

Clinical tests in shoulder examination: how to perform them

Maarten Hendrik Moen,¹ Robert-Jan de Vos,² Todd S Ellenbecker,³ Adam Weir²

¹University Medical Center Utrecht, Utrecht, The Netherlands

²Medical Center Haaglanden, Leidschendam, The Netherlands

³Scottsdale Sports Clinic, Scottsdale, Arizona, USA

Correspondence to

Mr Maarten Hendrik Moen, University Medical Center Utrecht, Heidelberglaan 100, Utrecht 3584 CX, The Netherlands; m.moen@umcutrecht.nl

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ABSTRACT

Background This article describes the best clinical tests of shoulder function and injury as identified in a recent systematic review published in the *British Journal of Sports Medicine*.

Discussion A description of the different tests is given, with photographs of the exact test procedure.

INTRODUCTION

The shoulder is often considered a difficult joint to examine, and this is partly due to the large number of different clinical tests of shoulder function. At least 109 separate shoulder tests have been described,¹ and for the sports-medicine specialist, orthopaedic surgeon and sports physical therapist, it can be hard to choose the right clinical test from all the available possibilities. Recently published qualitative articles and reviews have provided important information on the diagnostic accuracy and clinical application of the various clinical tests for shoulder injuries. The commonest shoulder injuries include: impingement,^{2,3} rotator cuff injuries,⁴ labral tears,⁵ instability⁶ and acromioclavicular dysfunction.⁷

A large systematic review of the clinical shoulder tests was recently published by Hegedus *et al* in this journal.⁸ They stated that ‘clearly we need larger methodologically robust studies on history and physical examination,’ because ‘few clinical tests are sufficiently diagnostically discriminatory.’ In addition, imaging for impingement, rotator cuff injury, instability, labral tears and acromioclavicular disorders may provide false-positive and false-negative results, and it has therefore been proposed that traditional clinical examination of the shoulder should remain the corner stone for diagnosis.^{9,10} Despite this pessimism, Hegedus *et al* provided the best overview of the clinical shoulder tests available at present.

This article will describe the best clinical shoulder tests as rated in this systematic review and meta-analysis of the individual tests.⁸ The chosen tests were selected from those recommended by Hegedus *et al* with two additional tests associated with a high degree of sensitivity and specificity. For a full description of the diagnostic accuracy of the tests, the reader is referred to the review of Hegedus *et al*.⁸

A description of the individual tests that might be useful in the diagnosis of specific shoulder injuries is given, along with photographs of the test procedure. When describing each clinical test, the first published version of that test was used and has been quoted as exactly as possible.

CLINICAL SHOULDER TESTS

Impingement tests

Neer test¹¹

- ▶ Posture: patient seated or standing and the examiner standing.
- ▶ Fixation: ipsilateral scapula to prevent protraction.
- ▶ Test: passive forward elevation of the arm (figure 1).
- ▶ Pay attention to: pain in the shoulder. The pain is relieved by injecting 10 ml of lidocaine beneath the anterior acromion.
- ▶ Background: the tuberculum majus impinges the degenerated supraspinatus and subacromial bursa against the acromion.

Hawkins–Kennedy test¹²

- ▶ Posture: seated or standing, with arm in 90° in forward elevation in the scapular plane.
- ▶ Fixation: stabilisation of the scapula to minimise upward rotation during performance of the internal rotation manoeuvre.
- ▶ Test: passive internal rotation of the shoulder until pain occurs (figure 2).
- ▶ Pay attention to: pain with forced internal rotation.
- ▶ Background: the tuberculum majus forces the supraspinatus tendon against the coracoacromial ligament.

Empty can test¹³

- ▶ Posture: sitting or standing, shoulders in 90° abduction, 30° of horizontal adduction and full internal rotation.
- ▶ Fixation: the examiner places their hands on the upper side of the upper arm.
- ▶ Test: the patient maintains this position against downwards resistance (figure 3).
- ▶ Pay attention to: primarily muscle weakness, less attention should be paid to pain.
- ▶ Background: strength test of the supraspinatus muscle. The subscapularis, infraspinatus and teres minor are electrically comparatively silent in this position.

Commentary on the impingement tests⁸

The Neer test and Hawkins–Kennedy test can be used as screening tests, and the empty can test may serve as a confirmatory test.

Rotator cuff tests

External rotation lag sign¹⁴

- ▶ Posture: seated with the back towards the examiner. The shoulder in 20° abduction, the elbow in 90° flexion and maximal external rotation minus 5° to avoid elastic recoil in the shoulder.



Figure 1 Neer test.

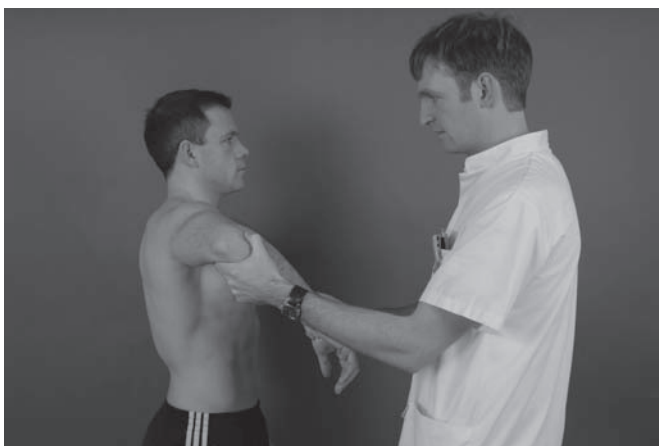


Figure 2 Hawkins–Kennedy test.

- ▶ Fixation: the examiner supports the elbow and holds the wrist in this position.
- ▶ Test: the patient is asked to maintain this position, while the examiner releases the wrist (figure 4).
- ▶ Pay attention to: the capacity of the patient to hold the arm in the same position. When an angular drop (lag sign) occurs, the test is positive.
- ▶ Background: a lag sign of more than 5° is suggestive of a (partial) tear of the infraspinatus or supraspinatus tendons.



Figure 3 Empty can test.

Drop arm test¹⁵

- ▶ Posture: supine or sitting with the arm next to the body.
- ▶ Fixation: no fixation is applied.
- ▶ Test: the patient abducts the arm horizontally. Then, the arm descends actively to the horizontal position and further (figure 5).
- ▶ Pay attention to: during the last 90° of descent to the anatomical position the patient may lean to the affected side and may lower the whole arm quite suddenly in abduction.
- ▶ Background: originally this test was designed for the assessment of supraspinatus tendon tears. Later on, the test was also used to assess infraspinatus injuries.

Supine impingement test¹⁶

- ▶ Posture: patient supine with arms on the table.
- ▶ Fixation: the examiner elevates the arm to full elevation.
- ▶ Test: the hand is supinated and the arm is adducted against the ear. The arm is then internally rotated (figure 6).
- ▶ Pay attention to: the test is positive if the manoeuvre produces an increase in pain.
- ▶ Background: the test was designed to assess any rotator cuff tear. Pain results from narrowing and compressing the subacromial space.

Belly press test¹⁷

- ▶ Posture: patient is sitting with the hand of the affected arm on the abdomen.
- ▶ Fixation: no fixation is applied.
- ▶ Test: patient exerts pressure on the abdomen with the hand until maximal internal rotation (figure 7).
- ▶ Pay attention to: the patient feels weakness and cannot maintain maximal internal rotation. The elbow drops backwards, and internal rotation is lost. Pressure is exerted by extension of the shoulder and flexion of the wrist.
- ▶ Background: the test was designed as an alternative to the lift-off test¹⁸ for shoulders that had decreased internal rotation.

Commentary on the rotator cuff tests⁸

The external rotation lag sign has a value as a specific test for the infraspinatus and supraspinatus muscles. The drop arm test produces few false-positive tests assessing the infraspinatus and supraspinatus muscles. The supine impingement test may be valuable as a screening tool to assess any partial of complete rotator cuff tear. The belly press test may be valuable as specific test to rule out subscapular tears.

Shoulder injuries in athletes

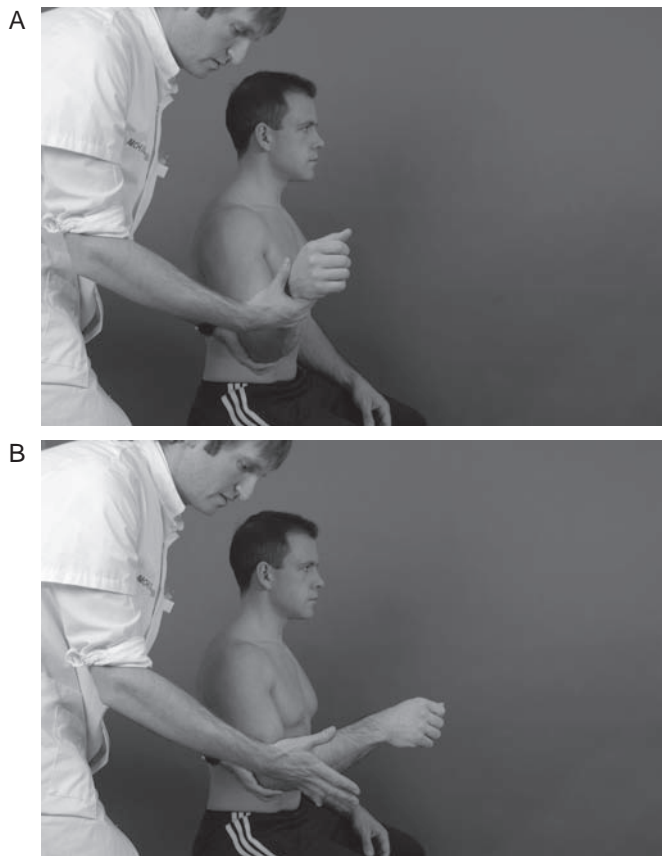


Figure 4 (A) External rotation lag sign: starting position. (B) External rotation lag sign: ending position.

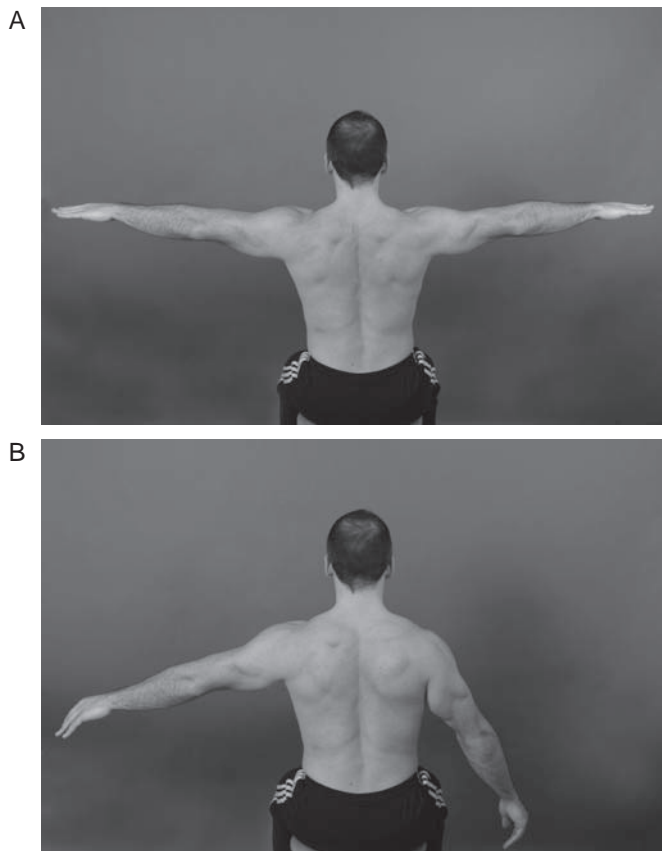


Figure 5 (A) Drop arm test: starting position. (B) Drop arm test: ending position.

Superior labrum anterior to posterior lesions tests

Anterior slide test¹⁹

- ▶ Posture: standing or sitting, hands on the hips with the thumbs pointing posteriorly.
- ▶ Fixation: the examiner places one hand on top of the shoulder from posterior, with the index finger over the anterior aspect of the acromion. The other hand is placed behind the elbow.
- ▶ Test: A forward and slightly superior directed force is supplied to the elbow and upper arm. The patient is asked to push against this force (figure 8).
- ▶ Pay attention to: pain or a click in the front of the shoulder under the examiner's hand.
- ▶ Background: anterior and superior humeral head translations allow stress to the superior labrum. The upward motion also causes traction on the biceps tendon, stretching the labral complex.

Biceps load II test²⁰

- ▶ Posture: supine, with the arm abducted 120° and externally rotated to its maximal point, the elbow in 90° and the forearm supinated.
- ▶ Fixation: the examiner grasps the patient's elbow and the wrist.
- ▶ Test: the patient is asked to flex the elbow, while flexion is resisted by the examiner (figure 9).
- ▶ Pay attention to: pain or more pain during resisted elbow flexion.
- ▶ Background: the superior labrum is peeled of the glenoid margin and pain increases.

Commentary on superior labrum anterior to posterior tests⁸

The anterior slide test, due to its high specificity, can be used to confirm a superior labrum anterior to posterior (SLAP) lesion. The biceps load II test appears diagnostic for SLAP lesions.

Instability tests

Apprehension test²¹

- ▶ Posture: supine or sitting, 90° abduction and maximal external rotation.
- ▶ Fixation: the examiner holds the wrist of the patient with one hand. The other hand is placed on the posterior aspect of the humeral head.
- ▶ Test: maximal external rotation is applied and the posterior aspect of the humeral head is also pressed forward (figure 10).
- ▶ Pay attention to: sudden apprehension feeling in the shoulder and pain.
- ▶ Background: the combined motion and anterior directed pressure causes subluxation of the shoulder.

Relocation test²²

- ▶ Posture: the patient is in supine position, the arm in 90° abduction and the elbow in 90° flexion.
- ▶ Fixation: with one hand, the examiner holds the forearm and the other hand is placed on the humeral head.
- ▶ Test: the examiner externally rotates the shoulder levering the forearm with one hand. The other hand applies a posterior force to the humeral head (figure 11).
- ▶ Pay attention to: relief of pain and the patient is able to tolerate maximal external rotation.
- ▶ Background: the posterior directed force maintains the humeral head in position.

Anterior release test²³

- ▶ Posture: the patient is in a supine position, the arm in 90° abduction and the elbow in 90° flexion.

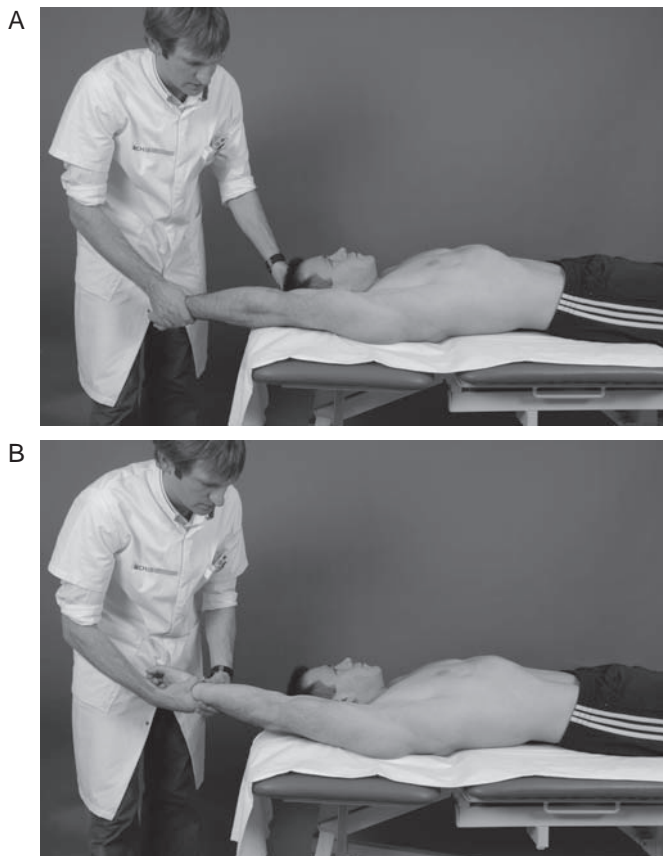


Figure 6 (A) Supine impingement test: starting position. (B) Supine impingement test: ending position.



Figure 7 Belly press test.

- ▶ Fixation: with one hand, the examiner holds the forearm, and the other hand is placed on the humeral head.
- ▶ Test: the examiner places a posteriorly directed force to the humeral head, while the arm is brought to extreme external rotation. The humeral head is then released (figure 12).
- ▶ Pay attention to: sudden pain, an increase in pain or an apprehension feeling.
- ▶ Background: releasing the posteriorly directed force, the humeral head can subluxate anteriorly.

Commentary on instability tests⁹

The apprehension, relocation and anterior release tests all appear to be diagnostic of anterior instability, especially when 'apprehension' is used as a positive test.



Figure 8 Anterior slide test.



Figure 9 Biceps load II test.



Figure 10 Apprehension test.

Acromioclavicular tests

O'Brien test²⁴

- ▶ Posture: patient standing and the examiner standing behind the patient. The patient's arm in 90° forward flexion, 10–15° adduction and full internal rotation.
- ▶ Fixation: the examiner puts their hand on the forearm of the patient.
- ▶ Test: the examiner applies downward force to the lower arm and the patient resists this force. After this,

Shoulder injuries in athletes



Figure 11 Relocation test.



Figure 12 Anterior release test.

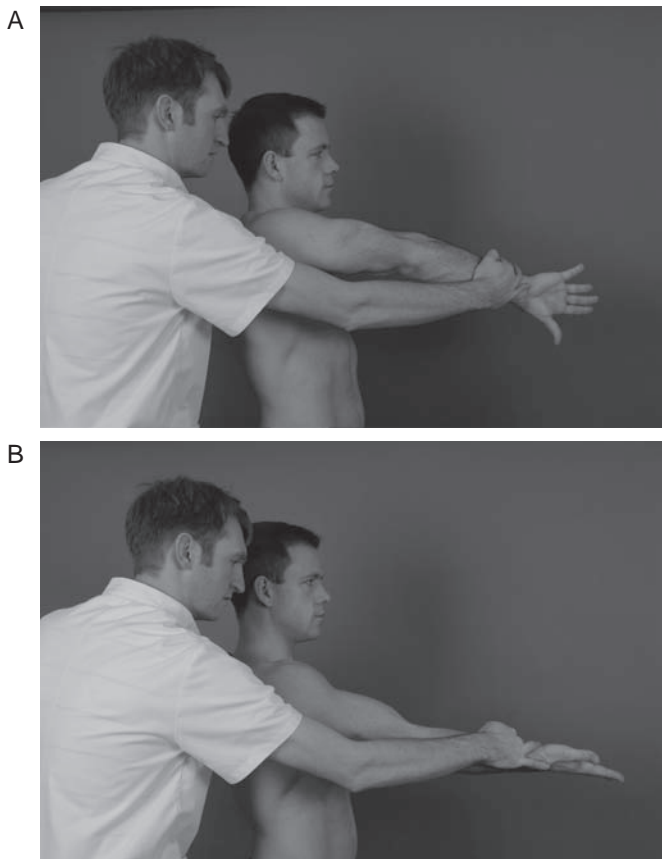


Figure 13 (A) O'Brien test: starting position. (B) O'Brien test: ending position.

the palm of the patient's hand is supinated, and the test is repeated (figure 13).

- ▶ Pay attention to: pain around the *acromioclavicular* (AC) joint, more present with resisted internal rotation.
- ▶ Background: with this test, the acromion is pushed by the tuberculum majus, compressing the AC joint.

AC joint tenderness test²⁵

- ▶ Procedure: not stated by Walton *et al*, but their article makes clear that palpation of the AC joint is performed (figure 14). The test is positive if a recognisable pain is felt on palpation.

Commentary on AC tests⁸

The O'Brien test can be used as a confirmatory test due to the test's high specificity. Palpation of the AC joint can be used to rule out AC complaints when the test is negative, since the sensitivity of this test is high.

DISCUSSION

This article outlines how to perform a selection of clinical shoulder tests, as described by the original author. These were selected from the recent review by Hegedus *et al* on clinical shoulder tests.⁸

The number of tests chosen for each condition was kept low in order to make the advice as practical as possible for daily use. From a review of the published literature, it became apparent that different authors reached different conclusions as to which clinical tests were the most useful.^{8 26 27} Hegedus *et al* noted in their review that there are, in fact, very few valid tests available for certain shoulder problems, especially SLAP lesions. Fortunately, after the publication of their review, new promising tests have been developed to examine SLAP lesions.^{28–30} In other situations, tests with high sensitivity and specificity values have only been investigated once and sometimes only by the inventor of the test.^{31 32} They also found that when tests were evaluated by more than one investigator, the different authors described large differences in the observed levels of sensitivity and specificity.^{33 34} The aim of this article was not to re-evaluate the literature, but to present a practical summary of how to perform the most clinically useful tests. Future studies



Figure 14 Acromioclavicular joint tenderness test.

What is already known on this topic

- ▶ Multiple studies have been performed describing clinical shoulder tests, with more than 109 separate shoulder tests available. Different reviews have provided insight in which tests to perform in clinical practice to be most useful. One of these reviews is the recent high-quality review by Hegedus *et al* in the *British Journal of Sports Medicine*.

What this study adds

- ▶ This study describes the best clinical shoulder tests according to the review by Hegedus *et al*. A description of the tests per shoulder injury is given along with photographs of the test procedure.

should focus on further examining the reliability and validity of shoulder tests and examine how these tests can help management decisions and the prediction of clinical outcomes.

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