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Increased kyphosis by a combination of fractures of the sternum and thoracic spine

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Abstract A 67-year-old patient suffered a fall and sustained injuries to the thorax, combined with fractures of the ribs, sternum and thoracic spine. Her pre-existing kyphosis (caused by osteoporotic vertebral collapse) increased in severity. There was a clear relationship between a sternal fracture, deterioration of thoracic kyphosis and a fracture of the thoracic spine.

Key words Sternal fracture · Thoracic spine · Kyphosis

Introduction

The sternum and ribs are thought to form a possible fourth column in the thoracic region [1], because insufficiency fractures of the sternum have been observed in association with thoracic kyphosis [1–3, 5]. It is well known that conservative treatment for a dislocated sternal fracture in combination with a fracture of the body of a thoracic vertebra can lead to severe kyphosis [1]. Therefore, the management of a sternal fracture should include careful examination of the thoracic spine.

Case report

A 67-year-old woman was seen at the casualty department with respiratory insufficiency a few days after she had suffered a fall. The mechanism of the fall was unclear. She was complaining of thoracic pain and showed respiratory insufficiency, bilateral compression pain on the thorax and compression pain on the sternum. On the antero-posterior chest plain radiograph, bilateral rib fractures were visible, with lung contusion on the right side. Owing to the respiratory insufficiency, she was admitted to the intensive care unit and received extra oxygen via a mask. One week later she was transferred to the traumatology department, where she was mobilised. The family had noticed that the patient was more

bent over than she had been previously and that there was a swelling at her sternum. Re-examination revealed severe kyphosis and a severely dislocated sternal fracture. She also complained of pressure pain on the thoracic spine. There were no signs of paralysis. Radiodiagnostic examination showed a dislocated fracture of the sternum and severe thoracic kyphosis, with a suspected fracture of T6 in association with an old compression fracture of T5. It was also apparent that the patient was suffering from osteoporosis (Figs. 1, 2). Comparison of the lateral chest plain radiograph to the one taken on admission to the casualty department (Fig. 3) revealed an increase in the kyphosis from 35° to 65°, which reinforced the suspicion of a new fracture of the thoracic spine. CT scanning with two-dimensional reconstruction showed a burst fracture with split of T6 (type B1.2 according to the classification of Magerl et al. [4]), below an old compression fracture of T5 (Fig. 4). Strict bed rest was prescribed for the patient because of the hypothetical risk of further deterioration of the dislocation and the ensuing neurological complications. Owing to the suspicion of further pathological fractures, a bone scan was performed with technetium 99m, but there was no pathology besides the traumatic abnormalities. In view of the increase in the angle of kyphosis and the dislocated sternal fracture, we considered it necessary to stabilise the thoracic spine to prevent any further deterioration of the kyphosis and to prevent the development of a neurological deficit. However, the patient flatly refused to undergo surgery, so we prescribed immobilisation with a 3-point reclination brace, which she had to wear day and night. The patient showed that she could manage well with the brace and was ultimately discharged from hospital. So far, she has not developed a neurological deficit.

Fig. 1 Lateral chest plain radiograph showing a collapsed sternal fracture and severe thoracic kyphosis

Fig. 2 Close-up and diagram of the collapsed sternal fracture

Fig. 3 Lateral plain radiograph of the thoracic spine on admission to hospital showing thoracic kyphosis with a wedge-shaped flattened T5 without any signs of a fracture at T6

Fig. 4 Two-dimensional reconstruction CT image showing severe kyphosis and a longitudinal fracture in the body of T6

Discussion

Fractures of a healthy sternum can occur after direct impact of an external force [5]. Slight trauma or even just bending forward may lead to a sternal fracture if there are any pathological changes in the structure of the sternum, such as in Morbus Kahler, metastases and tuberculosis of the sternum [5]. A sternal fracture can also be encountered in patients with osteoporosis and it usually occurs in association with increased thoracic kyphosis on the basis of osteoporotic collapse of the thoracic spine [2, 3, 5]. Such insufficiency fractures of the sternum are chiefly described in elderly women. In the case of thoracic kyphosis, any impacting forces are transferred directly to the sternum and ribs owing to loss of elasticity of the rib cartilage and local ossification [2].

Radiological differentiation should be made between a collapsed fracture of the sternum, in which the proximal part is displaced backwards (Fig. 2), and a sternal fracture without any collapse, with or without dislocation [2]. This distinction is clinically irrelevant. A lateral chest radiograph is of great value for diagnosing a combination of a sternal fracture and thoracic spine abnormalities [2, 5].

Few data are available on a combination of a sternal fracture and thoracic spine fracture, as was seen in our patient. In the literature, a translation injury is described with luxation of the thoracic spine, in which there is a severely unstable thoracic fracture plus a (not collapsed) sternal fracture, in combination with a neurological deficit. A dislocated sternal fracture in combination with a fracture of the vertebral body is an expression of a flexion-distraction injury of the thoracic spine, which can lead to severe kyphosis if conservative treatment is the only therapy

applied. It is assumed that the sternum and ribs form a fourth stabilising column in the thoracic region [1]. In our patient there was no swelling on the sternum and no dislocation of the sternal fracture on admission to the hospi-

tal. During mobilisation, the axial force on the fractured sternum must have caused the sternum to collapse and led to subsequent dislocation of the spinal fracture with an increase in kyphosis.

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