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Special Physical Examination Tests for Superior Labrum Anterior-Posterior Shoulder Tears: An Examination of Clinical Usefulness

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Clinical Question: The systematic review focused on diagnostic accuracy studies to determine if evidence was sufficient to support the use of superior labrum anterior-posterior (SLAP) physical examination tests as valid and reliable. The primary question was whether there was sufficient evidence in the published literature to support the use of SLAP physical examination tests as valid and reliable diagnostic test procedures.

Data Sources: Studies published in English were identified through database searches on MEDLINE, EMBASE, and the Cochrane database (1970–2004) using the search term *SLAP lesions*. The medical subject headings of *arthroscopy*, *shoulder joint*, and *athletic injuries* were combined with *test or testing*, *physical examination*, and *sensitivity and specificity* to locate additional sources. Other sources were identified by rereviewing the reference lists of included studies and review articles.

Study Selection: Studies were eligible based on the following criteria: (1) published in English, (2) focused on the physical examination of SLAP lesions, and (3) presented original data. A study was excluded if the article was limited to a clinical description of 1 or more special tests without any research focus to provide clinical accuracy data or if it did not focus on the topic.

Data Extraction: The abstracts that were located through the search strategies were reviewed, and potentially relevant abstracts were selected. Strict epidemiologic methods were used to obtain and collate all relevant studies; the authors developed a study questionnaire to record study name, year of publication, study design, sample size, and statistics. Validity of the diagnostic test study was determined by applying the 5 criteria proposed by Calvert et al. If the study met the inclusion and validity criteria, 95% confidence intervals were calculated for each sensitivity, specificity, and positive and negative likelihood ratio reported. No specific information was provided about the procedure if the reviewers disagreed on how the evaluation criteria were applied.

Main Results: The specific search criteria led to the identification of 29 full-text articles. The studies were reviewed, and inclusion and exclusion criteria were applied. This resulted in 14 excluded studies and 15 eligible studies for analysis. Of the 15 eligible studies, 1 evaluated only a single physical examination test for a SLAP lesion or biceps tendon injury, and 10 studies evaluated 2 to 6 physical examination tests for a SLAP lesion or biceps tendon injury. Nine studies reported sensitivities and specificities greater than 75%, 4 had sensitivities less than 75%, 3 had specificities less than 75%, 1 did not report sensitivity, and 2 did not report specificities. When validity was assessed for those 15 papers, only 1 study that evaluated the biceps tendon met the 5 critical appraisal criteria of Calvert et al and calculated 95% confidence intervals. When the Speed and Yergason tests were each compared with the gold standard (arthroscopy), the confidence intervals for the positive and negative likelihood ratios spanned 1. This indicated that the test result is unlikely to change the odds of having or not having the condition, respectively.

Conclusions: The literature currently used as a reference for teaching in medical schools and continuing education lacks the necessary validity to help rule in or out a SLAP lesion or biceps tendon involvement. Based on the results from the systematic review conducted by Calvert et al, no tests clinically diagnose a SLAP lesion. This is a cause for concern as magnetic resonance imaging or magnetic resonance arthrography, which are frequently used to assess a possible SLAP lesion, may also have diagnostic flaws and may be cost prohibitive. Performing arthroscopy on every patient to rule the condition in or out is unethical, especially if a SLAP lesion is not present. More rigorous validity studies should be conducted for SLAP lesion physical examination tests using the Quality Assessment of Diagnostic Accuracy Studies (QUADAS) tool or Standards for Reporting Diagnostic Accuracy (STARD) criteria.

Key Words: SLAP lesions, glenoid labrum, diagnostic accuracy, sensitivity

COMMENTARY

Since 1995, the number of diagnosed superior labrum anterior-posterior (SLAP) lesions has increased in the recreationally active and athletic populations. Prevalence in studies usually ranges from 3.9% to 11.8%; the identification of SLAP lesions with and without biceps tendon involvement has increased due to the use of arthroscopy[1] and to some extent magnetic resonance imaging.[2] To aid the clinician performing the physical examination, an extensive number of tests have been described in the literature. However, shoulder pain in active and overhead athletes can be a diagnostic challenge because of comorbidities.[1–3] Furthermore, when shoulder pain is nonspecific[2] and the exact pathophysiology is unknown, no definitive maneuvers specifically identify the lesion, the gold standard can be suspect, and studies can be biased.[2–6]

In addition, several classifications can be used. The 2 that appear the most often in the literature are the 4 types described by Snyder et al[1–3,5,6] and the 3 subtypes described by Morgan et al.[1,3]

When evaluating diagnostic accuracy studies, one should consider sensitivity, specificity, positive and negative likelihood ratios (LRs), and confidence intervals (CIs).[2,7] Doing so helps to rule the condition in or out or predict that the condition does or does not exist. *Sensitivity* refers to the proportion of patients with a positive test who have the condition. A reference standard usually verifies the presence of the condition. *Specificity* refers to the proportion of patients with a negative test who do not have the condition. Again this is verified by a reference standard. The reference standard for SLAP lesions is arthroscopy,[3] not magnetic resonance imaging or magnetic resonance arthrography. For most SLAP lesion tests, sensitivity is lower than specificity,[4] except when the special test has been evaluated by the creator.[3] For example, the active compression test developed by O'Brien had a sensitivity of 100% and specificity of 98.5%.[2] However, when the test was evaluated in another diagnostic accuracy study, those values decreased to 47% sensitivity and 55% specificity.[2] Because specificity is usually higher than sensitivity, the special tests are better at ruling a SLAP lesion out than in. One should be cautious, though, in interpreting the results; in most diagnostic accuracy investigations, assessors were not blinded, studies were uncontrolled, and populations having mixed symptoms[2] were included, with most patients being older than those commonly seen in a traditional athletic training setting.

Positive and negative LRs and CIs should be evaluated. The LRs combine sensitivity and specificity values to provide a ratio quantifying the posttest probability of having a condition once the index test results (arthroscopy) are obtained. A positive LR ranges from 1 to infinity.[5,7] Clinically, a positive likelihood ratio of 2.0 or more represents an increased likelihood that the patient has the condition.[5,6] Negative LRs range from 0 to 1; a value of 0.50 or less represents a decreased likelihood that the patient has the condition.[5–7] Both positive and negative LRs may give the athletic trainer more information than sensitivity and specificity alone, and they should be considered when a new special test is being evaluated for use. Calculating CIs may clarify the situation even further. When the CI for a positive or negative LR spans 1, the test result has a limited bearing on whether the patient has or does not have the condition.[2] For example, the CIs for the Speed (+LR = 0.5246, 3.0882, –LR = 0.653, 1.2987) and Yergason (+LR = 0.8427, 4.7465, –LR = 0.4788, 1.1045) tests cross 1, so the test is ineffective to rule the condition in or out.[2]

Orthopaedic special tests for SLAP lesions become suspect if the test dynamics are considered analogous to a torn knee meniscus in which a torn labrum may get caught in the joint. This is not the case, and tests designed to detect this have low sensitivity.[3] Other tests evaluate the shear movement of the labrum across the glenoid, as in the anterior slide test. Again, low sensitivity has been reported. Another test for SLAP lesions, the active compression test, creates tension in the biceps tendon or labrum and may be considered more of a pain-provocation test for either a labral or acromioclavicular joint injury.[3] Results of this test vary in the literature. Thus, physical examination should not be used in isolation because special tests do not identify SLAP lesions.[2–5] In the absence of a detailed patient history and other clinical findings, a single test rarely benefits the decision-making process.[6] Furthermore, a cluster of tests does not improve or aid in the diagnosis.[3,5,6] Rather, a careful history should be taken, including the mechanism of injury; intensity, occurrence, and location of pain; and presence of a click, pop, or catch.[1,3,5] Cook et al[6] stated that a click or catch may not be an acceptable criterion in diagnosing a SLAP lesion, but Michener et al[5] indicated otherwise. In the latter study,[5] the combination of a history of clicking, popping, or catching along with the anterior slide test yielded a high positive LR (6.0, 95% CI = 1.59, 22.71). Additional clinical studies are needed to determine which history questions, physical examination tests, and valid self-reported upper extremity disability, function, and symptom indexes[6] should be included to clinically detect a SLAP lesion.

Because the results of static isometric SLAP lesion tests may be suspect, a dynamic movement that duplicates the pain may be more helpful in diagnosing a biceps tendon or SLAP lesion. Two new SLAP lesion dynamic tests, the upper cut[4] and modified dynamic labral shear,[4] may be of assistance to the athletic trainer. These tests were developed from the description of pain by patients performing this movement. The upper-cut test relies on isotonic muscle activity to create tension in the biceps with dynamic rotation of the arm, and the modified dynamic labral shear (MDLS) combines appropriate positioning of the humerus with dynamic arm motion to apply stress to the labrum. For the upper-cut test, the patient is asked to rapidly bring the hand up and toward the chin, replicating a boxing upper-cut punch.[4] For the MDLS test, the examiner applies a shear load to the joint by maintaining external rotation and horizontal abduction and lowering the arm from 120° to 60° of abduction.[5] The upper-cut test had equal sensitivity (73%) and specificity (78%) in detecting a biceps tendon injury, whereas the MDLS test had higher specificity (98%) than sensitivity (72%) and was better at detecting a labral injury than a biceps tendon injury. For both tests, the +LR was large: 3.38 for the upper cut to predict a biceps tendon injury and 31.57 for the MDLS test to predict a labral injury. The upper-cut test was better (–LR = 1.40) in not predicting a labral injury than a biceps tendon injury (–LR = 0.34), whereas the MDLS test was better in not predicting a biceps tendon injury (–LR = 1.54) than a labral injury (–LR = 0.29). Based on the results of Calvert et al,[2] no single test can effectively diagnose a SLAP lesion. Therefore, the athletic trainer should include history questions, dynamic orthopaedic special tests, and valid self-reported upper extremity disability, function, and symptom indexes. Understanding the positive and negative LRs along with their CIs may be more useful than relying on sensitivity and specificity alone. Further diagnostic accuracy studies performed by athletic trainers on populations in traditional athletic training settings are currently rare in the athletic training literature and are needed.

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