

Citation: Park HB, Yokota A, Gill HS, El Rassi G, McFarland EG. Diagnostic accuracy of clinical tests for the different degrees of subacromial impingement syndrome. *The Journal of Bone and Joint Surgery*. 2005;87-A:1446-55.

The purpose behind the research of this study was to identify the diagnostic accuracy of tests used in clinical practice for diagnosing impingement syndrome. The authors wanted to see if they could differentiate between the degrees of impingement in the patients that arrived in one author's clinic.

Data were collected from 1127 patients that were seen in McFarland's office between August 1992 and June 2003. All of these patients were scheduled for shoulder surgery and each had to give informed consent, fill out a questionnaire, and undergo a physical examination four weeks prior to having surgery. All of the patients included in the study had to have arthroscopy performed and essentially could not have any other pathology that had made impingement syndrome be the secondary condition. In the end, 552 patients were included in the study.

The clinician performed eight tests: the Neer impingement sign, Hawkins-Kennedy impingement sign, painful arc sign, supraspinatus muscle test, Speed test, Cross-body adduction test, Drop-arm test, and the Infraspinatus muscle test. Each of the tests was described in further detail and a picture accompanied six of the descriptions. Before diagnostic values were calculated the patients were divided into two groups: patients with impingement and patients without. There were 193 patients in the nonimpingement group and 359 with impingement. Those members of the impingement group were divided into three subgroups: those with impingement and no rotator cuff disease, those with a partial tear of the RTC, and those with a complete tear of the RTC. Diagnostic accuracy values were calculated for each of the groups experiencing impingement.

The results of the study showed that when positive results are found with a combination of the Hawkins-Kennedy impingement sign, painful arc sign, and weakness in external rotation, impingement is most likely the cause of such positive signs (post test probability of .95 and likelihood ratio of 10.56). If a clinician combines the drop-arm sign, the painful arc and weakness in external rotation and the results are positive, the patient most likely has a full-thickness rotator cuff tear (post-test probability of .91 and likelihood ratio of 15.57).

When using the AAOS criteria for levels of evidence this study was rather good although I think that they could have referenced the gold standard of arthroscopy more in the article. I would say it was a level one because the diagnostic tests were previously developed and every shoulder arthroscopy patient was attempted to be recruited by the authors in their specified time period.

Any study about diagnostic testing, if it is done well, is beneficial to athletic training because it lets practicing clinicians and teachers know what diagnostic tests are worthwhile. Knowing such information can cut down on evaluation time and if the tests are accurate, it will give the clinician and the patient greater confidence of the diagnosis. Having a battery of three tests that make the clinician 95% confident in their diagnosis of impingement syndrome is beneficial when deciding if further diagnostic testing is needed to rule out or rule in greater rotator cuff issues.

## **Are the results in the study valid?**

### **1. Was there an independent, blind comparison with a reference standard?**

Although each patient did undergo arthroscopy and had radiographic images taken as part of their exam, the results from these diagnostic tests were not included when it came to calculating the statistics of the evaluation techniques used.

### **2. Did the patient sample include an appropriate spectrum of patients to whom the diagnostic test will be applied in clinical practice?**

I would say yes because each of the patients included in the study had some sort of shoulder pathology and were seen in an orthopaedic practice. Many, not all, patients that feel the need to see an orthoped for a shoulder injury, may have some severe impingement or rotator cuff pathology and this battery of tests may be efficient in making an accurate diagnosis.

### **3. Did the results of the test being evaluated influence the decision to perform the reference standard?**

I can't say for sure, but I don't believe so. The radiographs and other diagnostic tests were done regardless of the results from the physical examination. That is what I gathered from the material provided.

### **4. Were the methods for performing the test described in sufficient detail to permit replication?**

Yes, each of the tests was described in detail and photographs were also included in the article.

## **What are the results?**

### **1. Are likelihood ratios for the test results presented or data necessary for their calculation included?**

The likelihood ratios, pretest probabilities and post-test probabilities were presented for each of the tests as well as when the authors combined three tests for both the diagnosis of impingement syndrome and rotator cuff tears. The sensitivity and specificity were both reported for each of the tests as well.

## **Will the results help me in caring for my patients?**

### **1. Will the reproducibility of the test result and its interpretation be satisfactory in my setting?**

One of the limitations of the study stated by the authors was that the reproducibility and reliability of the tests were not calculated. The tests theoretically should be able to reproduce the same/similar results between clinicians because each orthopedist was most likely educated very similarly but one cannot be sure unless it is tested.

**2. Are the results applicable to my patient?**

I would still say that the results are applicable because most likely as a clinician, one would use these tests anyway. One might try the specific combination used in this study and see if their evaluations seem to be supporting the findings.

**3. Will the results change my management?**

Considering the fact that these tests will most likely be done in your practice anyway, management of the condition will probably not change.

**4. Will patients be better off as a result of the test?**

The clinician, if using the combination of tests compiled by the authors of this study, may arrive at a diagnosis more quickly. In today's world of lawsuits, the doctor will most likely order a diagnostic test such as an MRI or an x-ray to increase and confirm or dismiss a condition. This is in the best interest of the patient considering if the diagnostic test is in disagreement with the clinician, then the patient may not have to undergo surgery based on physical examination alone. This is really of no fault of the clinician because, after all, he/she does not have x-ray vision and the results of sensitivity and specificity of the tests that are used in physical examination are not as good as we'd like them to be.

