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Saccomanni's Test

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Abstract

Background: A prospective study was established to assess the sensitivity and specificity of the new Saccomanni (SAC) test for isolated AC pathology, and compare with 4 commonly used clinical tests.

Materials and Methods: The Saccomanni (Sac) test is essentially the cross-adduction test, with the addition of attempted elevation against resistance. In a positive test, this results in some pain and the inability of the patient to maintain the arm in the adducted and elevated position against resistance. Fifty-eight patients with isolated AC joint symptoms were assessed in random order with the Saccomanni test and 4 other tests. A corticosteroid and local anaesthetic injection was administered into the AC joint space. The Saccomanni test and 4 other tests were then repeated following the injection. After the injection, a symptom free clinical examination was used as a measure of true positive tests.

Study Design

Case Series.

Results: The SAC test showed a sensitivity of 98% and specificity is 91.7%. All 4 other tests were less sensitive.

Conclusion: The SAC test is a highly sensitive test in patients presenting with isolated AC related symptoms.

This study is an innovation for clinical tests in the world. The primary aim of this study was to assess the diagnostic sensitivity of my newly described SAC test. From the present study, it can be concluded that the easy-to use SAC is a highly sensitive test to evaluate AC joint pathology, when compared to other standard tests.

Clinical Relevance: Level III, Diagnostic Study of Nonconsecutive Patients.

Keywords: Acromioclavicular, Saccomanni test

Introduction

Acromioclavicular (AC) joint pathology is a common cause of shoulder pain [1]. The location of pain originating from the AC joint can be diverse and patients are often not able to identify the exact location [2]. In most patients, the pain will be located in an area bounded by the mid-part of the clavicle and the deltoid insertion3; but, the pain has also been shown to radiate to the radial side of the forearm into the thumb [3].

AC joint pathology can occur in isolation, but is often associated with other causes of shoulder pain such as subacromial impingement or rotator cuff pathology. Surgical treatment of other causes of shoulder pain can affect the AC joint, and arthroscopic acromioplasty may have detrimental effects on an already compromised AC joint [4,5]. Conversely, residual AC joint pathology has been shown to have a negative effect on the outcome of surgery to the rotator cuff.6, 7 Detection of AC joint pathology is, therefore, crucial in the treatment of patients with any type of shoulder problem, and various clinical tests have been described to asses AC joint pathology [1-10]. The primary aim of this study was to assess the diagnostic sensitivity of our newly described SAC test when compared with other tests.

Materials and Methods

Age, sex, occupation, hand dominance, affected arm, onset and duration of pain were documented. All patients were examined, rotator cuff strength, (graded from 0 to 5), impingement signs, AC joint testing, and palpation [11]. The AC joint was clinically examined for local tenderness and 5 AC joint compressive tests were used in random order, including the cross-body adduction, O'Brien's active compression test, Paxinos test,3 Jacob's test,1 and the SAC test described below [9,12].

Radiographs were ordered and assessed for signs of AC joint and erosion, congruency of the AC joint, and glenohumeral pathology. If symptoms were found to be isolated to the AC joint with at least 1 positive AC joint test, 2 ml of a combination of 1 ml lidocaine and 1 ml corticosteroids (Celestone; Schering Corporation, Kenilworth, NJ) was drawn up and injected into the AC joint until an end point to injection was reached or the full 2 ml amount had been injected. After 5 min, the AC joint compression tests were repeated.

All patients with isolated AC joint symptoms were included sequentially in this study. Inclusion criteria were defined as the presence of localized AC joint tenderness or at least 1 positive AC joint compression test. In addition, all post-injection tests had to be negative for patients to be included. Exclusion criteria included

previous surgery to the AC joint or rotator cuff, diminished rotator cuff strength or positive impingement signs, diminished passive glenohumeral movement, and patients with a known allergy to local anaesthetics or previous adverse reactions to corticosteroid injections elsewhere in the body. Informed consent was obtained from all patients and all agreed to be part of the study.

The SAC Test

The patient stands facing the examiner and the shoulder is passively elevated to 90 and then fully adducted. The elbow is then extended, with the shoulder in internal rotation (IR) and the forearm pronated. During this manoeuvre, the examiner supports the arm of the patient with his opposite hand, while resting the other hand on the patient's opposite shoulder to maintain adduction and prevent rotation of the patient's upper body. If pain is present, this is considered to be a positive cross-arm adduction sign. The patient is then asked to resist the examiner's downwards force on the forearm (Fig. 1, Fig. 2). In a positive SAC test, this results in pain and the inability of the patient to maintain the arm in the adducted and elevated position. As a further assessment in this study, the test was then repeated with the adducted arm in external rotation (ER).

Figure 1: Sac test is performed with elbow extended and internal rotation of the arm. The patient tries to hold the starting position by means of resisted internal rotation of arm. The shoulder is elevated to 90° and adducted horizontally.

Figure 2: The Saccomanni (SAC) test: starting position for performing Sac test. Sac test is performed with elbow extended and internal rotation of the arm. The patient is then asked to resist a downward at force. Pain and weakness are found in a positive SAC test.

Results

Patient Demographics

Fifty-eight patients fulfilled the inclusion criteria and were all included in the final analysis. Patient demographics clinical examination data, and glenohumeral radiographic data are shown in Table 1.

Table 1: Results of Clinical Testing and Radiographs. Results are Shown in Percentage of Total%

Patients N ¼ 58
Local AC joint tenderness 97
Positive cross-arm adduction 67
Positive O'Brien 83
Positive O'Brien ER 3
Positive Paxinos 12
Positive Jacob's 41
Positive SAC 98
Positive SAC ER 84
Radiographic signs of AC joint OA 79
Radiographic signs of GH joint OA 4

ER, external rotation; AC, acromioclavicular; OA, osteo-arthritis; GH, glenohumeral; SAC, Saccomanni.

There were 35 men and 23 women, with an average age of 48 years, ranging from 20 to 85 years. Fifty-six patients were right-handed and the dominant shoulder was involved in 32, while the nondominant arm was affected in 26. Twenty-six patients reported an acute onset of pain. In 8 patients, symptoms started from a lifting or jarring action a fall caused prolonged AC joint symptoms in 9, a car accident was reported in 3, and 8 patients recalled a specific incident or trauma to the shoulder during sporting activities (including 2 falls during skiing and cycling). An insidious onset of symptoms was reported by 32 patients. Average duration of symptoms was 18 months (range, 1–94).

Imaging Studies

Radiographs were obtained in all patients to further evaluate AC joint pathology. Radiographic signs of AC pathology were found in 46 out of 58 patients (79%). Details of radiographic evaluation are shown in Table 2. Minor degenerative changes were found in the glenohumeral joint of 4 patients.

Table 2: Details of Radiographic Assessment of AC Joint Pathology. Results are Shown in Percentage of Total%

Patients N ¼ 58
Joint narrowing 48
Sclerosis 33
Osteophytes 55
Bone cysts 26
AC subluxation 6
AC, acromioclavicular.

Several patients presented to our clinic, for the first time with additional imaging. Ultrasound examination was performed in 33 patients. This showed AC joint calcification in 1 patient. The ultrasound was considered to be normal in 13 patients, supraspinatus tendinosis or partial tearing was suspected in 17, and biceps tendonitis was reported in 1. A full thickness supraspinatus tear was suspected from the ultrasound scan in 2 patients. Magnetic resonance imaging (MRI) scans were done in 17 patients. AC joint pathology, with oedema or AC joint arthritis, was found in 12 patients. The MRI was normal in 3 patients. Inferior labral pathology was suspected from the MRI in 1 patient and a partial thickness supraspinatus tear was suspected in 1 other. There was no mention of AC joint pathology in these 2 patients.

One of the 2 patients with suspected full thickness supraspinatus tear on ultrasound also had an MRI scan. This showed AC joint arthritis but no rotator cuff tear.

Patient Review

The SAC test was positive in 57 patients and negative in only 1. In this patient, the other 4 AC compression tests were also negative when clinically tested; but, there was local tenderness to the joint.

The AC joint had become painful acutely, following a pulling action during martial arts. The patient presented to the clinic with an MRI showing oedema of the AC joint. Local tenderness disappeared following the AC injection and symptoms had resolved completely at 2 months clinical follow-up, indicating the pain seemed to be definitely from the AC joint. In this cohort, the SAC test was, therefore, the most sensitive (98%) of all the tests used to detect AC joint pathology (Table 1). The next most sensitive was the O'Brien test, with 48 out of 58 patients (83%) positive; the least sensitive was the Paxinos test, with a sensitivity of 12%. The SAC test in ER was less sensitive than in IR, and is, therefore, not included as part of the final SAC test. When the described SAC test is combined with standard radiographic findings, a sensitivity of 98% is obtained with a specificity of 91.7%. The specificity and results and diagnostic quality of clinical tests are in Table 3.

Table 3: Results and Diagnostic Quality of Clinical Tests

	Sac test	O'Brien test	Paxinos test	Jacob test
True-positive tests	12	8	3	5
True-negative tests	44	47	46	47
False-positive tests	4	1	0	1
False-negative test	8	12	14	15
Specificity (%)	91.7	97.9	100	97.9
PPV (%)	75	88.9	100	83.3
NPV (%)	82.4	80.9	77.8	76.5
Accuracy(%)	82.4	80.9	77.8	76.5

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Sensitivity (%) is described in the manuscript.

Specificity

The specificity was 91.7% for Sac test, 97.9 for O'Brien test, 100% for Paxinos test and 97.9% for Jacob test.

PPV

The PPV was 75% for Sac Test, 88.9% for O'Brien test, 100% for Paxinos test and 83.3% for Jacob test.

NPV

The NPV was 84.6% for Sac Test, 79.7% for O′Brien test, 76.7% for Paxinos test and 75.8% for Jacob test.

Accuracy

The accuracy is 82.4% for Sac test, 80.9% for O'Brien test, 77.8% for Paxinos test and 76.5% for Jacob test.

Discussion

Clinical examination of the AC joint remains the corner stone of the assessment of patients with suspected AC pathology. Standard radiographs of the AC joint are quite specific (90%), but less sensitive (40%) in detecting AC pathology.3 Ultrasound examination of the AC joint may be a useful tool,13 but is not used routinely. In the series presented, ultrasound did show AC joint calcification in 1 patient and a full thickness supraspinatus tear was how AC joint calcification in 1 patient and a full thickness supraspinatus tear was suspected from the ultrasound scan in 2; however, the tears were not confirmed at arthroscopy to excise the distal clavicle. MRI has a reasonable positive (76%) and negative 86%) predictive value for AC joint pathology10, 14; however, AC joint changes are often also found in MRI scans of asymptomatic patients.15 Two out of the 3 patients in this series with a normal MRI went on to arthroscopic AC joint surgery. Therefore, clinical signs are often necessary to establish the clinical relevance of abnormal AC joint imaging. Injection of local anaesthetic following the clinical examination tests is of great value in abnormal AC joint imaging. Injection of local anaesthetic following the clinical examination tests is of great value in confirming the clinical diagnosis in some patients, possibly precluding the need for more expensive techniques such as MRI or bone scans.

I describe a new SAC test to identify AC joint involvement in anterior shoulder pain. It is a modification of the cross-body adduction test and active compressive test, as described by O'Brien et al.12 The SAC test was positive in all but 1 patient, giving it a sensitivity of 98% in my hands. It was found that weakness of resisted elevation in the test was a more prominent finding than pain, as presumably the pain limited the patient's ability to lift the arm. Specificity, results and Diagnostic quality of Clinical tests were recorded in this study (Table 3), as only patients with isolated AC joint symptoms were included. It is presumed that in the SAC test, the compression across the AC joint from cross-body adduction is increased by resisted elevation of the arm. This is perhaps why the pain was only slightly less with the arm in ER, as opposed to the O'Brien test where it was much less in ER. During the O'Brien test, the arm is adducted to only 15 and the acromion is loaded by the supraspinatus tendon com pressing the AC joint from the undersurface of the acromion.16 O'Brien et al reported the test to be 100% sensitive and 96.6% specific12; however, these excellent values have not been reproduced by other authors.3, 8, 16 We found the O'Brien test to be positive in 48 out of 58 patients, giving it a sensitivity of 83%. In the cross-body adduction test, the AC joint is also compressed by rotating the scapula into the clavicle. Retrospective clinical data showed the cross-arm adduction stress test to be 77% sensitive and to have an overall accuracy of 79%.8 In my series, I found a sensitivity of 67% with a positive cross-body adduction test in 39 out of 58 patients.

Diagnostic injection of the AC joint has been described to be the gold standard in the detection of AC joint pathology.3 Unfortunately, AC joint injections can be challenging and up to one-third of injections have been shown to be outside the joint.17 I did not perform radiographic guidance of our injection site. Instead, local anaesthetic was injected and its anaesthetic effect was measured using the previously described protocol of clinical testing. Following the injection, AC tests were negative in all patients, indicating that the local anaesthetic was administered at the correct anatomical site.

Conclusion

The primary aim of this study was to assess the diagnostic sensitivity and specificity of my newly described SAC test. From the present study, it can be concluded that the easy-to use SAC is a highly sensitive and test to evaluate AC joint pathology, when compared to other standard tests but the specificity for Sac test is 91.7%.

Conflicts of Interest

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

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