Acta Orthop Scand 55, 57–58, 1984

The subacromial space in normal shoulder radiographs

The subacromial space in standard anteroposterior radiographs of 175 normal shoulders was between 9 and 10 mm. The space was significantly greater in men, with a slight reduction with age. In middle age, a subacromial space less than 6 mm is pathological, possibly indicating supraspinatus tendon rupture.

Key words: shoulder joint; tendon rupture.

Claes J. Petersson & Inga Redlund-Johnell

University of Lund, Department of Orthopaedic Surgery at Malmö General Hospital, S-214 01 Malmö, Sweden

The width of the space between the inferior surface of the acromion and the head of the humerus, the subacromial space, has been measured on radiographs by several authors, notably Golding (1962), Cotton & Rideout (1964), and Weiner & Macnab (1970a). However, all these authors pooled their estimates from normal shoulders without regard to age and sex. The purpose of the present study was to describe the subacromial space in anteroposterior radiographs of normal shoulders in relation to age and sex; this material has previously been used for studies of the glenohumeral joint space (Petersson & Redlund-Johnell 1983).

Material and methods

A total of 175 radiographs was reviewed, 88 of men and 87 of women. There were 10–11 patients in each 10-year age-group between 10 and 90. The radiographs were standard anteroposterior projections of the shoulder with the subacromial space and the lower border of the acromion clearly outlined. All had been taken with the patient supine and with the same film-focus distance. The roentgen examinations included mostly trauma cases with negative findings. Radiographs from patients with a history of chronic shoulder disability such as rheumatoid arthritis, rotator cuff disease, peritendinitis calcarea or frozen shoulder were excluded. Radiographs with a glenohumeral joint space <2 mm, osteophytes on the glenohumeral margins, cysts or subchondral sclerosis were not included.

The subacromial space was measured on radiographs taken with the arm in zero abduction and slight outward rotation, this being one of the standard projections in shoulder trauma in the department.

The acromio-humeral interval was measured from the dense cortical bone marking the inferior aspect of the acromion at a point directly above the head of the humerus and recorded as the smallest distance between this point and the articular cortex of the head of the humerus (Figure 1).

Results

There was no systematic left-right difference, and therefore the measurements of the two

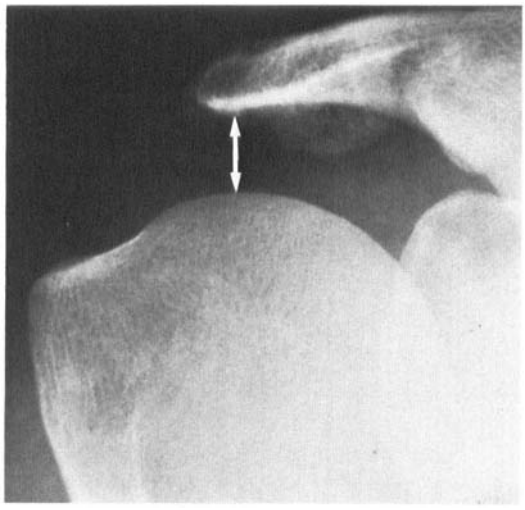

Figure 1. Measuring site.

sides were pooled. The subacromial space was 9.7 ± 1.5 mm (AV ± SD) – 10.2 ± 1.7 mm in men and 9.2 ± 1.4 mm in women, a significant difference ($p < 0.001$). In women there was no relationship between age and subacromial space. In men a significant ($p < 0.02$) negative correlation was found: the subacromial space decreased somewhat with increasing age. The scatter of the measurements was fairly uniform in various ages. In a few men and women over 80, the space was narrowed to 5 mm.

Discussion

The results of the present investigation suggest that the subacromial space on anteroposterior projections of the shoulder with the arm in zero abduction and slightly outwardly rotated does not change much with time. However, in men, a slight but significant reduction of the subacromial space with increasing age was registered. In both sexes, after the age of 80, occasional radiographs showed a space only slightly larger than 5 mm. According to several authors (Golding 1962, Cotton & Rideout 1964, Weiner & Macnab 1970a and Kotzen 1971), a space narrower than 5 mm is pathological, irrespective of age and sex and strongly indicative of a supraspinatus tendon rupture. Most patients with symptoms of supraspinatus tendon ruptures are middle-aged. Heikel (1968), Weiner & Macnab (1970), Neviaser (1971) and Wolfgang (1974) reported an average age of about 55 in their patients with supraspinatus tendon ruptures.

At this age, according to the present investigation, the subacromial space is 10.2 mm in men and 9.5 mm in women and the 95 per cent range is 6.6–13.8 mm in men and 7.1–11.9 mm in women. The lower range figures are in gross accordance with those registered by Golding (1962), 6 mm, Cotton & Rideout (1964), 6 mm and Weiner & Macnab (1970a), 7 mm, in their pooled material.

In the present investigation the subacromial space was significantly narrower in women. However, in men aged 55, the lower border value of the subacromial space was less than that of women due to a greater scatter. Therefore, in a middle-aged person, a subacromial space less than 6 mm, measured according to the presented method, is abnormal and suggests a supraspinatus tendon rupture.

Acknowledgement

Financial support was obtained from Herman Järnhardt Foundation.

References

Cotton, R. E. & Rideout, D. F. (1964) Tears of the humeral rotator cuff. A radiological and pathological necropsy survey. *J. Bone Joint Surg.* **46**-B, 314–328.

Golding, F. C. (1962) The shoulder – the forgotten joint. *Br. J. Radiol.* **35**, 149–158.

Heikel, H. V. A. (1968) Rupture of the rotator cuff of the shoulder. Experiences of surgical treatment. *Acta Orthop. Scand.* **39**, 477–492.

Kotzen, L. M. (1971) Roentgen diagnosis of rotator cuff tear. Report of 48 surgically proven cases. *Am. J. Roentgenol.* **112**, 507–511.

Neviaser, J. S. (1971) Ruptures of the rotator cuff of the shoulder. New concepts in the diagnosis and operative treatment of chronic ruptures. *Arch. Surg.* **102**, 483–485.

Petersson, C. J. & Redlund-Johnell, I. (1983) Joint space in normal gleno-humeral radiographs. *Acta Orthop. Scand.* **54**, 274–276.

Weiner, D. S. & Macnab, I. (1970a) Superior migration of the humeral head. A radiological aid in the diagnosis of tears of the rotator cuff. *J. Bone Joint Surg.* **52**-B, 524–527.

Weiner, D. S. & Macnab, I. (1970b) Ruptures of the rotator cuff: follow-up evaluation of operative repairs. *Can. J. Surg.* **13**, 219–227.

Wolfgang, G. L. (1974) Surgical repair of tears of the rotator cuff of the shoulder. *J. Bone Joint Surg.* **56**-A, 14–26.