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Shoulder arthroscopy

Arthroscopy of the shoulder joint has been carried out in 81 patients with different shoulder disorders. Thirty-two patients had rupture of the rotator cuff. Through cadaver studies and practice, a functional routine for examination has been established. Arthroscopy provides detailed and exact information of intraarticular conditions, and is valuable in planning for surgery and approach.

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Methods of surgical treatment of the shoulder have improved, and more differentiated information can now be utilized. This makes arthroscopy interesting. The joint is large enough and the instruments have already been perfected in knee joint surgery. However, arthroscopy has found few applications in the shoulder, and there have not been many reports in the literature (Ha'eri & Maitland 1981, Ha'eri & Orth 1980, Johnson 1980, Lilleby 1983, Mital & Karlin 1980, Wiley & Older 1980).

The value of arthroscopy for diagnosis and repair of cuff lesions has been investigated. Normal findings, a classification of cuff ruptures, and the technique used are described.

Patients and methods

Shoulder arthroscopy has been carried out on 81 patients with different shoulder symptoms. Thirty-two patients had an arthroscopically recognized rupture of the rotator cuff. They could be divided into two main groups. One group had full thickness cuff ruptures, some with rupture or luxation of the biceps tendon, with or without arthritis of the bicipital groove. Another group presented with superficial cuff ruptures (Table 1).

Technique

The first examinations were undertaken in 1979, after trying out the procedure on cadavers with a needle scope (Orthopaedic University Hospital, Münster). A posterocranial approach seemed to give the best survey of the joint.

The examination was later carried out with a Storz 5 mm arthroscope, 30 and 70 degree optic. The larger arthroscopy diameter with angulated optic gives an increased range of vision, and there has been no noticeable disadvantage as to the entry of the joint.

The patient lies on his side, and the shoulder to be examined is on top. The arm must be free to move. General or plexus anaesthesia is used, and sometimes local anaesthesia.

The arthroscope is brought into the joint through a small incision about 2 cm medial and inferior to the lateral edge of the spine of the scapula (Figure 1). Rotating movements of the humeral head facilitate orientation and make perforation of the capsule in its posterocranial part easy, without cartilage damage.

The joint is continuously flushed with saline solution, and drained through a cannula inserted from the front. After the examination, surgery can be performed with the patient in the same position.

Limitations

To obtain useful information from shoulder arthroscopy, the examiner must be a trained arthroscopist

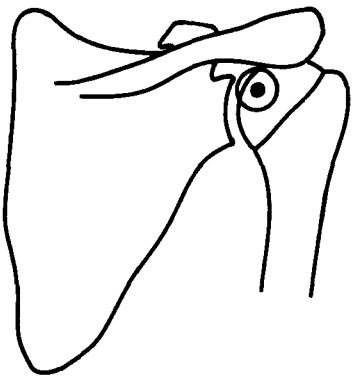
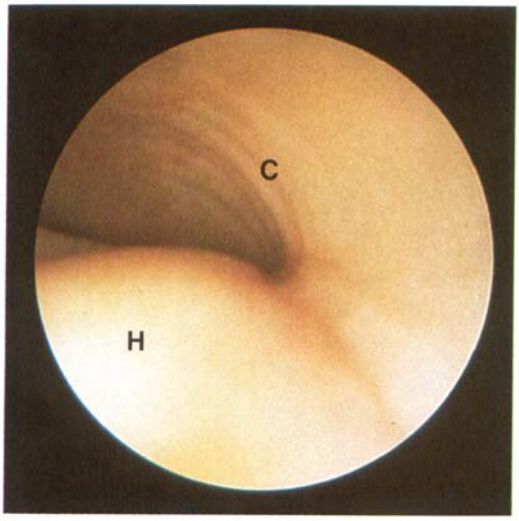
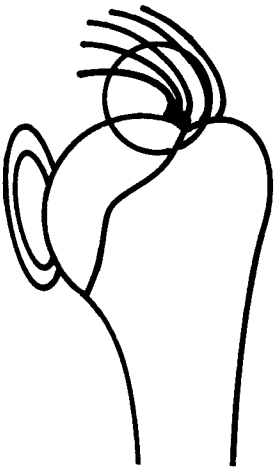
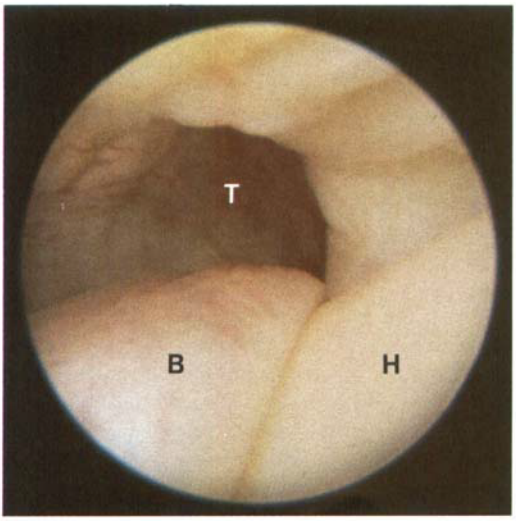
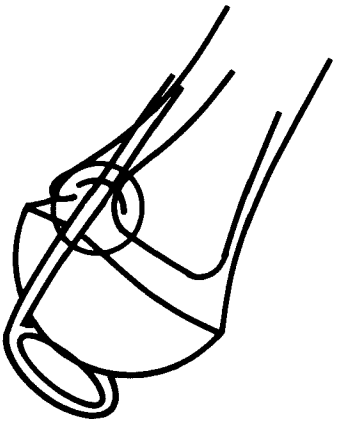


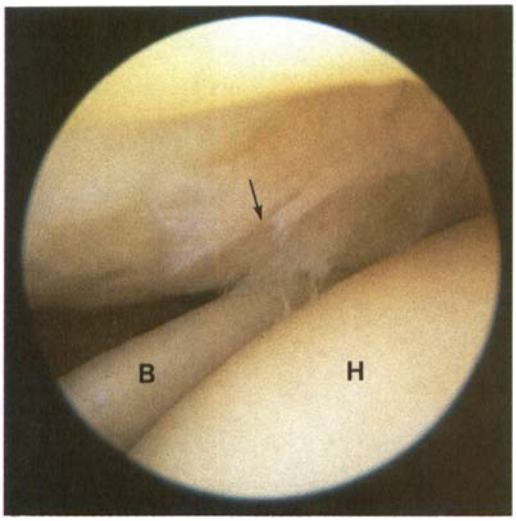
Figure 1. The right shoulder seen from behind. The capsule is penetrated in the centre of the circle.











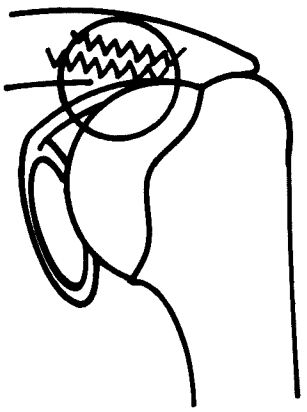
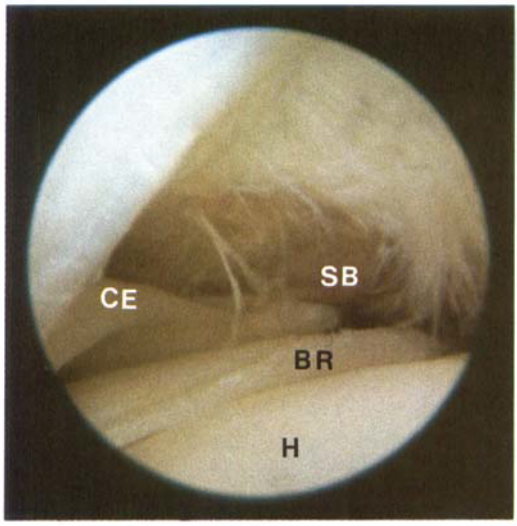
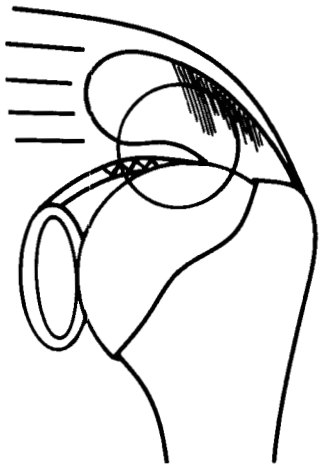
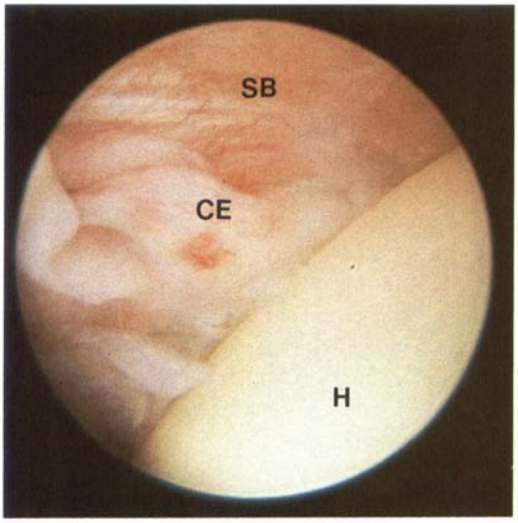
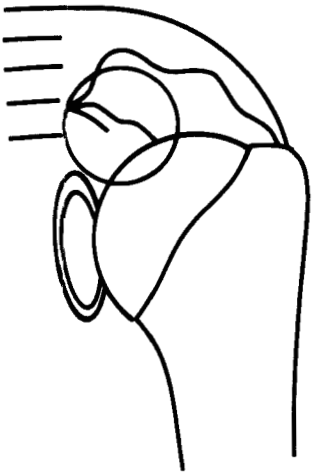


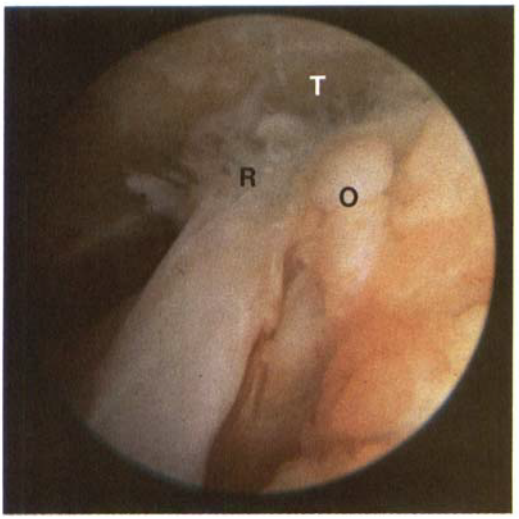
Figure 2. Rotator cuff (C). Humeral head (H). (The circle on the drawing indicates the photographed area).
Figure 3. Bicipital groove. Biceps tendon (B). Humeral head (H). Biceps tunnel (T).
Figure 4. Superficial cuff rupture (arrow). Biceps tendon (B). Humeral head (H).











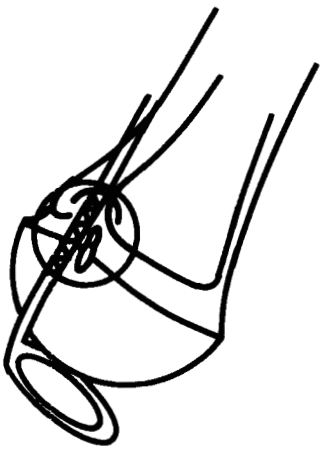


Figure 5. Full thickness cuff rupture. Cuff rupture edge (CE). Subacromial bursa (SB). Partly ruptured biceps tendon (BR). Humeral head (H).
Figure 6. Total cuff rupture. The cuff edge (CE), is distinguishable from the subacromial bursa (SB). Humeral head (H).
Figure 7. Bicipital groove arthritis. Partial biceps tendon rupture (R). Bicipital groove osteophytes (O). Bicipital tunnel (T).

Table 1. Arthroscopic findings in 32 shoulders with cuff rupture

Full thickness rupture and:	
Partial biceps tendon rupture	8
Bicipital groove arthritis	4
Total biceps tendon rupture	2
Biceps tendon luxation	2
Alone	1
Superficial cuff rupture and:	
Partial biceps tendon rupture	1
Bicipital groove arthritis	1
Alone	13
Total	32

and, equally important, must be familiar with shoulder disorders.

The examination takes 15–20 min, in addition to the operating time. A new sterile procedure may be necessary, but may be avoided with careful management. Survey of the joint may be hampered by synovitis or adhesions, and extracapsular fluid leakage from the joint may subsequently compress the capsule and make the examination difficult. Similar problems also occur in knee arthroscopy.

Complications

Fluid leakage to the soft tissues through the punctures required for instrumentation frequently occurs, but it is reabsorbed within 12 h, and does not cause much trouble to surgery. Abrasion of the cartilage due to the arthroscopy has occurred twice, but may be avoided with practice.

Results

Normal findings

By abduction and rotation of the arm, the whole cuff, which is elevated from the humeral head by fluid pressure, can be inspected (Figure 2). The surface is smooth and white or yellowish in colour with very few vessels.

By extension and outwards rotation of the arm, the biceps tendon can be followed from its origin on the supraglenoidal tubercle, to its departure from the joint in the bicipital groove (Figure 3). The tendon runs free in the joint over the humeral head and beneath the rotator cuff. Its contact area to the cuff and head varies according to the movement of the shoulder. In the groove it becomes a synovial cover. The groove offers abundant room for the tendon, but normally little space for side movements.

By rotating the arm, most of the humeral head can be visualized.

By adduction of the arm with a clothes-roll in the axilla, the head is elevated somewhat from the glenoid, which can be inspected together with the glenoid labrum. The glenoid cartilage is surrounded by the glenoid labrum which is more distinct cranially and anteriorly. Its anteroinferior portion is more adherent to the glenoid cartilage, which may erroneously be interpreted as a lesion of the labrum.

The broad subscapularis tendon is part of the anterior joint capsule, but is elevated and clearly distinguishable from this structure. It is covered by a thin layer of synovial tissue. The synovial lining is thicker in the rest of the capsule anteriorly and cranially.

The aperture of the subcoracoid bursa (subscapular bursa) which communicates with the joint space is visible. Inspection of the bursa itself, however, is hampered by the folds of the synovial lining.

Anterocranially, the coracohumeral ligament is visible as it leaves the subcoracoid bursa and attaches to the greater tuberosity. It is a marked structure, sometimes running free in the joint space.

The posterior part of the capsule is difficult to inspect because of the posterior entry, but this part of the capsule usually has little pathological value.

Cuff rupture

Lesions through some of the layers of the cuff only were classified as superficial ruptures. In such cases the cuff was frayed and uneven (Figure 4). The size of the area involved varied from approximately 1 to 4 square cm. The defect could be 2–3 mm deep. Such lesions were found in the supraspinatus tendon area, close to the attachment on the humeral head.

By inspection alone, differentiation between a small, full thickness rupture and a superficial rupture could be difficult. Palpation of the cuff with a hook made this easier. The cuff could be examined in this way from the inside, or from the outside if the hook was inserted laterally into the subacromial bursa.

Lesions through all layers of the cuff were classified as full thickness ruptures (Figure 5). The synovial lining of the subacromial bursa was visible through the defect. The tendon-like cuff structure and the rupture edge were mostly clearly distinguishable from the usually inflamed and red synovial lining of the bursa (Figure 6).

Full thickness ruptures limited to one part of the cuff were classified as partial, whereas those with a defect of most of the cuff, or of the whole cuff from the infraspinatus to the subscapularis tendon were classified as subtotal or total cuff ruptures. In these ruptures the concomitant tissue defect and retraction of the cuff medially could be estimated.

Cuff rupture was often combined with degenerative changes of the biceps tendon, mostly in the part in the bicipital groove, or proximal to this where it lies between the humeral head and the rotator cuff. Partial rupture of the biceps tendon was frequently seen together with full thickness rupture of the cuff. Some had severe arthritis of the bicipital groove, together with degenerative changes of the biceps tendon.

One patient with a superficial cuff rupture had severe arthritis of the bicipital groove, with marked osteophytes and a partial biceps tendon rupture (Figure 7).

A total biceps tendon rupture in a full thickness cuff rupture was a surprising finding in a case with a free intraarticular part, and the distal part adherent in the sulcus.

Two patients with cuff rupture also had luxation of the biceps tendon medially, and the bicipital groove was found to be empty.

A light reactive synovitis of the shoulder joint was seen in most cases with cuff rupture. Degenerative changes of the cartilaginous surfaces were not common.

Discussion

All the patients in this material had surgery as described below, and the arthroscopic diagnosis was thus controlled at operation. There was one false diagnosis in the differentiation between a superficial and a full thickness rupture. Estimation of the size of the rupture was not exact in three patients at the beginning, as the cuff defect was considerably underestimated. This was due to mistaking the thick and sclerotic bursa floor for part of the rotator cuff. For the same reason one cuff rupture was not recognized as a full thickness rupture. Such mistakes have not been a problem with increased experience, and with the use of a hook to palpate the cuff and the rupture edges.

At present, rupture of the rotator cuff is detectable without difficulty by arthroscopy. The location and extension of the rupture are determinable, and differentiation between a superficial and a full thickness rupture, and between a partial, a subtotal and a total rupture is possible. The size of the tissue defect due to retraction of the cuff medially can be estimated.

To some degree, differentiation between an old and a recent rupture is possible, according to the shape of the rupture edges, which are smooth in an old rupture, and frayed and uneven in a recent rupture.

In a large, full thickness rupture with a considerable tissue defect and retraction of the cuff medially, it may be necessary to mobilize the supraspinatus muscle, to use a transplant or to adapt parts of the infraspinatus and subscapularis tendon to close the defect. In such a case a transacromial approach might be most favourable. In a less extensive rupture a much smaller anterior approach may be sufficient.

The information gained through arthroscopy made such planning prior to surgery easier. Choice of the most suitable approach was possible, which otherwise might have been hampered by an unfavourably located incision.

Degenerative changes of the biceps tendon together with cuff rupture occurred frequently. More than half of all the patients, and almost all of those with full thickness rupture, had partial or total rupture of the biceps tendon, with or without bicipital groove arthritis. The degree of these changes seemed to increase along with the severity of the cuff rupture. However, severe bicipital groove arthritis and partial biceps tendon rupture was encountered in a patient with a subacromial impingement syndrome, who had a superficial cuff rupture only.

Degenerative changes like these may need treatment like transposition of the biceps ten-

don, and removing of osteophytes from the bicipital groove edges. This suggests the importance of not overlooking the condition of the biceps tendon, and the bicipital groove. If severe changes of those structures remain unrecognized in cuff repair or simple acromioplasty, the result will probably be unsatisfactory.

Arthroscopy gives differentiated information on the state of the cuff, the biceps tendon and the bicipital groove. This information is important in the choice of surgery and approach in the management of cuff ruptures.

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