SYSTEMATIC REVIEW

Diagnostic Accuracy of Clinical Tests for Subacromial Impingement Syndrome: A Systematic Review and Meta-Analysis

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ABSTRACT. Alqunaee M, Galvin R, Fahey T. Diagnostic accuracy of clinical tests for subacromial impingement syndrome: a systematic review and meta-analysis. Arch Phys Med Rehabil 2012;93:229-36.

Objective: To examine the accuracy of clinical tests for diagnosing subacromial impingement syndrome (SIS).

Data Sources: A systematic literature search was conducted in January 2011 to identify all studies that examined the diagnostic accuracy of clinical tests for SIS. The following search engines were used: Cochrane Library, EMBASE, Science Direct, and PubMed.

Study Selection: Two reviewers screened all articles. We included prospective or retrospective cohort studies that examined individuals with a painful shoulder, reported any clinical test for SIS, and used arthroscopy or open surgery as the reference standard. The search strategy yielded 1338 articles of which 1307 publications were excluded based on title/abstract. Sixteen of the remaining 31 articles were included. The PRISMA (preferred reporting items for systematic reviews and meta-analyses) guidelines were followed to conduct this review.

Data Extraction: The number of true positives, false positives, true negatives, and false negatives for each clinical test were extracted from relevant studies, and a 2×2 table was constructed. Studies were combined using a bivariate random-effects model. Heterogeneity was assessed using the variance of logit-transformed sensitivity and specificity.

Data Synthesis: Ten studies with 1684 patients are included in the meta-analysis. The Hawkins-Kennedy test, Neer's sign, and empty can test are shown to be more useful for ruling out rather than ruling in SIS, with greater pooled sensitivity estimates (range, .69–.78) than specificity (range, .57–.62). A negative Neer's sign reduces the probability of SIS from 45% to 14%. The drop arm test and lift-off test have higher pooled specificities (range, .92–.97) than sensitivities (range, .21–.42), indicating that they are more useful for ruling in SIS if the test is positive.

Conclusions: This systematic review quantifies the diagnostic accuracy of 5 clinical tests for SIS, in particular the lift-off test. Accurate diagnosis of SIS in clinical practice may serve to improve appropriate treatment and management of individuals with shoulder complaints.

Key Words: Meta-analysis; Rehabilitation; Sensitivity and specificity; Subacromial impingement syndrome.

SHOULDER PAIN IS the third most common musculoskeletal consultation in primary care, and second most common cause of referrals to orthopedic and sports medicine clinics.[1,2] The differential diagnosis of conditions that cause shoulder pain is a challenging and complex area of musculoskeletal practice. Subacromial impingement syndrome (SIS) is the most frequent cause of shoulder pain. SIS is a clinical syndrome that indicates pain and pathology relating to the subacromial bursa and rotator cuff tendons within the subacromial space. The 3 stages of SIS are subacromial bursitis, partial-thickness and full-thickness rotator cuff tears.[3] The cause of SIS is considered to be multifactorial, with both extrinsic and intrinsic factors involved in its pathogenesis.[4] The primary factors relating to the intrinsic theory are muscle overload and weakness, shoulder overuse and repetitive tissue microtrauma, and degeneration of the rotator cuff. The key elements of the extrinsic hypothesis are shape of the acromion, glenohumeral instability, altered scapulothoracic rhythm, os acromiale, and degeneration of the acromioclavicular joint.[5,6]

Clinicians have traditionally relied on a clinical examination comprising a subjective history and physical examination, followed by various clinical tests to diagnose SIS. Numerous clinical tests have been described to evaluate the presence of impingement syndrome and to determine the integrity of the individual components of the rotator cuff.[7] These tests can be broadly classified as impingement or pain provocation tests and rotator cuff strength tests. Impingement tests are designed to reproduce symptoms or pain by compressing the greater tuberosity against the acromion.[8,9] Rotator cuff strength tests assess the integrity of the individual rotator cuff tendons and their respective musculotendinous units. Table 1 contains the com-

List of Abbreviations

CI	confidence interval
LR	likelihood ratio
PRISMA	preferred reporting items for systematic reviews and meta-analyses
QUADAS	quality assessment of diagnostic accuracy studies
ROC	receiver operating characteristic
SIS	subacromial impingement syndrome

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Table 1: Clinical Tests Used in the Diagnosis of SIS

Shoulder Pathology	Muscle Function	Clinical Test
SIS	Not applicable	Neer's sign, Hawkins-Kennedy test, horizontal adduction test
Supraspinatus tear	Initiates arm abduction	Empty can test, full can test, drop arm test, painful arc test, supraspinatus palpation, resisted abduction
Infraspinatus and teres minor tear	Lateral rotation of arm and adduction.	Resisted external rotation (infraspinatus test), external rotation lag sign, Patte's test, Hornblower's sign
Subscapularis tear	Medial rotation of the arm and adduction	Bear-hug test, belly-press test/Napoleon test, belly-off test, lift-off test, internal rotation lag sign, internal rotation strength test

mon clinical tests that are used to assist in the diagnosis of SIS. A recent review[10] examined the diagnostic accuracy of clinical tests for different shoulder pathologies, including SIS. However, the included studies used various reference standards in the diagnosis. The aim of this systematic review and meta-analysis is to determine the diagnostic accuracy of common clinical tests to detect SIS.

METHODS

Search Strategy

The preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines for the reporting of systematic review and meta-analysis were followed to conduct this

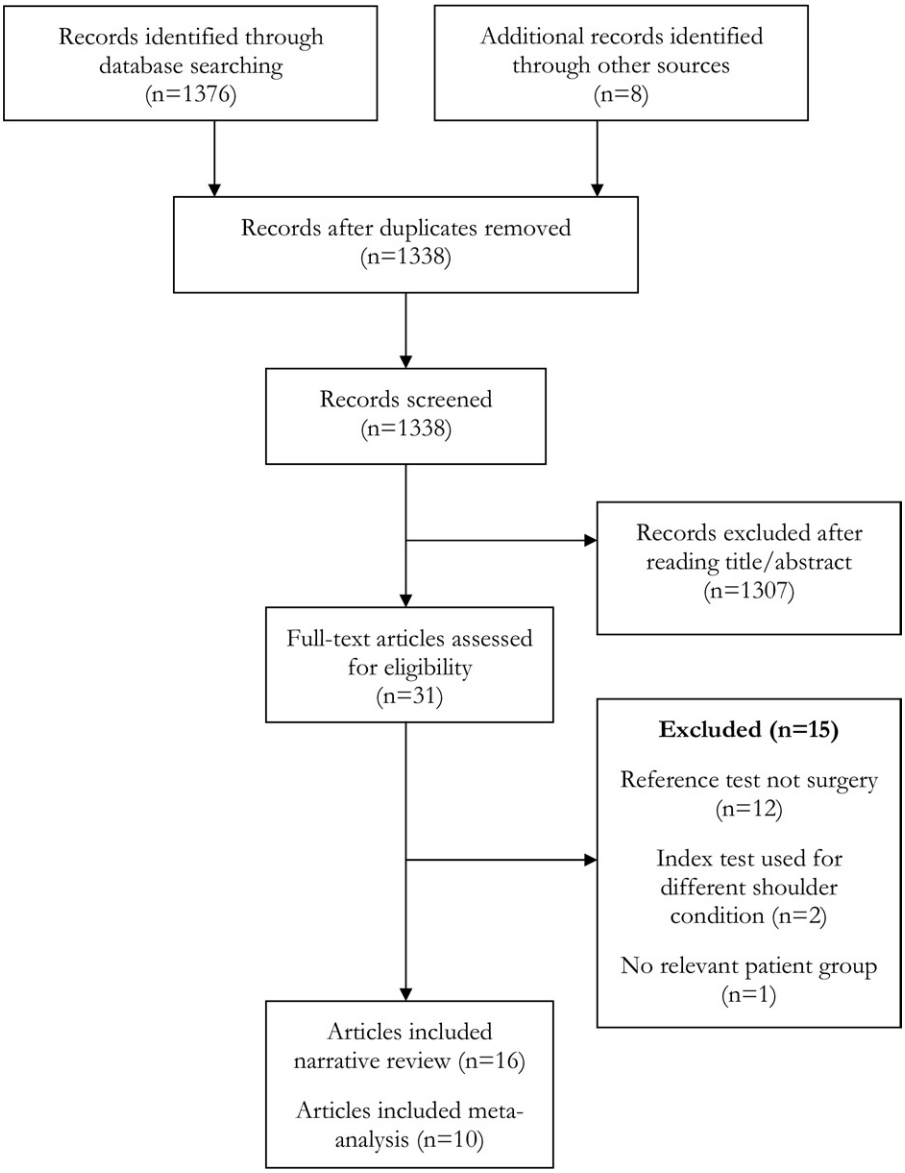

Fig 1. PRISMA flow diagram of the studies.