# The unstable shoulder

*Andrew L Wallace, Susan Alexander, Chinmay M Gupte*

***Not all unstable shoulders are the same, and careful patient selection ensures proper treatment. Improved understanding of the mechanisms of stability, advances in imaging and arthroscopic technology mean that repeated visits to the emergency department with a painful dislocated shoulder should be a thing of the past.***

Dislocation of the shoulder has been of medical interest since the time of Hippocrates (c. 2400 BC) and it continues to be a common and disabling condition, primarily affecting the young and active. In his youthful enthusiasm Winston Churchill dislocated his right shoulder while leaping from a boat on his arrival in India in 1896, and thereafter had numerous recurrences, having to be careful when playing polo during his days as war correspondent, and even when making expansive gestures during orations in the House of Commons (Jenkins, 2001).

Although shoulder instability is a familiar entity, poor understanding of the pathology and natural history of the condition, and of the non-operative and operative treatment options available, frequently results in patients being wrongly advised or inappropriately referred. Instability of the shoulder can be described based on the degree of initial trauma (traumatic or atraumatic), the extent of instability (subluxation or dislocation), the direction (anterior, posterior, inferior or multidirectional) and the nature of the condition (acute, recurrent or chronic), as well as the presence of any voluntary component. Unfortunately, since shoulder instability forms a spectrum of clinical presentation, at present there is no agreed universal scheme for classification.

The stability of the shoulder is basically dependent upon dynamic factors such as neuromuscular control of the scapular and rotator cuff muscles, and static factors such as the structural integrity of the bony elements, labrum and ligaments. Non-operative rehabilitation programmes under physiotherapist supervision can address deficiencies in the dynamic component; surgical intervention can address deficiencies in the static component. In recent years considerable advances in both areas have provided more reliable outcomes for patients with unstable shoulders.

**Mr Andrew L Wallace** is Consultant Orthopaedic Surgeon, St Mary's Hospital, London W2 1NY, **Ms Susan Alexander** is Research Fellow, Kennedy Institute of Rheumatology Division, Imperial College London, and **Mr Chinmay M Gupte** is Specialist Orthopaedic Registrar, Charing Cross Hospital, London

*Correspondence to: Mr AL Wallace*

## PATHOMECHANICS

Anterior dislocation of the shoulder is one of the most common reasons for presentation to the emergency department, affecting approximately 2% of the population. Most cases follow a distinct traumatic episode when the upper limb is forcibly abducted and externally rotated, often during sports or recreational pursuits. The fibrocartilaginous labrum and capsule of the glenohumeral joint (*Figure 1a*) are avulsed from the bony rim of the glenoid cavity as the humeral head dislocates anteriorly (*Figure 1b*; *Figure 2*).

This 'essential lesion' was first described by Bankart in 1923 (Bankart, 1938) and has long been regarded as the primary pathology of the initial dislocation episode and the major reason for recurrence. The likelihood of recurrence is directly related to the age at which the first dislocation occurs. In a young active person, the risk of further painful distressing episodes of instability requiring emergency hospital treatment is high (at least 50%), particularly if the individual continues to engage in physical activity (Hovelius et al, 1996).

### Diagnosis

Most cases of shoulder instability can be classified and treatment plans determined based on an accurate history and physical examination. It is important to elucidate the mechanism of the accident and position of the arm at the moment of the injury, as well as events in the immediate aftermath. A strong family history of shoulder instability, repetitive overuse in work or in gymnastics, throwing sports or butterfly swimming may well be relevant, particularly in the context of atraumatic or multidirectional instability. Epilepsy is often an aetiological factor in presentation with posterior instability.

In patients with anterior instability, abduction and external rotation of the arm may induce a feeling of apprehension or impending subluxation. Conversely, adduction and internal rotation

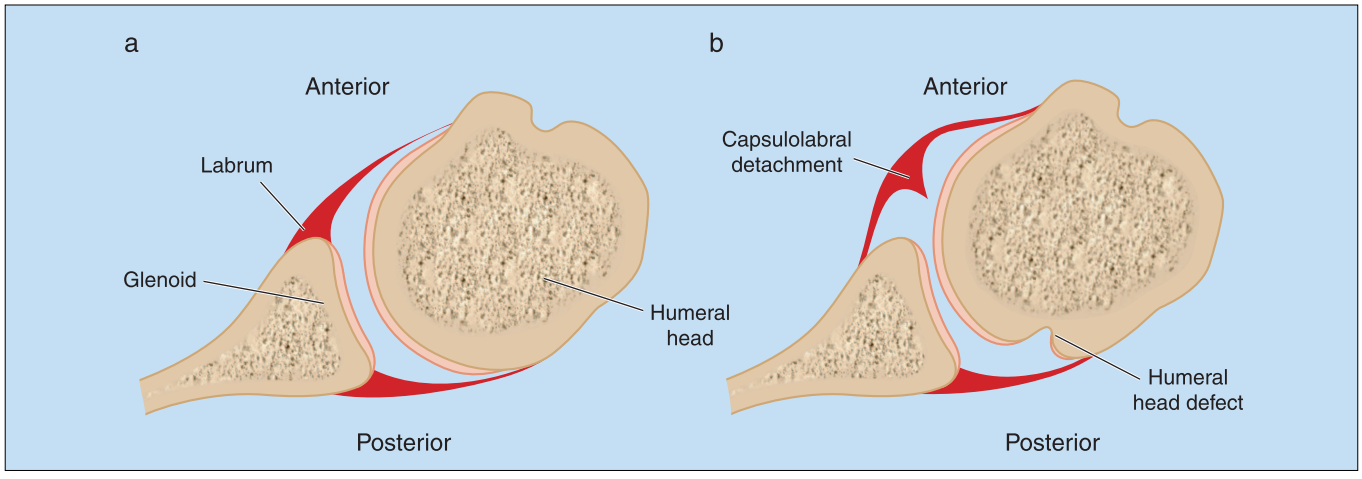


*Figure 1. Diagram showing (a) axial view of a normal left glenohumeral joint and (b) the classic pathological features of anterior instability. The humeral head defect results from compression upon the exposed anterior glenoid rim during the dislocation event.*

of the flexed arm may cause the humeral head to sublux in posterior instability, reducing with a 'clunk' on abduction. Generalized joint hypermobility may be a feature of multidirectional instability.

Imaging with simple radiographs is usually sufficient to determine the specific diagnosis and exclude associated bony injuries (*Figure 3*), but if the history is not conclusive or the symptoms suggest pain or subluxation rather than obvious dislocation, then magnetic resonance imaging (MRI) can be helpful in defining the extent of labral pathology and the presence of associated bone and soft tissue injuries (*Figure 4*).

## Emergency treatment

Initial management of the unstable shoulder varies considerably. The authors recently surveyed more than 60 emergency departments across the UK, but of these only 12 had an established protocol for reduction of the dislocated shoulder. This is surprising, given that nearly one in five were referred to the orthopaedic team because of failure of attempted reduction by the emergency department staff. Most doctors had been taught methods of reduction (usually either the Kocher or Hippocratic technique) 'on the job' rather than in a structured tutorial.

Complications of the dislocated shoulder include fractures of the glenoid rim or greater tuberosity of the humerus, rotator cuff tears, and injury to the axillary nerve, axillary vessels or brachial plexus. Awareness of these complications was limited with 39% of doctors able to identify only one or two potential problems. Finally very few patients were referred to specialist shoulder clinics, with virtually all being seen for review in general orthopaedic clinics.

Most patients are treated with some form of immobilization in a sling for 3–6 weeks. Biomechanical and clinical research by Itoi et al (2002) has suggested that the traditional position of immobilization, with the arm internally rotated across the chest, may not be optimal for

*Figure 2. Arthroscopic view of the anterior glenoid rim, showing the humeral head on the left, the cartilage surface of the glenoid in the background and the detached anterior labrum in the foreground with associated synovitis.*

*Figure 3. Anteroposterior radiograph of a right shoulder, demonstrating subcoracoid position of the humeral head typical of anterior instability.*

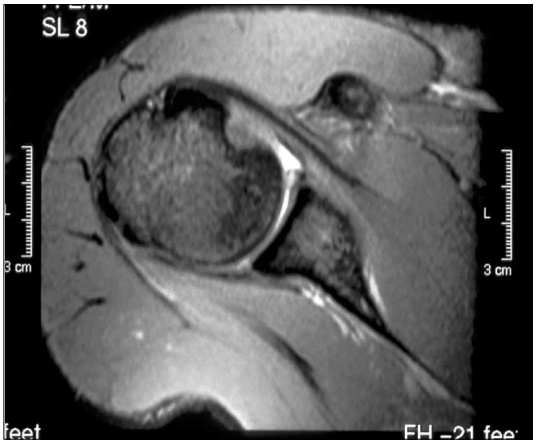


*Figure 4. Axial magnetic resonance image of a right shoulder demonstrating an effusion in the glenohumeral joint, together with detachment of the posterior labrum and a notch defect in the anterior humeral head, typical of posterior instability.*

healing of the capsulolabral detachment. MRI has revealed that in internal rotation, medial displacement of the labrum and buckling of the capsule along the glenoid neck occurs, leaving the glenoid rim exposed. When the arm is externally rotated, the capsulolabral complex reduces into near-anatomical position. Prospective trials are currently in progress to evaluate these findings in a large clinical series, although ensuring compliance with an external rotation brace may be difficult.

**Surgical stabilization**

In a Swedish prospective randomized multicentre trial of active patients aged 16–30 years, arthroscopic lavage following the primary dislocation event reduced the recurrence rate from 43% to 13% (Wintzell et al, 2000). In a Canadian prospective, randomized controlled trial, arthroscopic repair of the labral detachment with bioabsorbable tacks similarly reduced the risk of actual recurrence (47% *vs* 16%) when compared to conventional treatment in a sling followed by early active mobilization (Kirkley et al, 1999).

For those patients with established recurrent instability, rehabilitation programmes involving physical exercises and muscle strengthening are often ineffective because of the underlying structural deficiency. Surgical stabilization is frequently considered, although the choice of surgical procedure needs to be carefully weighed against the domestic, occupational and recreational demands of the individual patient. Techniques for open reconstruction of the capsulolabral complex have been described with postoperative recurrence rates of less than 5% (Rowe et al, 1978; Hovelius et al, 2001) but these procedures may often result in significant joint stiffness.

Development of minimally-invasive techniques of arthroscopic stabilization have been the subject of intensive effort by orthopaedic surgeons in recent years. Although early reports were encouraging, longer term studies have generally failed to match the success of the open procedures (Sperber et al, 2001). It has now been recognized that although labral repair can be adequately achieved using implantable tacks or suture anchors (*Figure 5*), failure to address the issue of the excess capsular laxity may be responsible for the differential results (Speer et al, 1996). Treating capsular laxity by adjunctive capsular shift, plication or thermal modification has improved results of arthroscopic labral repair and outcomes are now expected to match those for open surgery (Gartsman et al, 2000; Kim et al, 2002).

**Consequences of instability**

While surgery can relieve the symptoms of instability, it is not known whether the risk of secondary degenerative joint disease (DJD) is altered. In non-operatively treated unstable shoulders, the prevalence of radiographical evidence of DJD was 20% after 10 years (Hovelius et al, 1996). A history of shoulder dislocation is associated with a 10–20 times greater likelihood for total shoulder replacement in later life, compared to those who have never had a dislocation (Marx et al, 2002). Unfortunately, even though

*Figure 5. Anteroposterior radiograph of a left shoulder, showing three titanium suture anchors used for arthroscopic repair of the detached labrum along the anteroinferior rim of the glenoid fossa. There is an osteophyte developing on the inferior humeral head indicative of evolving degenerative joint disease.*

this risk is impressive, open surgical stabilization seems to be associated with an even greater risk of DJD.

Long-term reviews have revealed presence of degenerative change in up to 60% of shoulders (Hovelius et al, 2001), but it is not yet clear whether this is a result of the severity of the initial traumatic event, the number of recurrent episodes or the abnormal constraint of the joint as a result of excessive scarring of the anterior capsule and musculature. Reports of arthroscopic stabilization are presently of insufficient duration of follow up to determine whether this risk can be altered. Although in most patients the time interval between onset of instability and development of DJD is lengthy, the factors predicting risk deserve closer study in properly constructed trials comparing non-operative and operative treatment strategies.

**The future**

There is an urgent need to agree standardized protocols for initial reduction, improve awareness of complications and ensure adequate aftercare so that affected patients may be counselled about the likely natural history and relative risks of treatment options.

Arthroscopic stabilization (*Figure 6*) can reduce recurrence, and since the inherent surgical risks are reasonably low, early referral to an orthopaedic surgeon with an interest in shoulder surgery should be a priority. The case for stabilization when there have been several recurrences is clear-cut; decision making after the first dislocation is more difficult. Arthroscopic stabilization of all primary dislocations may imply over treatment of a minority of patients who would not otherwise develop recurrence, but this decision is probably justified if the patient is young and wishes to remain active in sports and leisure activities, particularly if the consequences of further dislocations may in themselves be dangerous (such as in collision sports, rock-climbing or surfing) or impact directly on the individual's livelihood. HM

*Conflict of interest: The authors have received research support from a commercial company indirectly related to the subject of this article.*

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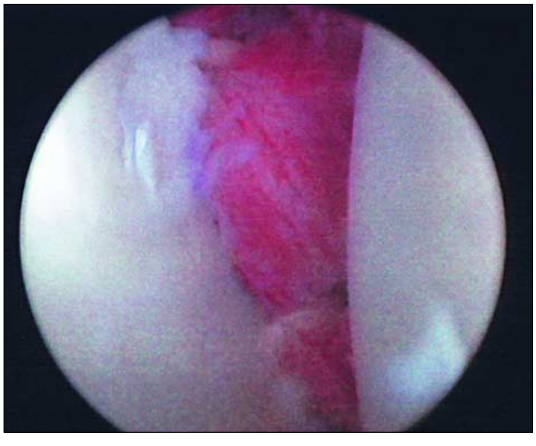
***Figure 6. Arthroscopic view from the posterior portal showing a completed arthroscopic labral repair with the labrum repositioned at the margin of the glenoid rim using absorbable suture anchors.***



## KEY POINTS

- Shoulder instability is a spectrum of conditions.
- Physiotherapy and surgery are complementary.
- Newer minimally-invasive surgery can stabilize the shoulder effectively.
- Instability leads to degenerative arthritis, despite successful surgical stabilization.
- Early referral for orthopaedic opinion after primary dislocation is vital.