

Case Report

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TANAFFOS 

Isolated Traumatic Bilateral First Rib Fracture: A Rare Entity

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Since the first rib is protected very well by the overlying soft tissue and bones, its fracture is a major injury and a considerable force is required to do it. Therefore, an isolated fracture of this rib is unusual. A 28-year-old healthy female had an accident while crossing the road and a heavy object fell on her. She had severe pain behind her clavicle region and was immediately hospitalized and examined. Thorough clinical examination and different relevant investigations surprisingly disclosed isolated bilateral first rib fracture which is a very rare clinical condition.

Key words: First rib, Bilateral first rib fracture, Trauma, Isolated injury

INTRODUCTION

Fracture of the first rib is extremely rare and bilateral fractures are even less common whatever the etiology might be. First rib fracture has been challenging for attendant doctors since it was first described in 1869 (1). It is well documented that traumatic fractures usually involve not only the first rib but also the surrounding structures like clavicle or scapula (2). Major thoracic trauma is a fatal association of first rib fractures and commonly predisposes patients to injury of the brachial plexus, subclavian vessels and other mediastinal structures. It seems that the mechanism of injury is different in unilateral and bilateral first rib fractures, since fatal complications invariably follow unilateral first rib fractures and are not very common in bilateral injury. In this case report we highlight traumatic bilateral first rib fracture without any other major devastating thoracic organ injury which is a very rare clinical entity.

CASE SUMMARIES

A healthy young woman aged 28, was crossing the road, when suddenly a hoarding fell from height on her head and shoulders. Instantly, she experienced an acute pain behind her clavicles which persisted afterwards, radiating into her shoulders, scapulae and upper chest, having a stabbing character. The pain was aggravated on deep breathing and coughing. Any movement of the arms increased the pain. She also suffered from a cut injury with active bleeding on the right shoulder. She was immediately rushed into the emergency department of medical college hospital of Kolkata.

On clinical examination, at the emergency department, the pain was located behind the clavicles. Any active movement of the shoulders would aggravate the pain. There was tenderness in the supraclavicular fossae, in both sides. The cut injury was found to breach the skin and platysma muscle. She was hemodynamically stable with pulse rate of 96 beats / min and BP of 130/76 mm Hg.

Axillary, brachial and radial pulses were equally palpable in both sides. Air entry was equal in both lungs.

Local dressing was applied and patient was sent for x-ray of neck and upper part of chest (Figure 1) and PA x-ray of chest (Figure 2) to document the extent of damage. X-rays showed transverse bilateral fractures of first ribs with no parenchymal injury to the lungs. CT scan of the neck and chest was undertaken to exclude any minor injury to the lungs or great vessels. CT scan surprisingly revealed bilateral first rib fracture with minimal subcutaneous emphysema at the site of the cut injury without any injury to great vessels or any other structures (Figure 3). The cut injury was repaired at emergency department with 3-0 polyamide suture. Because of the severity of the symptoms, a figure of eight bandage was applied to restrict the shoulder movements. Adequate analgesics were prescribed. After 48 hours of observation, she was discharged from the hospital. She had the figure of eight bandage of the shoulders for two weeks. Afterwards, the patient complained only of mild discomfort. By the end of the second week she was able to resume work, although a slight discomfort remained for another week, after which the patient became completely asymptomatic. Three months after the accident, repeat X-rays showed callus formation.

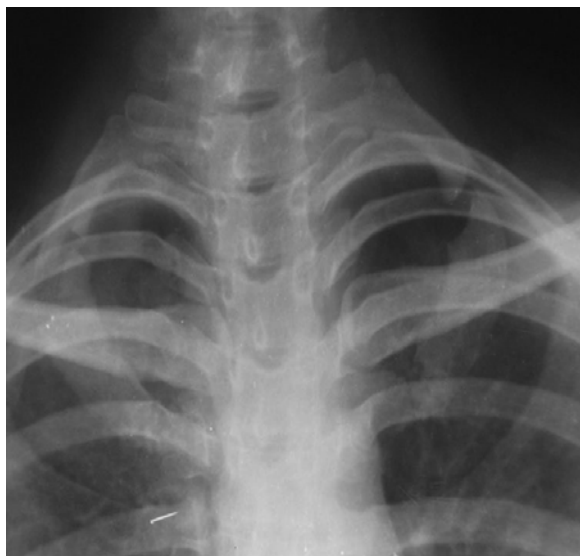


Figure 1. X-ray of cervical spine along with upper ribs showing bilateral first rib fractures.



Figure 2. Chest X-ray showing bilateral first rib fracture with no intrathoracic lung parenchymal or major vascular injury.



Figure 3. CT scan of the chest showing bilateral first rib fracture

DISCUSSION

Since the first rib is protected very well by the overlying soft tissue deep in the cervical root as well as the clavicle and scapula, its fracture is considered a major injury and a considerable force is required to do it (2). Therefore, an isolated fracture of this rib is unusual. Isolated fracture of the first rib often occurs with or without a history of trauma (3) which is rarely correlated with the fracture. First rib fractures may be isolated or occur along with other rib or clavicle fractures and are usually located in an anatomically weak area (4). Therefore, many authors in the past discussed the mechanism of this fracture. Some authors marked this entity as a

developmental anomaly instead of a fracture (5). Jones pointed out in 1869, that traumatic fracture of the first rib was extremely rare (6).

According to several authors (7), the mechanism of this fracture is sudden forceful contraction of the juxtacostal muscles along with traction on the arm. The scalenus anterior and the upper slip of the serratus anterior insert on each side of the subclavian sulcus and by exerting opposite traction lead to fracture of the anatomical weak point of the first rib. Furthermore, this type of fractures may even remain silent. Most authors have rightly designated this type of fracture as fatigue fracture (3). Many authors tried to elaborate pathological fracture of the first rib in few patients, but this suspicion was disproved. In the literature we could not find any data regarding pathological fractures of the first rib.

Even after an extensive research the mechanism of injury in bilateral first rib fracture remains questionable. According to some authors, since it is a relatively benign condition clinical endeavors should be directed at associated complications, especially of the thoracic structures and spinal cord. On the other hand, others suggest that bilateral first rib fracture is a hallmark of major thoracic trauma and direct urgent investigation to rule out the possibility of injury to the great vessels (8). Keeping in mind the rarity of bilateral first rib fracture, we can draw the conclusion that there can not be any definite rules regarding the investigation protocol of this injury. We should plan the investigations based on anatomical structures at risk of injury. Although unilateral fractures are uncommon, they are found more often than bilateral first rib fractures. Documented cases of bilateral first rib fractures, irrespective of the different mechanisms, can be categorized into one of the three classes: (8) (a) due to direct chest injury, usually related to road traffic accidents; (b) in sports, particularly in weight lifting and rowing where prompt excessive neck muscle contraction is mandatory; and (c) medical cases of respiratory problems that require excessive contraction of accessory breathing

muscles of respiration like status asthmaticus, and pertussis in childhood.

Nowadays, selective investigations are recommended to define subclavian artery or other major vascular injuries. The common situations where such investigations are warranted are a) chest radiograph showing widened mediastinum, b) upper-extremity absence of pulse, c) first rib fractures, d) brachial plexus injury and e) an expanding hematoma (9,10). After excluding the possibility of major vascular injury, treatment of bilateral first rib fracture should include appropriate analgesics and hot compression only, since cervical collar stabilization is not routinely required.

CONCLUSION

We should be aware of bilateral first rib fracture when a patient complains of upper chest pain with a history of physical trauma although it is a rare phenomenon. The combinations of unusual features which make this case study unique are a) traumatic rib fracture is not a common phenomenon, b) Symmetrical bilateral first rib fracture is a rare entity and lastly c) First rib fracture with no other major organ damage (isolated first rib fracture) is also uncommon.

Conflict of interest statement: No author of this paper has any conflict of interest, including specific financial interests, relationships, and/or affiliations relevant to the subject matter or materials included in this manuscript.

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