Coracoid pain test: a new clinical sign of shoulder adhesive capsulitis

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Abstract Patients with adhesive capsulitis were clinically evaluated to establish whether pain elicited by pressure on the coracoid area may be considered a pathognomonic sign of this condition. The study group included 85 patients with primary adhesive capsulitis, 465 with rotator cuff tear, 48 with calcifying tendonitis, 16 with glenohumeral arthritis, 66 with acromioclavicular arthropathy and 150 asymptomatic subjects. The test was considered positive when pain on the coracoid region was more severe than 3 points (VAS scale) with respect to the acromioclavicular joint and the anterolateral subacromial area. The test was positive in 96.4% of patients with adhesive capsulitis and in 11.1%, 14.5%, 6.2% and 10.6% of patients with the other four conditions, respectively. A positive result was obtained in 3/150 normal subjects (2%). With respect to the other four diseases, the test had a sensitivity of 0.96 and a specificity ranging from 0.87 to 0.89. With respect to controls, the sensitivity and specificity were 0.99 and 0.98, respectively.

The *coracoid pain test* could be considered as a pathognomonic sign in physical examination of patients with stiff and painful shoulder.

Introduction

Adhesive capsulitis of the shoulder, most commonly referred to as frozen shoulder, is a common disorder. Its aetiology, however, is not completely elucidated despite extensive research.

Patients with adhesive capsulitis frequently have associated diseases such as Dupuytren's disease [23], thyroid disease [8], Parkinson's disease [21], osteoporosis [5], cardiorespiratory conditions [4], hyperlipidaemia [7], as well as diabetes in which capsulitis is often long standing and more difficult to manage [2, 15].

Radiographs of the shoulder are normal. Thickening of the coracohumeral ligament (CHL) and of the joint capsule in the rotator cuff interval (RCI), as well as the subcoracoid triangle sign, are characteristic magnetic resonance (MR) arthrographic findings in frozen shoulder [13, 16, 18, 19, 24]. The RCI, in fact, is the region in the anterosuperior aspect of the glenohumeral joint formed by a complex intersection of the fibres of the coracohumeral ligament, the superior glenohumeral ligament, the glenohumeral joint capsule, and the supraspinatus and subscapularis tendons [13, 20].

A set of diagnostic criteria was first described by Codman [9] and it still holds true today. These criteria include: pain in the shoulder which comes on slowly and is felt at the insertion of the deltoid, inability to sleep on the affected side, atrophy of the scapular muscles, and local tenderness. The pain is "very trying", but patients are usually able to carry out the activities of daily living. There

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is restriction of both active and passive motion, with painful and decreased elevation and rotations of the arm. There is no consensus on the exact range of motion (ROM) restriction required for a patient to be diagnosed as having a frozen shoulder. Dias et al. [10] described diffuse tenderness over the glenohumeral joint, extending to the trapezius and interscapular area. No other clinical tests were reported as specifically related to adhesive capsulitis.

In this study, we analysed whether pain causing deep palpation on the coracoid area, which is located just above the anatomical area involved in the disease (RCI), may be a pathognomonic sign of shoulder adhesive capsulitis.

Materials and methods

Between May 2006 and May 2008, in the “shoulder clinical office” of the University of Rome “Sapienza”, we evaluated a total of 1,196 patients. This included 85 consecutive patients with primary (unrelated to trauma and/or surgery) shoulder adhesive capsulitis (mean age 54 years, range 46–62 years), 465 with a small or large posterosuperior rotator cuff tear (mean age 53, range 40–57), 48 with calcifying tendonitis of the shoulder (mean age 50, range 43–53), 16 affected by glenohumeral arthritis (Samilson-Prieto [22] grade I–II in patients younger than 60 years, mean aged 56, range 45–59) and 66 with a degenerative arthropathy of the acromioclavicular (AC) joint (mean age 57, range 45–64). In addition, the test was performed in 150 subjects without shoulder disease and with a mean age of 55 years (range 51–63). Very fat patients were excluded from the study because of the difficulty to reach the coracoid process by finger palpation. The test was not used to formulate the diagnosis; the latter was based on Codman’s criteria, shoulder stiffness and MRI findings in adhesive capsulitis, clinical and MRI evaluation in rotator cuff tears, and

clinical and radiographic findings for calcifying tendonitis, glenohumeral arthritis and AC arthropathy. These conditions were selected because they are common in patients aged 50 to 60 years, which is the age range in which adhesive capsulitis is most frequently observed.

The total number of patients was 830 (mean age 57 years, range 40–62), of whom 518 (62.4%) were women and 312 men. They all provided a full history and gave informed consent.

On physical examination it was recorded whether digital pressure on the area of the coracoid process elicited local pain (Fig. 1); examinations were consistently performed by the same examiner (S.G.). For comparison, digital pressure was also carried out on the AC joint and the anterolateral subacromial area. Patients and controls were instructed to record the severity of pain on a visual analogue scale (VAS) of 0 (no pain) to 10 points (most severe pain). The test was considered positive when the score was 3 points or higher on pressure in the coracoid area compared with the other two areas. Results were collected on a database (Microsoft Office Excel) and were analysed with Pearson χ^2 test. The results in patients with adhesive capsulitis were compared to those with the other conditions and to the controls to assess sensitivity, specificity, positive predictive value and negative predictive value (and their confidence intervals).

Results

The test was positive in 82/85 (96.4%) patients with adhesive capsulitis (mean VAS scale 8.3 points, range 6–10), compared with 52/465 (11.1%) (mean VAS scale 5.1, range 3–8) with rotator cuff tear, 7/48 (14.5%) (mean VAS scale 6.2, range 4–8) with calcifying tendonitis, 1/16 (6.25%) (mean VAS scale 4, range 3–5) glenohumeral arthritis, and 7/66 (10.6%) (mean VAS scale 5.3, range 3–6)

Fig. 1 The coracoid pain test is considered positive when the digital pressure on the coracoid area (black arrow, **b**) evokes a more intensive pain with respect to other shoulder area (**a**)

with AC arthritis. A positive result was obtained in 3/150 asymptomatic subjects (2%) (mean VAS scale 4, range 3–5). The mean diagnostic values of the test of palpation-evoked coracoid pain in shoulder adhesive capsulitis compared to rotator cuff tear, calcifying tendonitis, glenohumeral and AC arthropathy are reported in Table 1 and the mean values with respect to controls in Table 2.

Discussion

Since the first description of shoulder adhesive capsulitis [11], limited progress has been made in identifying the clinical features of this condition. In recent literature, the vast majority of studies investigated the best treatment to carry out [1, 3, 14, 19] or the aetiology of the disease [13, 16, 17, 19, 24]. However, no studies have tried to identify clinical tests able to differentiate adhesive capsulitis from other forms of shoulder stiffness.

The purpose of this study was to find a simple clinical test that could help shoulder surgeons make a correct and quick diagnosis of frozen shoulder. Studies on cadavers and open or arthroscopic surgery have recognised that the anatomical structures predominantly involved in frozen shoulder are the RCI and the CHL [12, 13, 16, 19], which are just posterolateral to the coracoid process. RCI contractures associated with shoulder adhesive capsulitis vary in severity, ranging from mild to severe [16]. Although the pathogenesis is not completely elucidated, some authors postulated that contracture of RCI and CHL is the essential lesion in adhesive capsulitis [6, 16]. An attempt was thus made to test this hypothesis by using digital pressure on the area of the coracoid process to elicit local pain.

It has been reported that the coracoid region is not the only painful area in adhesive capsulitis. As shown by Hand et al. [12], the entire capsular tissue is thickened, inflamed and congested and, consequently, there is diffuse pain in the shoulder. In addition, Hand et al. maintain that an almost complete loss of external rotation is a pathognomonic sign

Table 2 Sensitivity, specificity and prognostic values of the test in adhesive capsulitis compared to normal asymptomatic subjects

Coracoid pain test	Value	95% confidence interval
Sensitivity	0.99	0.99–1.00
Specificity	0.98	0.97–0.99
Positive predictive value	0.99	0.98–1.00
Negative predictive value	0.99	0.98–1.00

of frozen shoulder. Accordingly, Neviaser and Neviaser [17] reported that, on physical examination, a specific localised tender spot is rarely found, although the long head of the biceps may occasionally be painful on palpation. In our study, almost all patients with adhesive capsulitis (96.4%) complained of pain on pressure over the coracoid process. When positive, this test can be used to rule in the diagnosis of adhesive capsulitis (high specificity); furthermore, it has a high sensitivity and when negative it rules out the diagnosis.

Patients with the other shoulder conditions who were included in the study as controls did not complain of pain when the test was performed, with the exception of a small number of cases (11.1% in rotator cuff tears, 14.5% in calcifying tendonitis, 6.2% and 10.6% in glenohumeral and AC arthropathy). Furthermore, it was almost consistently negative in asymptomatic subjects. It is conceivable that in patients with other shoulder diseases, the specific condition might cause inflammation of the synovial membrane and/or the subacromial bursa, making the entire anterior subacromial region painful.

In conclusion, digital pressure over the coracoid area elicits pain in the vast majority of patients with adhesive capsulitis and, thus, it can be considered an easy and reliable clinical test for identifying patients with or without this condition. Based on its sensitivity and predictive values, it may represent a “cardinal test” for this condition.

Table 1 Sensitivity, specificity and prognostic values of the coracoid pain test in adhesive capsulitis compared to other shoulder pathological conditions

Coracoid pain test	Value				95% confidence interval			
	RCT	CT	ACa	GHa	RCT	CT	ACa	GHa
Sensitivity	0.96	0.96	0.96	0.96	0.90–0.99	0.90–0.99	0.90–0.99	0.90–0.99
Specifity	0.89	0.87	0.89	0.88	0.86–0.91	0.76–0.96	0.80–0.95	0.80–0.94
Positive predictable value	0.61	0.83	0.92	0.91	0.53–0.69	0.74–0.89	0.85–0.96	0.85–0.95
Negative predictive value	0.99	0.91	0.95	0.95	0.98–1.00	0.77–0.97	0.87–0.98	0.87–0.98

RCT rotator cuff tear, CT calcifying tendonitis, ACa acromioclavicular arthritis, GHa glenohumeral arthritis

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