Sternal Fracture

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A 49-year-old man who had a motor vehicle accident 3 days earlier was transferred to the emergency department from a state hospital because of persistent chest pain. He stated that his car hit another car while he was driving at a speed of approximately 80 km/h and his seat belt restrained him. In initial evaluation, his vital signs were found to be within normal limits. The patient complained of a substernal chest pain increasing with inspiration. During the physical examination, there was a 5 cm vertical skin abrasion on the frontal scalp area. Patient had an intense pain and tenderness with the palpation of the anterior chest wall over the sternum. In radiological studies, there was a suspicion of a subtle fracture line or displacement at 4th-5th right anterior ribs on antero-posterior chest X-ray graphy and an uncertain fracture line on lateral sternum radiograph. So, we carried out a thoracic CT scan because of the persistance of patient's intolerable chest pain. Axial sternal CT images showed a vertical mid-sternal, slightly displaced fracture (Fig. 1). A contusion in the middle lobe of the right lung, fracture in the 4th-5th right anterior ribs as well as 3rd-4th-5th-7th left anterior ribs and minimal pleural effusion on the left side were also detected in the CT scan.

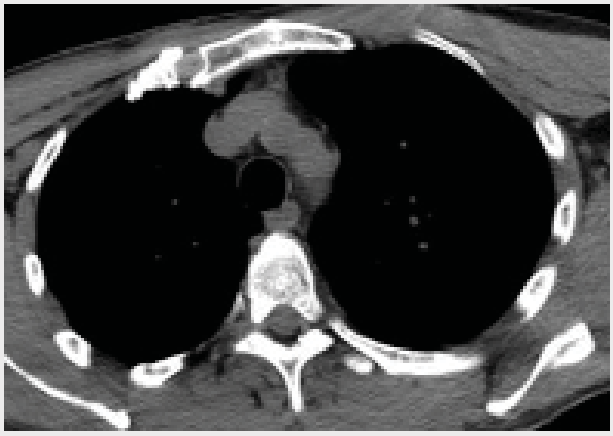

Fig. 1. *Axial CT image showing a vertical mid-sternal, slightly displaced fracture.*

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**For the diagnosis and teaching points, see page 191.*

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Diagnosis

Sternum Fracture

Sternal fractures are uncommon injuries following blunt trauma to the chest. It is caused mainly by anterior blunt chest trauma, typically from motor vehicle accidents when the chest hits the steering wheel, more likely in restrained passengers. Actually, the incidence of sternal fractures has increased recently because of the common use of across-the-shoulder seat belts. Infrequently, fractures of the sternum can also be encountered in patients suffered from a fall injury or direct trauma to the chest.[1,2]

The pathophysiologic mechanism of a sternal fracture is usually depends on the diagonal fastening of a seat belt which restrains the upper part of the sternum. With rapid deceleration from a frontal impact, the forward push of the body against the fixed seat belt across the sternum results in a fracture at that location which is identified by the position of the belt, patient size, magnitude of the impact, and vector of the forces.[2] The usual anatomical locations of fractures are the upper or midportion of the sternum with a transverse course. In 50 to 60% of the patients, sternum fractures are related with other major injuries.[3] Therefore, fracture of the sternum should be considered as a characteristic finding of serious multiple concomitant injuries comprising rib fractures, long-bone fractures and head injuries. Occasionally, cardiac arrhythmias may be seen.[1]

Patients with a sternal fracture characteristically present with anterior chest pain, pain over the sternum on examination, ecchymosis, soft tissue swelling, or palpable deformity. These findings together with the history will often lead to the diagnosis. The diagnosis of sternal fracture is mostly done with physical examination or on lateral chest radiography. However, since a lateral plain chest x-ray film is not routine in the initial evaluation of trauma patient, sternum fractures are frequently overlooked.[4] Currently, an ultrasound examination performed in the emergency department or a computed tomography (CT) scan of the sternum can quickly identify a fracture.[5,6]

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