Diagnostic evaluation of shoulder pain: a systematic review on the accuracy of signs and symptoms related to rotator cuff disorders

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CRD summary
The review assessed the diagnostic accuracy and clinical utility of history taking and clinical tests for impingement or rotator cuff tears of the shoulder. No data on the accuracy of history taking were identified, and the majority of clinical tests were evaluated in single studies. The author appropriately concluded that the available evidence was limited.

Authors' objectives
To assess the accuracy and usefulness of history taking and clinical tests to diagnose rotator cuff injuries presenting as shoulder pain.

Searching
MEDLINE (from 1966 to 2001), EMBASE (from 1980 to 2001) and CINAHL (from 1982 to 2001) were searched for relevant studies. The search terms, which were given, included terms for diagnostic accuracy studies. The bibliographies of known primary and review articles, as well as those of retrieved articles, were examined for additional studies.

Study selection
Study designs of evaluations included in the review
The inclusion criteria for study design were not specified. Only full reports were included.

Specific interventions included in the review
Studies describing clinical tests or history items for the diagnosis of impingement or rotator cuff tears were eligible for inclusion. The included studies evaluated a variety of index tests.

Reference standard test against which the new test was compared
The included studies were required to describe a reference standard of diagnosis, but this was not specified. The reference standards used in the included studies were arthroscopy, surgery, or subacromial injection test.

Participants included in the review
Studies were excluded if the participants' diagnoses included systemic disorders such as rheumatoid arthritis and fibromyalgia, fractures, or tumours.

Outcomes assessed in the review
The included studies were required to report diagnostic accuracy in terms of the sensitivity and specificity.

How were decisions on the relevance of primary studies made?
One reviewer screened the abstracts of retrieved citations for relevance to the review question. Relevant articles were retrieved and two reviewers independently assessed these against the inclusion and exclusion criteria. Only studies in English, Dutch or German were included.

Assessment of study quality
The validity of the primary studies was assessed using the Quality Assessment of Diagnostic Accuracy Studies (QUADAS) tool. Two reviewers independently assessed study validity. Any disagreements were resolved by consensus.

Data extraction
The author did not state how the data were extracted for the review, or how many reviewers performed the data extraction.
Methods of synthesis

How were the studies combined?
The studies were combined in a narrative. Accuracy data (in terms of the sensitivity, specificity, and positive and negative predictive values) were tabulated for individual studies, grouped by index test. The author classified sensitivity and specificity values higher than 0.80 and a difference between pre- and post-test probability of at least 0.3 as describing a ‘good’ test to distinguish impingement or rotator cuff tears from other shoulder disorders.

How were differences between studies investigated?
The existence of between-study heterogeneity was highlighted in the text. No formal assessment of heterogeneity was reported.

Results of the review

Nine studies, with a total of 1,020 participants, were included in the review.

Spectrum bias could not be excluded in 8 of the 9 studies; only one study included the optimal spectrum (defined as patients visiting the orthopaedic clinic with shoulder pain). Blinding of the index test was unclear for 6 studies and absent from two. Six studies did not clearly describe selection criteria. The time between the index test and the reference standard was unclear in 7 studies, and the reference standard was not described clearly in six.

Impingement.

No data on the accuracy of history items were identified. Eleven tests were evaluated in a total of 5 studies; five tests were evaluated by more than one study.

The test of Hawkin was evaluated in 4 studies. High sensitivities (greater than 0.80) were found in 3 of the 4 studies. The specificity ranged from 0.25 to 0.69 in 3 studies and was unreported in the fourth.

The lift-off test was evaluated in 2 studies. One study found a sensitivity of 0.62 and a specificity of 1.00 for subscapularis tears, while the other found a sensitivity of 0.92 and a specificity of 0.36 for unspecified impingement of the m. subscapularis.

The test of Neer was evaluated in 4 studies. The sensitivity was high (greater than 0.80) in 3 of the 4 studies. The specificity, which was calculated in 3 studies, ranged from 0.31 to 0.66.

Painful arc was assessed in 2 studies. Both reported sensitivities of less than 0.80 and specificities greater than 0.80.

The test of speed was evaluated in 2 studies. One study reported low sensitivity and specificity, while the other reported values of 0.85 and 0.80, respectively.

High sensitivity and low specificity were reported for the horizontal adduction test (n=1) and the O'Brien test (n=1). Low sensitivity and high specificity were found for the drop arm test (n=1), the resistance test in external rotation 0 and 90 degrees (n=1), the test of Yergason (n=1), and Jobe II (n=1). Both low sensitivity and specificity were found for the test of Jobe I (n=1) and the abduction against resistance in 0 degrees abduction (n=1). Only sensitivity (0.78) was reported for the test of Yocum. None of the above tests were classified as useful in terms of the change from pre- to post-test probability.

Rotator cuff tears.

No data on the accuracy of history items were identified. Twenty clinical tests were evaluated in 6 studies. No test was evaluated in more than one study.

The dropping sign and Hornblower’s sign had high sensitivity and specificity (greater than 0.90) for non-operative tears.
of the m. teres minor or m. infraspinatus. The internal rotation lag sign had high sensitivity and specificity (greater than 0.90) for partial or full tears of the m. supraspinatus and/or m. infraspinatus. The impingement sign and tests of Neer, Hawkins, Speed, Patte, and Jobe (both tests) had high sensitivity values, but low specificity. Conversely, the drop sign, external rotation less than 70 degrees, the lift-off test and external rotation lag sign had high reported specificity and low sensitivity. Low values for both sensitivity and specificity were reported for weakness with elevation, weakness with external rotation, elevation less than 170 degrees and infraspinatus muscular atrophy.

Information gain for the presence of a rotator cuff tear was limited. The only tests for which the change from pre- to post-test probability was calculated to be greater than 0.30 were the dropping sign, Hornblower's sign, the internal rotation lag sign and the external rotation lag sign.

**Authors' conclusions**
The available evidence on the accuracy of history taking and clinical tests for the diagnosis of impingement and rotator cuff tears was limited. No data on the accuracy of history taking were identified, and a large number of different clinical tests were reported. The accuracy of these tests was limited, except for the dropping sign, Hornblower's sign and the internal rotation lag sign.

**CRD commentary**
The review addressed a clearly stated research question. The inclusion criteria were broad, resulting in a set of studies that assessed a wide range of index tests and used several different reference standards of diagnosis. Interpretation of the results of the review was, therefore, difficult. However, given the apparent paucity of data, this broad and inclusive approach seemed appropriate. The search strategy was limited to three electronic databases and the use of diagnostic search terms (known to be poorly indexed) might have further limited the retrieval of relevant data. Similarly, the inclusion of only full papers in English, Dutch or German might have led to the incomplete retrieval of the available data. Publication bias was not assessed. The validity of the included studies was assessed using an appropriate tool, and the results of this assessment were reported in full. Given the limited and heterogeneous nature of the available data, the use of a narrative summary was appropriate and well presented. The author's conclusions follow from the data presented.

**Implications of the review for practice and research**
The author did not state any implications for practice or further research.

**Bibliographic details**

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.