

NONTRAUMATIC BILATERAL FIRST RIB FRACTURES

A. TSUKADA, S. UCHIYAMA, H. TORIUMI, H. NAKAGAWA, T. MIYASAKA

The authors report the case of a 21-year old woman who presented bilateral spontaneous fractures of the first ribs, in the posterior portion on the right side, in the anterior portion on the left side. The pathogenesis of spontaneous fractures of the first rib is discussed.

Keywords : fracture ; rib.

Mots-clés : fracture ; côte.

CASE REPORT

A 21-year-old woman with pain in the right anterior chest was seen in late December 1995 at a private clinic. She first felt pain quite suddenly when she turned to look back while sitting in a chair. X-rays revealed a fracture in the right first rib and an intact left first rib (fig. 1). She was followed conservatively. On January 30, 1996, she felt pain again but this time in her left anterior chest, radiating to her back. She had been squatting at work doing inventory. A few days later, she visited our hospital, complaining of bilateral anterior chest pain, aggravated by cough. The patient was an office worker and did not report any history of direct trauma. She had not been involved in any sports activities in the previous three years. On physical examination, the patient was found to be a healthy Japanese woman of average height (164 cm) and weight (57 kg). Examination of the head, neck, shoulders, and upper extremities was normal. There was tenderness over the left supraclavicular triangle, with left chest pain with movement of the shoulder or neck, and no palpable mass. An anteroposterior radiograph of the cervical spine and chest demonstrated bilateral first rib fractures (fig. 2). The right first

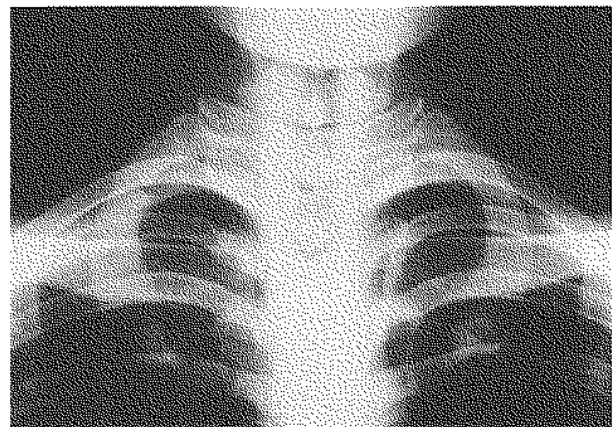


Fig. 1. An AP radiograph of the upper chest taken when the patient visited the private clinic, complaining of pain in the right anterior chest. There is a transverse fracture line at the posterior one-third of the right first rib. No fracture is seen in the left first rib.

rib had a transverse fracture line in the posterior segment, and the left first rib had a transverse fracture line in the anterior segment. Isotope bone scan confirmed an isolated increase in uptake in both first ribs, corresponding to the fracture lines seen on the radiograph. Plain computer tomography demonstrated the fracture line of the first ribs, but no signs of bone destruction. Bone mineral density of the lumbar spine calculated by DEXA fell within the normal range. The patient

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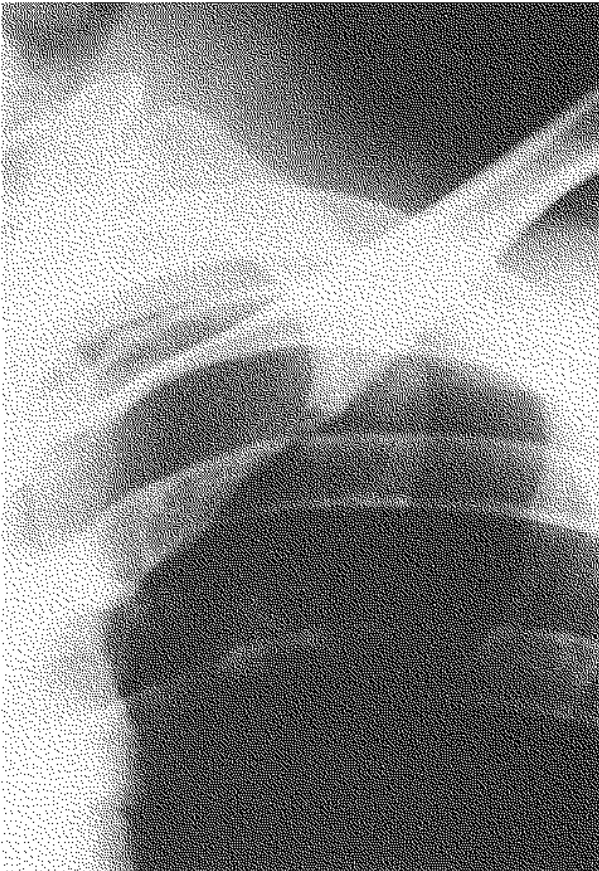


Fig. 2. — An AP radiograph of the upper chest at the first visit to our hospital demonstrated bilateral first rib fractures. The right first rib showed a transverse fracture line in the posterior segment, while the left first rib showed a transverse fracture line in the anterior segment.

was instructed to avoid lifting heavy weights and to visit the hospital at regular intervals. Symptoms resolved completely over a period of eight months. On October 19, 1996, a radiograph revealed callus formation at the sites of the original fractures (fig. 3).

DISCUSSION

Nontraumatic first rib fractures are uncommon, and bilateral fractures occurring spontaneously are still rarer (7, 9). We excluded the possibilities of congenital malformation which could be erroneously taken as a fracture, because this case definitely demonstrated spontaneous bony union



Fig. 3. — An AP radiograph taken at the latest examination revealed callus formation at the sites of the original fractures.

and the left first rib just before the occurrence of the fracture was normal. The treatment of choice for this kind of fracture is uniformly accepted as conservative. Although cases of surgical intervention have been reported (13, 14), the prognosis is generally considered to be good. There has also been a widely accepted explanation as to the etiology and the mechanism of the nontraumatic first rib fracture (1, 2, 4, 5, 8, 10, 11, 12). The first rib is broad and flat with a groove for the subclavian artery on its upper surface which weakens the bone. The fracture is usually attributed to the sudden contraction of the scalene muscles, which produces bending stress at the thinnest and more mobile segment of the rib. Theoretical analysis using free-body diagrams suggested the posterolateral segment as the highest predicted bending stress point (3). However we questioned this described mechanism in the present case because the patient denied any episode that could cause sudden muscle contraction or relevant direct trauma. If the fracture occurred at the thinnest portion of the site corresponding to the subclavian artery groove, the fracture site would have been consistent for both sides. According to Hartley's study (6), the movements of and strains upon the first rib must continue in varying degrees by night and by day throughout life, for even in sleep respiration must continue. The first rib has to endure more and greater strains than any other rib. As a result of excessive strain, the first rib

can fracture spontaneously. This concept may explain the development of fractures in this particular patient. However, discrepancy of the fracture sites was, again, still not clearly explained. The present case indicated that there is still much to be clarified about the mechanism of the non-traumatic first rib fracture.

We should be aware that bilateral first rib fracture can occur with patient complaints of upper chest pain, even without a history of physical trauma or sports activities.

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SAMENVATTING

A. TSUKADA, S. UCHIYAMA, H. TORIUMI, H. NAKAGAWA, T. MIYASAKA. Niet traumatische bilaterale ribfractuur.

De auteurs beschrijven een geval van 21-jarige dame met een bilateraal spontane fractuur van de eerste rib. De pathogenese van dergelijke fractuur wordt beschreven.

RÉSUMÉ

A. TSUKADA, S. UCHIYAMA, H. TORIUMI, H. NAKAGAWA, T. MIYASAKA. Fracture spontanée bilatérale de la première côte : présentation d'un cas.

Les auteurs rapportent le cas d'une jeune femme de 21 ans qui a présenté bilatéralement à quelques semaines d'intervalle une fracture spontanée de la première côte : dans la portion postérieure de la côte à gauche, dans la portion antérieure de la côte à droite. Ils discutent la pathogénie des fractures spontanées de la première côte.