Arthrotomography of the unstable shoulder

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Thirty-seven patients suffering from clinically verified subluxation of the shoulder joint underwent double-contrast arthrotomography. Sixteen of these patients were operated on, 4 of whom after arthroscopy, and 1 patient had only arthroscopy. Arthrotomography readily revealed lesions of the glenoid labrum, most of them small, and also redundancy of the anterior joint capsule. The method can be recommended in the examination of the glenoid labrum in patients suffering from anterior subluxation of the shoulder.

The diagnosis of recurrent anterior subluxation of the glenohumeral joint has been based on the patient's history and confirmed by physical examination (McGlynn et al. 1982). Avulsion or a tear of the glenoid labrum has been reported in recurrent subluxation of the shoulder, demonstrated either by operation or arthroscopy (Blazina and Saltzman 1969, Rowe and Zarins 1981, McGlynn et al. 1982).

Double-contrast arthrography has been recommended (Goldman and Ghelman 1978, Mink et al. 1979), and El-Khoury et al. (1979) introduced double-contrast arthrotomography to evaluate the state of the glenoid labrum more precisely.

We have compared axillary arthrotomography with arthroscopy and surgery in evaluating lesions of the anterior glenoid labrum of the subluxating shoulder.

Patients and methods

The series comprised 37 patients (20 men and 17 women) suffering from an anterior subluxating shoulder joint as diagnosed by clinical examination. The mean age of the patients was 31 (17–45) years. All the patients had a disability characterized by feeling of the shoulder slipping out of the socket, accompanied by sharp pain when using the upper arm in abduction and external rotation. All the patients had a positive apprehension sign and obvious click when the arm was externally rotated in abduction of 90° while an anteriorly directed pressure was applied on the posterior aspect of the humeral head. Patients with voluntary subluxation were excluded, as well as those with any sign of multidirectional instability.

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Thirty-seven patients underwent axillary arthrotomography of the shoulder. All the patients with a clinical and radiographic diagnosis of anterior subluxation of the shoulder were treated initially with specific resistive exercises in order to strengthen the muscles of the rotator cuff, especially the subscapularis muscle. After this program 17 patients were left with persisting instability symptoms, chronic shoulder pain, and an inability to work.

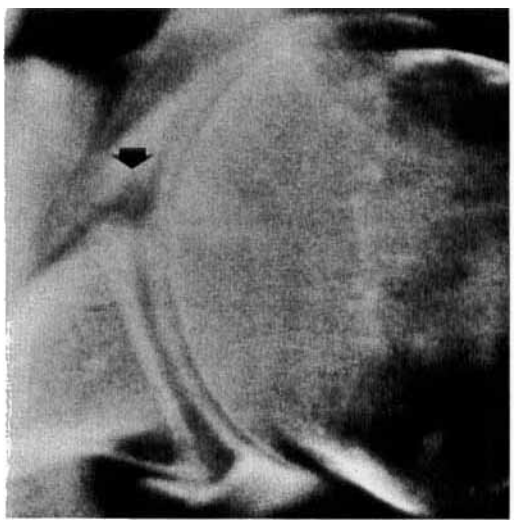
Four of the 17 patients were first examined with arthroscopy before the operation. One patient underwent only arthroscopy of the shoulder. The arthrographs of those 17 patients who underwent a surgical procedure were analyzed in more detail and correlated with the surgical or arthroscopic observations.

Arthrographic technique

The shoulder joint was punctured under fluoroscopic control with a technique presented by Killoran et al. (1968). One to 2 ml of contrast medium, with an iodine concentration of 200 mg/ml, was injected intraarticularly followed by the addition of 10 ml of room air. The patient was positioned on the side with the affected shoulder closer to the film (Franji and El-Khoury 1979). The neck was flexed and the contralateral shoulder was moved forward to avoid superimposing the shoulder. Sections of the shoulder were taken at 5-mm intervals with a linear motion.

The radiographic signs recorded as pathologic were blunting or avulsion of the labrum and the presence of contrast medium in the labrum (El-Khoury et al. 1979, McGlynn et al. 1982; Figures 1 and 2). The extent of lesions of the glenoid labrum and possible bone defects were also noted. In addition, redundancy of the anterior joint capsule (Uhthoff and Piscopo 1985) was recorded (Figure 3).

Five patients underwent shoulder arthroscopy under general anesthesia. Posterior entry of the arthroscope was used as described by McGlynn and Caspari (1984). A detached glenoid labrum, bony erosion of



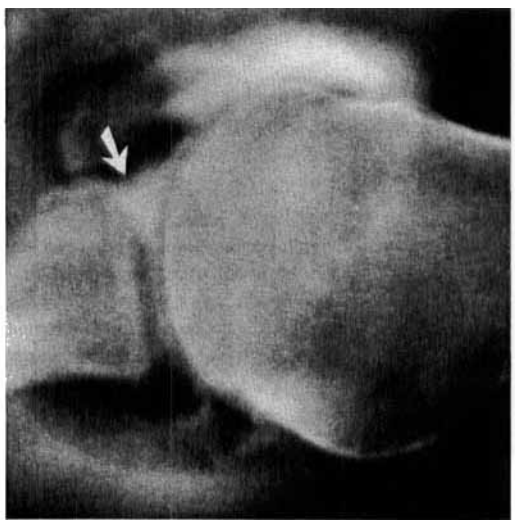


Figure 1. Lesion of the anterior glenoid labrum. Note blunting of the triangular shadow of the labrum (black arrow).

Figure 2. Avulsion of the anterior glenoid labrum. Note also the fragmentation of the glenoid bone, which was verified surgically (white arrow).

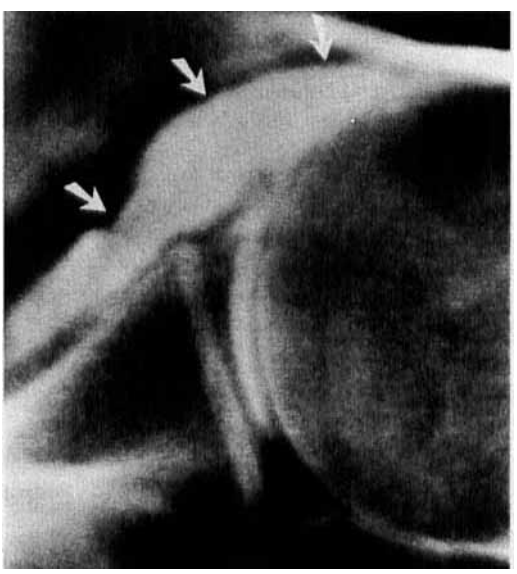


Figure 3

Figure 3. Redundancy of the anterior joint capsule (white arrows).

the underlying glenoid, or detachment of the anterior aspect of the capsule could be specifically identified. The area of the glenoid rim and capsular attachment was carefully palpated with a dissector instrument.

At operation the lesions of the anterior rim were classified into three types according to Rowe and Zarins (1981):

Type I: An avulsion of the capsule and fibrocartilaginous labrum from the anterior part of the glenoid rim, with or without eburnation of the rim;

Type II: An avulsion of the anterior part of the capsule, the labrum, and a fragment of the glenoid rim, the width of the fragment being less than one eighth of the transverse width of the glenoid, or lesions with a marked eburnation of the underlying bone without any loose fragments;

Type III: Similar to Type II, but with a fragment greater than one eight of the transverse width of the glenoid.

Results

In 31/37 patients, arthrotomography showed a lesion of the anterior glenoid labrum with 29 Type 1 and one each of Types II and III lesions. In the 17 patients who had arthroscopy and/or an operation, 16 had blunting or avulsion of the anteroinferior glenoid labrum with the presence of contrast medium in the labrum. One patient had an arthrotomographic finding of an avulsion of the anterior glenoid labrum associated with a large bone erosion of nearly half of the glenoid (Figure 2). These tomographic observations were confirmed by direct inspection during operation or arthroscopy; a constant observation was an anteroinferior abnormality of the glenoid with detachment of the glenoid rim to total absence of the labrum associated with bone erosion of the anterior glenoid rim. The distribution of the surgical or arthroscopic observations of the 17 patients was a Type 1 lesion in 15 patients and Types II and III lesions in 1 patient each.

When arthrotomographic findings and surgical or arthroscopic observations were compared, a minor defect of the anterior glenoid labrum was detected with both methods in 15 of 17 patients. In 1 patient, arthrotomography revealed only a minor defect of the anteri-

or glenoid labrum, but, in addition, eburnation of the subchondral bone was visible during the operation. In 1 patient, arthrotomography revealed a large avulsion of the glenoid labrum associated with a large bone erosion of the glenoid (Type III lesion), which was also verified during surgery. Thus, in 16/17 patients with anterior subluxation of the shoulder, arthrotomographic findings of the glenoid correlated positively with surgical and/or arthroscopic observations.

During surgery, redundancy of the anterior joint capsule due to the trauma was observed in 8 patients, seen by axillary arthrotomography in only 6 of these patients. Conversely, in 2 patients arthrotomography showed redundancy of the anterior joint capsule during surgery, which could not be verified during surgery.

Discussion

The diagnosis of subluxation of the shoulder has been based on a clinical history with physical findings inconsistent with radiographic studies (Protzman 1980, Mizuno and Hirohata 1983). Fraying, tearing, or detachment of the anterior or anteroinferior glenoid labrum and concomitant eburnation of the underlying glenoid bone are consistent peroperative findings (Rowe and Zarins 1981, Pappas et al. 1983, McGlynn and Caspari 1984). These changes are considered to be secondary to repeated injuries when the humeral head moves forward and backward in the glenoid fossa. These typical observations of the anterior glenoid labrum of patients with subluxation of the shoulder joint are, however, rarely noted in plain radiographs (McGlynn et al. 1982). Only occasionally may calcification of the anterior capsule of the shoulder joint be seen (Protzman 1980).

Single-contrast shoulder arthrography has not been useful in revealing lesions of the glenoid labrum because an excess of contrast medium obscures its image (Goldman and Ghelman 1978). It has been reported that double-contrast arthrography more readily detects tears of the glenoid labrum due to a smaller amount of the liquid contrast medium (Goldman and Ghelman 1978, Mink et al. 1979). However, both in double- and single-contrast arthrography the glenoid labrum may not be imaged if the liquid contrast medium pools at the labrum. Arthrotomography using a double-contrast technique has been introduced to eliminate this disadvantage (El-Khoury et al. 1979); we limited the amount of liquid contrast medium to 1–2 ml to avoid troublesome pooling of the contrast medium.

In our study, preoperative axillary arthrotomography gave a correct diagnosis of the anteroinferior glenoid rim, except in 1 patient, in whom the extent of the defect was underestimated.

In axillary arthrotomography, attention has been paid to the appearance of redundancy of the anterior joint capsule (El-Khoury et al. 1979). This redundancy has been suggested to be of traumatic (Protzman 1980) or of congenital origin (Uhthoff and Piscopo 1985). We found one case of joint capsule redundancy without any surgical signs of traumatic origin.

Arthroscopy has been reported to be an accurate method for confirming the clinical diagnosis of subluxation of the shoulder joint and to be helpful in selecting specific surgical reconstruction procedures (McGlynn and Caspari 1984). For outpatients, however, axillary arthrotomography has its place especially if computed tomography or arthroscopy is not available.

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