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Osteoporotic Manubrial Fracture Following a Fall

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We describe a case in which an elderly woman sustained a manubrial fracture after a fall from standing. The patient did not sustain further complications from her injury and was managed medically. The radiographic appearance and clinical implications of this event are discussed.

Case Report

87-year-old woman with severe osteoporosis who fell from standing while at home. Her only complaint was of chest pain. No significant external injuries were noted, and her electrocardiogram (EKG) and cardiac enzymes were normal. Radiographs of the chest and sternum (Fig. 1 A,B) showed a transverse fracture of the manubrium with anterior displacement, as well as severe kyphoscoliosis.

A computed tomography (CT) scan of the patient's chest with 3-dimensional reconstruction confirmed the manubrial fracture with anterior displacement. The patient was managed medically with analgesics (Fig. 1C-E). A follow-up chest radiograph two days after her fall demonstrated a stable manubrial fracture without evidence of healing.

Discussion

Manubrial fractures are relatively rare. Sternal fractures as a whole comprise only 0.5% of all bone fractures, and of those, only 5% involve the manubrium [1]. 90% of manubrial fractures are due to motor vehicle collisions, although they are not a common complication [2,3]. Brooks et al. found that of the patients admitted to their trauma center after being involved in a motor vehicle accident, 0.8% had fractures of the sternum, and only 2.2% of those involved the manubrium [4]. High impact trauma is by far the most common cause of manubrial fracture. Only one case report describing a low impact manubrial fracture has been published [5].

Sternal fractures rarely occur in isolation, and isolated manubrial fractures are even rarer. Due to the commonly high impact mode of occurrence, these fractures are often found in conjunction with fractures of the rib, clavicle, thoracic vertebra, and/or scapula [3]. Although the accompanying traumatic injuries can cause serious complications, the sternal/episternal fracture itself typically does not. Studies have shown that sternal fractures are not a marker for significant myocardial injury, thoracic aorta damage, or mediastinal injury [4,6,7,8] Although rare, one complication that has been associated with sternal fractures is the development of methicillin resistant Staphylococcus aureus

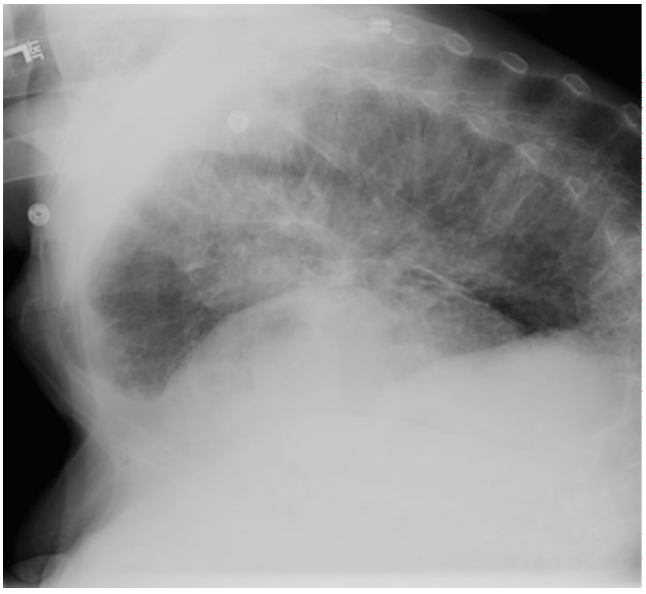

Figure 1A. 87-year-old woman with chest pain following a fall. Lateral radiograph of the chest showing a transverse fracture of the distal 1/3 of the manubrium with anterior displacement. Also of note is the patient's severe kyphoscoliosis and osteopenia.

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Abbreviations: EKG, electrocardiogram, CT, computed tomography

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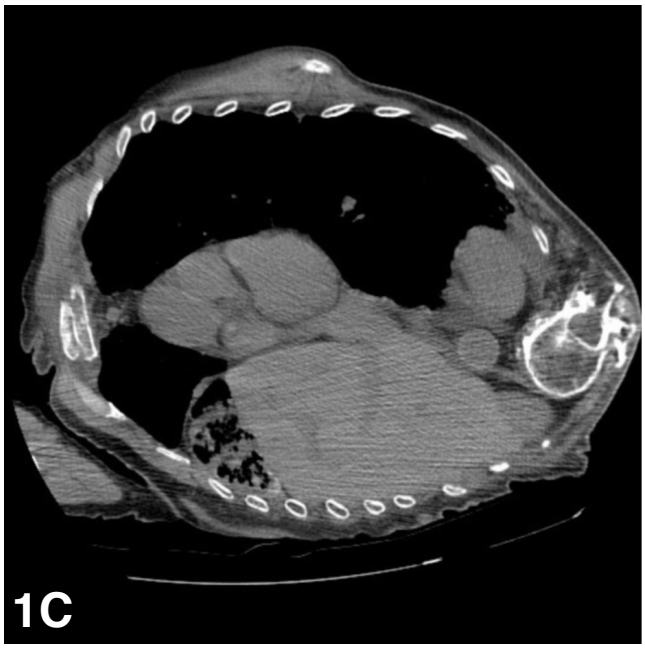
Figure 1. 87-year-old woman with chest pain following a fall.
B. Photographic enlargement of manubrial fracture.
C. Axial CT showing displaced manubrial fracture.
D. Sagittal reformat of CT images showing displaced manubrial fracture.



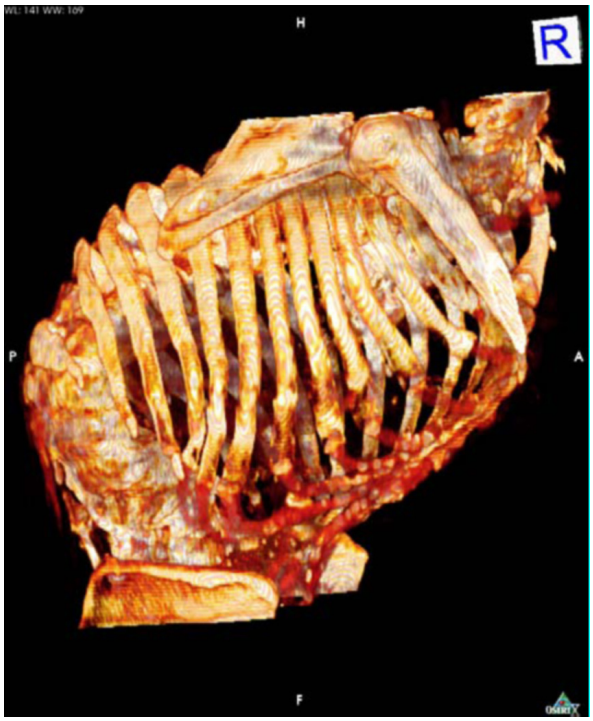


Figure 1E. 87-year-old woman with chest pain following a fall. 3-dimensional CT scan reconstruction showing thoracic cage deformity, kyphoscoliosos, and displaced manubrial fracture.

mediastinitis in patients with a history of intravenous drug abuse [9].

The diagnosis of a sternal or manubrial fracture is typically made via radiographs or CT imaging. Some studies have suggested, however, that radiographs may be inconclusive and may underestimate the extent of injury when compared with CT [3]. Because injuries may be missed when relying on radiographs alone, a negative chest radiograph should be followed by 2-D CT and, when possible, 3-D CT scan reconstruction when clinical suspicion is high [3]. 3-D CT scan reconstruction, in particular, has been found to be more sensitive and specific in diagnosing sternal/episternal fractures than both radiographs and standard 2-D CT scans [3,10,11].

Treatment of sternal and manubrial fractures depends on the severity of the fracture. Studies have shown that patients with uncomplicated sternal fractures may be discharged to home with oral analgesics [5,11]. If the pain associated with the sternal fracture is not adequately controlled with oral analgesia, continuous infusion of local anesthetic and opioid via a periosteally positioned catheter may provide effective analgesia [13]. If a complex fracture is present or there are overriding fragments, the fracture should be openly reduced and internally fixed [12,14] If the patient is managed medically but returns with continued complaints of chest pain and disability, the fracture should be re-evaluated for nonunion or the development of pseudoarthrosis.

Manubrial fractures as a complication of osteoporosis and low impact trauma, such as a fall from standing, have not been described in the primary literature. The most related case report involved a patient with a thoracic burst fracture who later developed symptomatic sternomanubrial dislocation and progression of thoracic kyphosis [15]. In our patient, an elderly, osteoporotic female, we would have expected a fall from standing to result in a vertebral body fracture rather than a manubrial fracture. It is our speculation that the patient's severely kyphoscoliotic thoracic configuration resulted in force transference from the point of impact to the manubrium rather than the vertebral bodies, resulting in a manubrial fracture.

Although manubrial fractures as a complication of osteoporosis are relatively rare, they must be in the differential diagnosis of an elderly person complaining of post-traumatic chest pain. Similarly, due to the greatly increased healing times of osteoporotic patients, a patient with continued sternal pain should be evaluated for fragment nonunion or the development of a pseudoarthrosis.

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