

# A new test of resistance in the diagnosis of postero-superior rotator cuff tears

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Received: 18 December 2006 / Accepted: 13 February 2007  
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**Abstract** The aim of this study was to assess the diagnostic accuracy of a new clinical test for the diagnosis of subacromial impingement and full thickness postero-superior rotator cuff tears. One hundred and twenty patients who underwent arthroscopic treatment for acromioplasty or cuff repair were previously submitted to a new test of resistance. The test is performed in the standing position with the involved arm in 90° abduction, 20°-30° ante-position and in external rotation (as for full-can test). Thus, the patient was invited to follow the way of a spiral drawn on a drawing sheet for 20 turns; 1 turn = from the centre to the end of the spiral and vice versa (spiral width = 20 cm). The test was considered positive when the patient was not able to conclude it due to strength decrease or to shoulder pain. Sensitivity, specificity, positive and negative predictive values as well as diagnostic accuracy were calculated for our test of resistance. The test resulted scarcely reliable as detector of subacromial impingement and not very reliable as detector of small tear. When the test is positive there is a high probability that a subacromial disease exists; instead, when it is negative there is a high probability that the patient has not a large or massive cuff tear. The resistance test (Gum-Turn test) adds to our armamentarium of physical examination signs in patients with painful shoulder and furnishes further information on possible dimensions of tendinous tear.

**Keywords** Rotator cuff tear · Subacromial impingement · Cuff tear diagnosis

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## Introduction

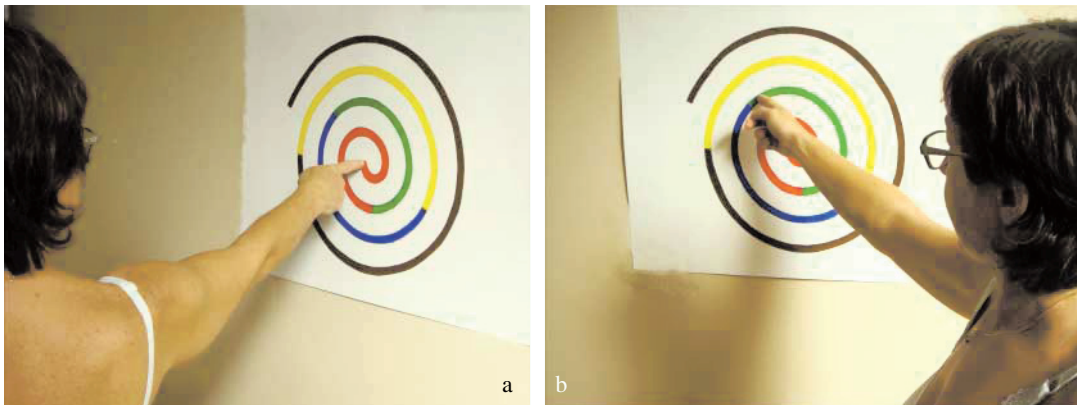
There are a huge number of clinical tests for assessing postero-superior cuff tendon function and therefore to hypothesise their inflammation or tear. Summarising, these tests may be classified in five groups: (1) those able to reproduce shoulder pain when the distance between greater tuberosity and coraco-acromial arch decreases during forward flexion or internal rotation (Neer; Hawkins) [4]; (2) those that assess cuff muscle strength (Jobe [2]; full-can [3]; etc.); (3) those where the examiner appreciates the possibility that a common gesture may be performed (hornblower’s sign) [5]; (4) LAG signs (ERLS and DROP) [1] and, finally (5) those where the examiner directly palpates, through the deltoid, the cuff tear (Wolf) [6].

The purpose of this study was to assess the diagnostic accuracy of a new test of resistance for the diagnosis of impingement syndrome and full thickness postero-superior rotator cuff tears.

## Materials and methods

One hundred and twenty patients consecutively undergoing shoulder arthroscopy for diagnoses related to shoulder pain and weakness (impingement syndrome and postero-superior cuff tears) were clinically evaluated. The study group consisted of 46 patients with impingement syndrome and 74 with a cuff tear (53 supraspinatus and 21 supraspinatus+infraspinatus). The patient age ranged from 46 to 79 (mean age 64.2).

The test of resistance is performed in the standing position with the involved arm in 90° abduction, 20–30° ante-position and in external rotation (as for the full-can test). Thus, the patient was invited to follow the way of a



**Fig 1a,b** The test of resistance

**Table 1** Test of resistance

|                         | Sensitivity (%) | Specificity (%) | Positive predictive value (%) | Negative predictive value (%) | Diagnostic accuracy (%) |
|-------------------------|-----------------|-----------------|-------------------------------|-------------------------------|-------------------------|
| Subacromial impingement | 37              | 98              | 94                            | 64                            | 69                      |
| Cuff tear (in general)  | 65              | 98              | 98                            | 66                            | 79                      |
| SS tear                 | 55              | 98              | 97                            | 68                            | 76                      |
| SS+IS tear              | 91              | 98              | 95                            | 96                            | 96                      |

SS, supraspinatus; IS, infraspinatus

spiral drawn on a drawing sheet for 20 turns; 1 turn=from the centre to the end of the spiral and vice versa (spiral width=20 cm) (Fig. 1a,b).

After 10 turns we allowed patients to rest for 1 min. The spiral is coloured red and blue to limit visual problems consequent to action repetitivity. The test was considered positive when the patient was not able to conclude it due to strength decrease or to shoulder pain. When the test resulted positive, we considered the number of turns performed. Results were compared with the contralateral normal arm.

## Results

Data were tabulated and sensitivity, specificity, positive and negative predictive values as well as diagnostic accuracy were calculated for our test of resistance (Table 1).

## Conclusions

Our test is scarcely reliable as a detector of subacromial impingement and not very reliable as a detector of a small tear; when the test of resistance results are positive there is a high probability that subacromial disease exists.

Finally, when the test results are negative there is a high probability that the patient does not have a large or massive cuff tear.

In conclusion, the resistance test (Gum-Turn test) adds to our armamentarium of physical examination signs in patients with painful shoulder and furnishes further information on possible dimensions of tendinous tear.

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