   - **a** The overweight or obese.
   - **b** Those active in sport.
   - **c** Those over 65.
   - **d** Work or recreation that involves overhead activities.

2. **Which ONE shoulder articulation provides the greatest range of motion of any joint in the body?**
   - **a** Sternoclavicular articulation.
   - **b** Glenohumeral articulation.
   - **c** Acromioclavicular articulation.
   - **d** Scapular and ribcage articulation.

3. **Which THREE shoulder conditions most commonly affect those over 30?**
   - **a** Stiffness.
   - **b** Impingement.
   - **c** Arthritis.
   - **d** Instability.

4. **Which TWO statements regarding shoulder pain are correct?**
   - **a** Most of the stability is provided by the rotator cuff.
   - **b** Frozen shoulder is slightly more common in women and in the left shoulder.
   - **c** Persistent shoulder impingement leads to ossification and sclerosis of the greater tuberosity.
   - **d** Frozen shoulder is characterised by an avascular and painful lining of the shoulder capsule.

5. **Which ONE shoulder condition usually does NOT present with pain at night?**
   - **a** Rotator cuff tear.
   - **b** AC joint pain.
   - **c** Impingement.
   - **d** Arthritis.

6. **Which THREE statements regarding the examination of a painful shoulder are correct?**
   - **a** Cervical nerve compression may cause shoulder pain.
   - **b** Stiffness can be ruled in or out by simply having the patient place their elbow by their side while the examiner gently externally rotates the arm.
   - **c** In a torn rotator cuff movements in all planes will be restricted.
   - **d** Impingement signs are useful to identify pain in the subacromial space.

7. **Which ONE lesion is best identified by a positive O'Brien test?**
   - **a** Rotator cuff tear.
   - **b** SLAP lesion.
   - **c** Traumatic anterior instability.
   - **d** AC joint pathology.

8. **Which THREE imaging modalities may be useful in identifying the cause of shoulder pain?**
   - **a** CT scan.
   - **b** X-ray.
   - **c** MRI.
   - **d** Ultrasound.

9. **Which TWO statements regarding the management of shoulder pain are correct?**
   - **a** Patients may lose power of pronation following biceps tendon rupture.
   - **b** Partial thickness rotator cuff tears (less than 50% thickness) are initially treated with a corticosteroid injection followed by rehabilitation.
   - **c** The results of surgery for both small and large rotator cuff tears are outstanding.
   - **d** A single injection of corticosteroid and local anaesthetic into the subacromial space is helpful in impingement syndrome and subacromial bursitis.

10. **Which THREE statements regarding the management of shoulder pain are correct?**
    - **a** Multidirectional instability responds well to an external rotation splint.
    - **b** The natural history of idiopathic adhesive capsulitis is that it will resolve on its own over two-and-a-half years.
    - **c** Shoulder replacement is a very effective means of improving pain in late-stage arthritis.
    - **d** Treatment for AC joint pain includes corticosteroid injection and distal clavicle excision.

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◂ PAGE 20 major disorders in or out, particularly stiffness, instability and rotator cuff dysfunction.

X-ray and ultrasound are helpful secondary line investigations.

AC joint pain is the one shoulder disorder where pain is localised. Stiffness can be confirmed by testing external rotation motion and traumatic anterior shoulder instability by an apprehension test. Rotator cuff function can be checked by a combination of assessing power of external rotation and supraspinatus, and by checking for impingement signs.

X-rays are useful for diagnosing calcific tendonitis, glenohumeral joint arthritis and cuff-tear arthropathy.

Ultrasound is used to confirm a rotator cuff tear. A single corticosteroid injection in the relevant location is a useful first-line treatment for AC joint pain and impingement.

Persistent impingement, instability, stiffness and many rotator cuff tears can be restored effectively with arthroscopic surgery. Shoulder replacement is effective for treating severe glenohumeral joint arthritis and cuff tear arthropathy.

Conflict of interest declaration

Professor Murrell is on the editorial or governing board of the *Journal of Shoulder and Elbow Surgery* and *Shoulder and Elbow*. He is also a paid consultant and provides research support to Smith and Nephew.

References on request from howtotreat@adg.com.au