Case report

Manubriosternal joint dislocation in rheumatoid arthritis: the role of thoracic kyphosis

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SUMMARY A case report of manubriosternal joint (MSJ) dislocation in a rheumatoid patient with thoracic kyphosis is presented together with a review of the relevant literature. Variations in the anatomical nature of the MSJ between normal individuals are described. In 43% of the population its characteristics are noted to be such that it may be involved in rheumatoid arthritis (RA). A joint thus involved can be dislocated by forces generated by longstanding thoracic kyphosis and transmitted to the manubrium via the first rib. Xeroradiographs of the MSJ region in our patient showed dislocation of the joint in the upright position and its subsequent reduction on lying the patient flat. We suggest that this demonstrated reduction is secondary to the lessening of the thoracic kyphosis that occurs in the supine position. It is concluded that in RA MSJ dislocation is a function of thoracic kyphosis.

Radiological surveys of the manubriosternal joint (MSJ) of patients with rheumatoid arthritis (RA) have shown its frequent involvement in the disease process.¹⁻³

However, the number of case reports of actual dislocation of the joint is very small. One further such case is presented here, and the literature is reviewed. In addition, the development and anatomy of the joint in so far as it is relevant to its involvement in RA is outlined and the factors involved in its dislocation are discussed.

Case history

A 54 year old lady with seropositive RA of 14 years duration had noted an increasing prominence over her sternum for three years. It was otherwise asymptomatic. There was no history of trauma. She had occasional episodes of vasculitis and had been on steroids for many years.

Clinically there was evidence of widespread

rheumatoid involvement of the joints. Marked thoracic kyphosis was noted. There was a prominence over the manubriosternal region (Fig. 1). The patient could lessen the size of this deformity by bracing her shoulders or by lying flat.

Fig. 1 A patient with a prominence over the manubriosternal region.

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Fig. 2 Lateral xeroradiograph of the sternum showing dislocation at the manubriosternal joint in the upright position. The arrows indicate the adjacent ends of the manubrium and the sternum.

Radiologically there was extensive erosive damage of the peripheral joints and also evidence of atlantoaxial and C4/5 subluxation. Xeroradiographs showed dislocation of the MSJ in the upright position (Fig. 2) and its subsequent reduction on lying the patient flat (Fig. 3).

Anatomical considerations

A knowledge of the development and anatomy of the MSJ is essential to understanding its involvement in RA. In adults there is considerable individual variation in the nature of MSJs. In a study of 100 MSJ specimens Rivington⁴ found that 51 were symphyseal, six were ankylosed, and 43 showed predominantly diarthrodial properties. Diarthrodial MSJs do not have all the distinctive characteristics of

true synovial joints⁵ but will be referred to as such for the purposes of this discussion. Rivington⁴ also noted that the synovial type of joint occurred more commonly in adults than in children and postulated that this was due to absorption of the symphyseal cartilage during the period of youth, resulting in the formation of an intra-articular cavity. In 10% of all people over 30 years of age the manubrium is joined to the body of the sternum by bone.⁶ It is suggested that these individuals fail to develop a fibrous lamina between these two segments during embryological development.⁷ The junction is therefore a synchondrosis (as are the junctions between the epiphyses and diaphyses of the long bones) and undergoes inevitable fusion, obviously precluding its involvement in RA.

The manubrium itself is very tightly bound by the

Fig. 3 Lateral xeroradiograph of the sternum showing the subsequent reduction on lying flat of the dislocation at the manubriosternal joint shown in Fig. 2. The arrows indicate the adjacent ends of the manubrium and the sternum.

massive first costal cartilages. This results in its movements being essentially under the control of the two first ribs. The first ribs at their other ends articulate with the first thoracic vertebrae at the costovertebral and costotransverse joints.

Discussion

Radiological changes of the MSJ were found in 41–70% of patients with RA compared with an incidence of 11–28% in control subjects.^{1–3} Loss of joint space, erosions, sclerosis, and ankylosis were the main findings. In view of the propensity to dislocation of joints involved in RA it is surprising that MSJ dislocation was not noted in any of the total of 207 patients in these three surveys. There have been, however, three individual case reports of MSJ dislocation in RA.^{8–10} One of these patients⁹ was the index case to a clinical and radiological survey of approximately 400 patients with RA carried out by Khong and Rooney.¹¹ Nine further

patients were considered to have subluxation of the MSJ, making a total of 12 thus far reported in the literature.

Review of a further case report,¹² referred to as a case of MSJ dislocation by Khong and Rooney,¹¹ showed that although there was destruction of the sternum, no actual dislocation of the joint was noted by the authors.

All the patients described have had severe destructive disease and kyphosis was documented in all but one. Including the case presented here, the mean age of all patients was 62 years (range 53–73 years), and all patients but one were female. There is no reference to any of the 12 previously reported patients having been on steroids so it is difficult to determine the extent to which these drugs may have contributed either to the development of kyphosis or weakening of the MSJ in our patient.

After a microradiographic and histological study Kormano¹³ speculated that the presence of a synovial cavity or some synovial cells, or both, in an MSJ

could lead to its being involved in RA. Reference to the anatomical considerations above indicates such a situation in some 43% of the population. This involvement will lead to bony ankylosis of the joint in as many as 12% of patients.³ However, such weakening of the joint as occurs in the substantial majority of patients will render it susceptible to dislocation in the event of it being subjected to appropriate forces.

Dislocation of the MSJ as a consequence of flexion-compression injuries of the thoracic spine has been well described in traumatology.^{14 15} Fowler¹⁶ in his comprehensive review suggests that acute flexion of the thoracic spine transmits predominantly via the first ribs a downward and backward force to the manubrium, leading to its separation from the body of the sternum. The lower border of the manubrium then occupies a position below and behind the upper border of the body.

We suggest that chronic flexion of the thoracic spine transmits via the first rib similar if less acute forces to the manubrium, which can ultimately lead to dislocation of a joint weakened by RA. In a number of Fowler's cases as in ours reduction of the dislocation was achieved by lying the patients flat.

In RA an increased incidence of thoracic kyphosis has been described.^{17 18} Kyphosis also increases with age, and the rate of increase is higher in females than in males.^{19 20} This appears more obvious after the age of 40 years.²⁰

Accordingly, MSJ dislocation would be expected to occur predominantly in older women if thoracic kyphosis, as we suggest, is indeed the determining factor. That virtually all of the small number of patients described in the literature are older females with kyphosis seems to lend support to this view. However, the main evidence for the important role of thoracic kyphosis is provided by the demonstrated reduction of the MSJ dislocation in our patient on lying her flat.

Furthermore, minor degrees of joint subluxation may similarly be reduced during radiological examination. Lateral radiographs of the chest in order to include the MSJ would involve patients being positioned with their shoulders braced, thus lessening thoracic kyphosis. This may in part account for the low number of reported cases of dislocation of the joint in RA.

In summary, the anatomical development of the MSJ lends itself to potential involvement in RA in 43% of the population. When the joint is weakened by RA longstanding thoracic kyphosis transmits forces to the manubrium via the first rib that can ultimately lead to its dislocation.

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