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Intraarticular findings in the chronically painful shoulder

A study of 32 posttraumatic cases

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32 consecutive patients suffering from chronic shoulder pain for more than 6 months after a single, nondislocating shoulder trauma were examined clinically and by special radiographs, dynamic sonography, MRI and arthroscopy. Typical complaints were pain during loading, especially during over the head activities. Symptoms of a "dead arm" and instability were also present. Patients with previous dislocations, traumas or radiographic signs of degenerative shoulder lesions were excluded.

The patients had a decreased active range of motion and positive signs of apprehension and impingement, but only 4 had clinical signs of shoulder instability. Diagnostic evaluation identified labral tears, partial and total rotator cuff lesions with subacromial impingement and tendinitis of the biceps tendon. Surgery was performed in 24 patients, using capsulolabral and rotator cuff reconstruction, arthroscopic labral resection and open subacromial decompression.

In conclusion, patients with chronic posttraumatic shoulder pain have intraarticular injuries, especially tears of the glenoid labrum. History, clinical findings, radiography and sonography are seldom diagnostic. MRI is valuable, particularly for indentification of labral pathology, but arthroscopy appears necessary for a preoperative assessment.

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Pathologic findings following acute (Baker et al. 1990) or recurrent (Rowe 1980) dislocations have previously been reported. Chronic shoulder pain due to overuse, as in athletic performances, is well known (McMaster 1986, Hurley and Anderson 1990, Burns and Turba 1992) as well as chronic shoulder pain caused by degeneration (Adolfsson and Lysholm 1991). Posttraumatic chronic shoulder pain after a single trauma is less frequently reported (Neviaser 1993).

Non-invasive methods to diagnose shoulder disorders include standard and special radiographs in order to identify osseous lesions (Rozing et al. 1986). Sonography can identify pathology of the rotator cuff (Middleton 1989), whereas computerized tomographic (CT-) arthrography has provided additional information about lesions of the rotator cuff, glenoid labrum and capsule (Mink et al. 1985, Rafii et al. 1987). MRI has recently been introduced for diagnosis of shoulder disorders (Iannottti et al. 1991).

We determined the cause of chronic shoulder pain by means of non-invasive and invasive diagnostic methods in patients who suffered from posttraumatic shoulder pain.

Patients and methods

During 18 months, 32 consecutive patients were reffered to our department because of chronic shoulder pain treated non-operatively for more than 6 months after a single-shoulder trauma (Table 1). The mean time with shoulder disorder before inclusion was 24 months. The mean age was 32 (17–55) years; there were 29 men and 3 women. The traumas were either distortions or contusions of the shoulder. Typical complaints were pain during loading and especially during over the head activities. Symptoms of a "dead arm" and a sensation of instability were also present. Patients with previous dislocations, traumas or radiographic signs of degenerative shoulder lesions were

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Table 1. Trauma history, symptoms, clinical and diagnostic findings

Case	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	+	–	+	+	+	–	+	+	+	–	–	+	–			8	8
2	+	–	–	+	–	+	+	+	–	–	–	+	–		4	4, 8	4, 8
3	–	+	–	+	–	+	+	+	–	–	+	–	–			8	4, 8
4	–	+	–	+	–	+	–	+	–	+	–	–	–	1	6	8	6, 8
5	–	+	+	–	–	+	+	+	+	–	–	–	–			8	8
6	–	+	+	–	–	–	+	+	–	–	–	+	–		5	5	5
7	+	–	–	+	+	–	–	+	–	–	–	–	–	2	2	2	2
8	+	–	+	–	–	–	+	+	–	+	–	–	–		4	4, 8	4, 8
9	–	+	–	+	–	+	+	+	+	–	–	–	–			8	8
10	–	+	–	+	–	–	–	+	+	–	–	–	–			8	8
11	+	–	–	–	+	–	+	–	+	–	–	–	–			8	8
12	+	–	–	+	–	–	–	+	+	–	–	–	–			8	8
13	+	–	+	–	–	–	+	–	+	–	–	–	–	1		8	8
14	+	–	–	+	–	+	–	+	+	–	–	–	–		7		7
15	+	–	+	–	–	–	+	–	+	–	–	–	–			8	8
16	+	–	+	–	–	+	–	–	+	–	–	+	–		3	3	3
17	+	–	+	–	–	–	–	+	–	–	–	+	–			8	8
18	+	–	–	+	+	–	+	–	+	–	–	–	+		3	3	3
19	+	–	–	+	+	–	–	+	–	+	–	–	–				3
20	–	+	–	+	+	+	–	–	+	–	–	–	–			8	8
21	+	–	+	–	–	–	+	–	–	–	–	+	–		5	5	5
22	–	+	+	–	–	–	+	+	+	–	–	+	–		4	4, 8	4, 8
23	–	+	–	+	+	–	–	+	+	–	–	–	–	1			8
24	+	–	+	–	+	+	–	–	+	–	+	–	–				
25	–	+	–	+	+	–	–	+	–	–	–	+	–	1			8
26	+	–	–	+	–	+	–	–	+	–	+	–	–				8
27	+	–	+	–	–	–	–	+	–	–	–	–	–			8	8
28	+	–	+	–	+	+	–	+	–	–	–	+	–			8	8
29	+	–	–	+	–	–	–	–	–	–	–	+	–		5	5	5
30	+	–	–	+	–	–	–	–	+	–	–	+	–		6		6, 8
31	–	+	–	+	–	–	–	–	–	–	–	+	–	1	4	4, 8	4, 8
32	–	+	+	–	–	–	–	+	–	–	–	+	–				4

Trauma
- A Distortion
- B Contusion

Symptoms
- C Shoulder pain during loading
- D Over the head pain
- E Symptoms of "dead arm"
- F Feeling of shoulder instability
- G Popping sensation inside the shoulder

Clinical findings
- H Decreased active ROM
- I Positive anterior apprehension sign
- J Positive posterior apprehension sign
- K Positive drawer test
- L Positive impingement sign
- M Positive impingement test

Diagnostic findings
- 1 Osseous Bankart lesion
- 2 Avulsion of greater tuberculum
- 3 Synovitis of rotator cuff
- 4 Partial rotator cuff tear
- 5 Total rotator cuff tear
- 6 Biceps tendinitis
- 7 Partial biceps rupture
- 8 Labral tear

- N Special radiographs (1 and 2)
- O Ultrasonography
- P MRI
- Q Arthroscopy

excluded. At the time of injury all patients had been examined by plain radiographs, which were normal.

20 patients suffered their initial trauma during sports activities, such as handball (14), soccer (2), tennis (2), skiing (1) and skating (1). The remaining 12 patients were injured during work.

All patients had pain during shoulder activities, but not at rest. Characteristic findings and distribution of clinical findings are shown in Table 1.

The patients were evaluated with a questionnaire and examined clinically for instability, using the drawer test and presence of a sulcus sign. Positive anterior/posterior apprehension, impingement and the active and passive range of motion were also recorded. All were evaluated by standard AP- and a 45-degree craniocaudal projection, with the patient in the supine position (West Point). Rotatory views were obtained with the arm in external and internal rotation. The sonographic examination was performed with a high-resolution 5 MHz or 7.5 MHz phased linear-array transducer (Acuson 128 XP; Mountain View, California). Magnetic resonance imaging was performed with a Phillips 1.5-T MR Imager giving proton-density and T2-weighted coronal 5 mm sections with a 0.5 mm intersection gab. This sequence was followed by a thin-slice (1.5 mm) contiguous 3-D imaging of the shoulder. Finally, arthroscopy was done with the patient in the lateral

decubitus position and a traction device mounted on the arm placed at approximately 70 degrees of abduction. The standard posterior approach using a 5 mm, 30- or 70-degree arthroscope was used and bursoscopy was performed in all patients. Each patient was tested for instability under anesthesia and the standard of reference for comparison of the intraarticular findings was arthroscopy.

Lesions of the glenoid labrum were described as either total detachment of the labrum from the glenoid rim and capsule or partial, with rupture of the labrum (flap tear). Degenerative lesions of the labrum were also described. The lesions of the rotator cuff were described as either partial with a joint side or a bursal side tear or total, with complete rupture of the rotator cuff.

Each examination was carried out by a different person and no information regarding clinical and diagnostic findings by the other methods was provided before each examination.

Results

We found 22 labral tears, of which 10 were total labral detachments, 8 were partial labral tears (flap tears) and 4 had degenerative lesions of the labrum. 5 of the total labral tears were combined with an osseous Bankart lesion of the glenoid cavity (Table 1).

3 patients had a total rotator cuff lesion and 6 had a partial rotator cuff tear at the joint side. No bursal side tears were seen.

During arthroscopy, we tried to dislocate or subluxate the shoulder, but only 4 were found to be unstable under anesthesia. Operative procedures were performed in 24 patients. Open surgery was necessary in 16 cases, using a deltopectoral approach where capsulolabral (10) and rotator cuff reconstruction (2) with the Mitek-anchor-system were performed. One of the patients with the total rotator cuff lesion could not be reconstructed because the defect was too large. 4 patients had a subacromial decompression with resection of the coracoacromial ligament and bony spurs. 8 patients were treated arthroscopically with resection of the labral tear. No operative complications were recorded. 8 patients with isolated partial rotator tears, degenerative labral tears and biceps tendinitis were treated non-operatively.

Discussion

The diagnostic evaluation of patients with chronic posttraumatic shoulder pain was performed in order to identify intraarticular lesions. Our findings indicate that especiallly labral lesions should be kept in mind as a possible cause of shoulder pain. Labral lesions in connection with shoulder pain and shoulder instability have been described (Pappas et al. 1983, McMaster 1986, Kohn 1987, Snyder et al. 1990, Nelson et al. 1991), but the traumas were typically dislocation or repetitive minor subluxation. Intraarticular lesions in patients with a subluxating shoulder are also localized in the labrum and glenohumeral ligaments (McGlynn and Caspari 1983, Rowe 1987, Garth et al. 1987). We identified 17 non-osseous and 5 osseous labral lesions, but no Hill-Sach's lesion, which indicates that the shoulders had not been dislocated at the initial trauma. A Hill-Sach's lesion has been reported after an acute traumatic anterior dislocation in 47 percent of the cases and even more often after recurrent dislocations (Calandra et al. 1989). Repeated subluxation may be a concurrent cause of the chronic pain, but only 4 of our patients were unstable under anesthesia. As in our study, rotator cuff pathology as a frequent cause of posttraumatic shoulder pain has been reported before (Adolfsson and Lysholm 1991, Nelson et al. 1991, Burns and Turba 1992).

We could identify synovitis, partial and total lesions of the rotator cuff and pathology of the biceps tendon by sonography (Figure 1), but not tears of the glenoid labrum. This is in accordance with the findings of Middleton (1989) and Brenneke and Morgan (1992). Using special radiographic views (Figures 2 and 3), it is possible to identify osseous lesions around the humeral head and glenoid cavity with high accuracy (Pavlov et al. 1985, Rozing et al. 1986). MRI was found to be reliable for identifying tears of the labrum (Figure 4) and rotator cuff (Zlatkin et al. 1988, Iannotti et al. 1991, Nelson et al. 1991). MRI did not distinguish between total labral tears (detachment) and partial labral tears (flap tears) but, if the labrum was dislocated from its normal position, indicating a total detachment from the glenoid rim or capsule, MRI was able to visualize this. MRI was also able to detect degenerative and eroded labral changes. Surprisingly, we found only 2 of the 5 osseous Bankart lesions of the glenoid rim by MRI.

Arthroscopic evaluation of shoulder disorders is well-established (Andrews et al. 1984, Hurley and Anderson 1990, Adolfsson and Lysholm 1991) and we identified lesions within the rotator cuff, glenoid

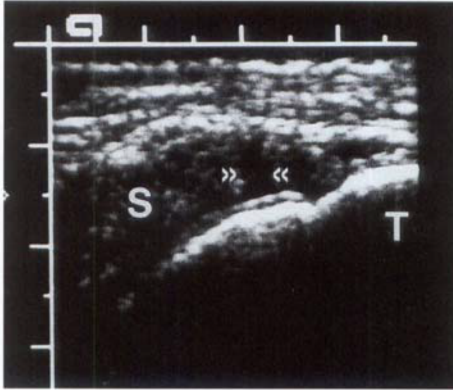

Figure 1. Case 6. Small full thickness rotator cuff tear. Longitudinal sonogram showing area of discontinuity (> <) in the supraspinatus tendon(s) near its point of insertion on the greater tuberosity (T).

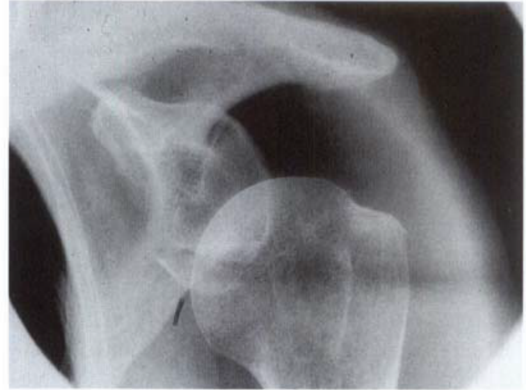

Figure 2. Case 25. External AP view demonstrating an avulsion fracture of the anteroinferior part of the glenoid cavity (osseous Bankart lesion).

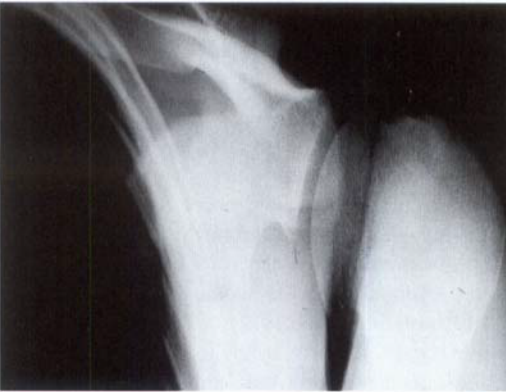

Figure 3. Case 13. West point radiographic view of a left shoulder with a minor osseous Bankart lesion.

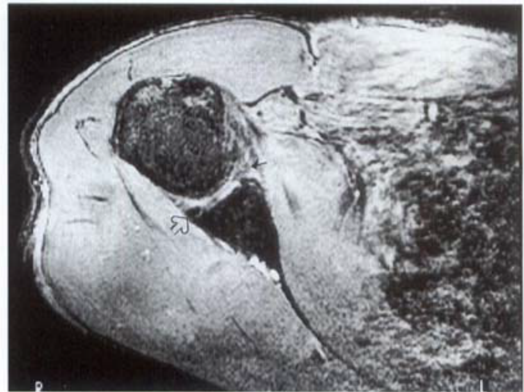

Figure 4. Case 26. Axial gradient echo image showing a labrum lesion as an area of abnormally high signal intensity from the anterior part of the glenoid labrum (black arrow), as distinct from the normal low signal intensity from the posterior labrum rim (open arrow).

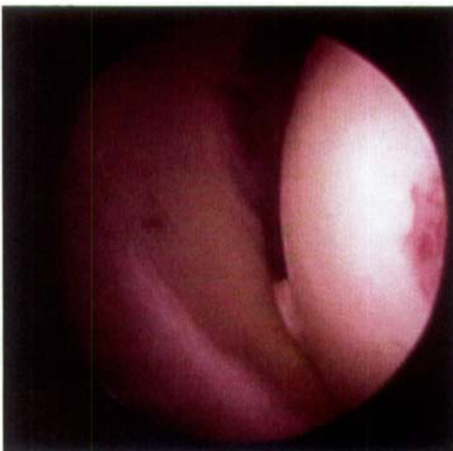

Figure 5. Case 28. Arthroscopically shown tear of the anterior glenoid labrum.

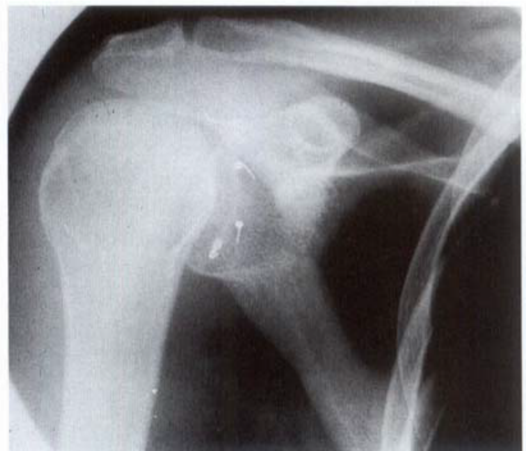

Figure 6. Case 31. Anterior glenoid labrum fixed with 3 Mitek anchors.

labrum (Figure 5) and biceps tendon. Lesions found by arthroscopy were confirmed in the 16 operated patients. Figure 6 demonstrates a glenoid labrum fixed with 3 Mitek anchors.

In conclusion, patients with chronic posttraumatic shoulder pain have intraarticular injuries, especially tears of the glenoid labrum. History, clinical findings, radiography and sonography are seldom diagnostic. MRI is a valuable non-invasive diagnostic method, especially in demonstrating labral pathology, but arthroscopic evaluation appears necessary for preoperative assessment.

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