

## RADIOGRAPHIC JOINT SPACE IN NORMAL ACROMIOCLAVICULAR JOINTS

CLAES J. PETERSSON & INGA REDLUND-JOHNELL

Departments of Orthopaedic Surgery and Diagnostic Radiology, Malmö General Hospital (University of Lund), Malmö, Sweden

The acromioclavicular joint space in standard antero-posterior images of 151 normal subjects was measured. The joint space was significantly wider in men. There was a highly significant reduction of the joint space with age in both men and women and in persons past 60 a joint space of 0.5 mm or less is not pathological. A joint space wider than 7 mm in men and 6 mm in women is abnormal. The measuring technique described is useful in population studies. In individual cases a simple measurement with a ruler serves the same purpose.

*Key words:* acromioclavicular joint; joint space; osteoarthritis; osteolysis; radiography

Accepted 17.xi.82

An early sign of osteoarthritis is a reduced joint space. Oppenheimer (1943) and Zanca (1971) stated that the normal acromioclavicular joint space in an adult is 1-3 mm wide. However, the relationship between age and joint space was not studied. To our knowledge, no further data have been presented concerning the normal acromioclavicular joint space.

The purpose of our study was to describe the acromioclavicular joint space in antero-posterior projections of normal adults in relation to age and sex.

### MATERIAL AND METHODS

A total of 151 images were reviewed, 75 of men and 76 of women. There were 10-11 patients in each 10-year-group between 20 and 90. The radiographs were standard antero-posterior projections of the superior right or left thoracic quadrant including the shoulder and with the borders of the acromioclavicular joint clearly outlined. Most images were of patients with thoracic trauma or pulmonary distress. A few images were of patients with shoulder trauma not involving the acromioclavicular joint. All images had been taken with

the patients supine and with the same film-focus distance. The joint space was measured with a ruler at its superior and inferior border (Figure 1) and the average of the two measurements, the integral space, calculated. The coefficient of variation of repeated measurement was 13 per cent.

### RESULTS

There was no systematic right-left difference in either sex, therefore the mensurations of the two sides were pooled. The results of the measure-

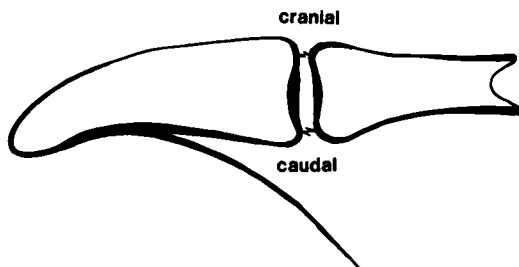


Figure 1. Cranial and caudal measuring sites in an antero-posterior image of the acromioclavicular joint.

Table 1. Acromioclavicular joint space in various measuring sites (mm, average  $\pm$  1 S.D.)

	Cranial	Caudal	Integral
Men	3.8 $\pm$ 1.0	2.7 $\pm$ 0.6	3.3 $\pm$ 0.8
Women	3.5 $\pm$ 1.0	2.4 $\pm$ 0.6	2.9 $\pm$ 0.8
Common	3.7 $\pm$ 1.0	2.6 $\pm$ 0.6	3.1 $\pm$ 0.8

ments are presented in Table 1. The joint space was significantly ( $P < 0.01$ ) wider in men than in women. In both men and women there was a highly significant ( $P < 0.001$ ) reduction of the

joint space with age (Figure 2). In both sexes the scatter of the measurements was greater in the ages 40–70. In both men and women over sixty joint spaces narrower than 0.5 mm were found. In these joints there was often subchondral sclerosis and, occasionally, osteophytes.

## DISCUSSION

In patients with acromioclavicular pain, narrowing of the joint space in antero-posterior radiographs is a frequent observation (Worcester & Green 1968). In some patients with acromioclavicular pain and with a history of minor acromioclavicular trauma, widening of the joint space may occur (Madsen 1963, Jacobs 1964, Allen 1967, Murphy et al. 1975, Seymour 1976, Levine et al. 1976, Morrison 1978). Widening of the acromioclavicular joint space has also been observed in patients with rheumatoid arthritis (Alpert & Meyers 1961) and in patients with acroosteolysis (Gorham 1955, Milner & Baker 1958, Blundell et al. 1958).

DePalma (1957) found narrowing of the acromioclavicular joint space in increasing frequency with age but did not examine the normal limits of the normal joint space in different ages. Oppenheimer (1943) and Zanca (1971) suggest the limits of the acromioclavicular joint space in a healthy shoulder to vary between 1 and 3 mm but did not correlate joint space with age or sex. Our data suggests that there is a significant reduction of the acromioclavicular joint space with time both in men and in women. The joint space is significantly wider in men. Our data support the evidence presented by DePalma (1957) that a slow degenerative process is common also in those individuals without symptoms of degenerative joint disease. A joint space of 0.5 mm or less can be expected in a person over 60. Our data also indicate that in men, a joint space wider than 7 mm, and in women, a joint space wider than 6 mm, is a pathological finding irrespective of the age of the patients. In contrast, Petersson & Redlund-Johnell (1983) failed to demonstrate any relationship between age and glenohumeral joint space – at least the joint space did not decrease with age – decreased joint space in the

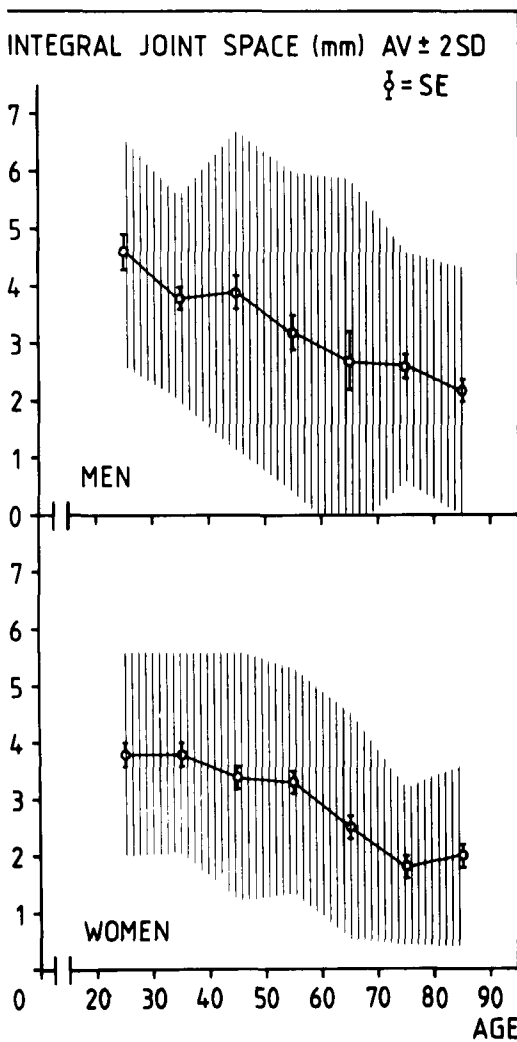


Figure 2. The relationship of age, sex and joint space.

shoulder should not be accepted as normal even in the elderly.

The integral joint measurement has the advantage of smoothing irregularities of the joint space and may be useful for population studies. For routine use, a simple measurement with a ruler serves just as well.

## REFERENCES

- Allen, W. C. (1967) Post-traumatic osteolysis of the distal clavicle. *Postgrad. Med.* **41**, A73-A77.
- Alpert, M. & Meyers, M. (1961) Osteolysis of the acromial end of the clavicles in rheumatoid arthritis. *Am. J. Roentgenol.* **86**, 251-259.
- Blundell Jones, G., Midgely, R. L. & Stewart Smith, G. (1958) Massive osteolysis-disappearing bones. *J. Bone Joint Surg.* **40-B**, 494-501.
- DePalma, A. F. (1957) Degenerative changes in the sternoclavicular and acromioclavicular joints in various decades. C. C. Thomas, Springfield, IL.
- Gorham, L. W. & Stout, A. P. (1955) Massive osteolysis (acute spontaneous absorption of bone, phantom bone, disappearing bone). *J. Bone Joint Surg.* **37-A**, 985-1003.
- Jacobs, P. (1964) Post-traumatic osteolysis of the outer end of the clavicle. *J. Bone Joint Surg.* **46-B**, 705-707.
- Levine, A. H. & Schwartz, E. E. (1976) Post-traumatic osteolysis of the distal clavicle with emphasis on early radiologic changes. *Am. J. Roentgenol.* **127**, 781-784.
- Madsen, B. (1963) Osteolysis of the acromial end of the clavicle following trauma. *Br. J. Radiol.* **36**, 822-828.
- Milner, S. M. & Baker, S. L. (1958) Disappearing bones. *J. Bone Joint Surg.* **40-B**, 502-513.
- Morrison, I. S. (1978) Post-traumatic osteolysis of the acromial end of the clavicle. *Aust. Radiol.* **22**, 183-186.
- Murphy, O. B., Bellamy, R., Wheeler, W. & Brower, T. D. (1975) Post-traumatic osteolysis of the distal clavicle. *Clin. Orthop.* **109**, 108-114.
- Oppenheimer, A. (1943) Arthritis of the acromioclavicular joint. *J. Bone Joint Surg.* **25**, 867-870.
- Petersson, C. J. & Redlund-Johnell, I. (1983) The joint space in normal gleno-humeral radiographs. *Acta Orthop. Scand.*, in press.
- Seymore, E. Q. (1977) Osteolysis of the clavicular tip associated with repeated minor trauma to the shoulder. *Radiology* **123**, 56.
- Worcester, J. N. & Green, D. P. (1968) Osteoarthritis of the acromioclavicular joint. *Clin. Orthop.* **58**, 69-73.
- Zanca, P. (1971) Shoulder pain: involvement of the acromioclavicular joint (analysis of 1,000 cases). *Am. J. Roentgenol.* **112**, 493-506.

Correspondence to: Claes Petersson, M.D., Department of Orthopaedic Surgery, Malmö General Hospital, S-214 01 Malmö, Sweden.