

Traumatic First Rib Fracture as Isolated Thoracic Injury, A Rare Presentation - Case Report

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Abstract: *Fracture of first rib following trauma is often associated with high morbidity and mortality and is considered hallmark of severe trauma.¹ But traumatic first rib fracture without concomitant other regional injuries is very rare. This must involve other mechanisms in causation instead of direct traumatic force.*

Keywords: first rib fracture, trauma, motor vehicle accident

1. Introduction

Due to the protected location in the upper thoracic cavity, first rib fractures are relatively rare compared with other rib fractures. Isolated first rib fractures are uncommon. They are usually associated with severe blunt trauma to thorax, although other mechanisms have been suggested, these being (a) indirect trauma, (b) sudden contraction of the neck muscles, predominantly scalenus anterior and (c) stress or fatigue fractures attributable to repeated pull of muscles as seen in athletes, kick boxers and other professionals.² We are presenting a case with isolated first rib fracture following motor vehicle accident without any other regional injury.

2. Case Report

A young male patient was brought to accident and emergency of PGIMS, Rohtak with alleged history of motor vehicle accident, patient was riding on his bike when he collided with another motor vehicle and fell on ground. He gave history of loss of consciousness and was complaining of pain over right upper chest. On examination, patient was conscious, oriented to time, place, person, vitals were stable, bilateral radial artery pulsation present, respiratory system examination normal, per abdomen no abnormality detected, no signs of any neurological deficit in ipsilateral upper limb.

NCCT head was done which revealed few small hyperdensities in bilateral frontal and temporal regions? hemorrhagic contusion, for which he was managed conservatively in consultation with neurosurgeon. His chest radiograph (figure 1,2) was taken which revealed isolated fracture of the first rib on the right side with no signs of pneumo or hydro thorax, no mediastinal widening, ruling out the possibility of severe intrathoracic injury. His bilateral clavicles were normal and no signs of scapula fracture on either side.



Figure 1: Fracture site marked with tip of the arrow



Figure 2: Fracture site marked with tip of the arrow

Patient was managed conservatively with simple analgesics and proper rest of the right upper extremity using arm sling and subsequently discharged to follow up in OPD.

3. Discussion

The anatomy of the first rib provides it with great protection and stability.³ Isolated fracture of the first rib remains the rarest of all rib fractures, being deeply placed and protected

from all sides by the shoulder girdle and muscles. Great forces are required to fracture this rib and hence this fracture when recognized must always raise the suspicion of associated serious thoracic injuries and the possibility of damage to the closely related subclavian vessels and the brachial plexus.⁴ Most of first rib fractures are associated with motor vehicle accidents, especially automobiles and motorcycles. These accidents may result in severe blunt blows to the sternum and anterior chest wall. The first rib fractures can be divided according to their origin: the stress fractures and the traumatic fractures.³

Fracture of the first rib may involve any of the five mechanisms: (i) posteriorly directed trauma to the upper thorax or shoulder girdle; (ii) a direct blow to the sternum and anterior chest wall; (iii) a blow fracturing the clavicle; (iv) a strong sudden contraction of the scalenus anterior muscle; and (v) radiographic findings of a first rib fracture without history of trauma.⁵

First rib fracture being a hallmark of severe trauma is associated with vascular injuries in 3-45% cases with a mean of 12%. It is rarely associated with minimal trauma, but more commonly associated with major trauma. In severe trauma, it is associated with multiple rib fractures inducing morbidity and mortality due to atelectasis, pneumonia or vascular intrathoracic lesions.³ Advanced trauma life support program (American College of Surgeons Committee on Trauma, 1993) ranks fractures of the first and second ribs as the second in the list of ten radiological signs indicating the likelihood of major vascular injury in the chest with only widened mediastinum given a greater significance. There is a variant of first rib fracture with low velocity injuries which is not associated with any major complications in contrast to majority of first rib fractures associated with high velocity injuries. Causative factor of such injuries may be violent muscular contraction of scalenus anterior or serratus anterior, but not direct trauma.⁶

So, if a patient presents with traumatic first rib fracture without concomitant other thoracic injuries with no signs and symptoms of any vascular or neurological injury it can be labelled as low velocity injury requiring conservative management as is the case with the patient described in this case report.

Management of isolated first rib fracture involves proper rest of upper limb of the affected side and simple analgesics but one must always be aware of the possible complications related to it.

4. Conclusion

Isolated first rib fracture may occur in motor vehicle accidents without any other concomitant regional injury but one must always be careful while dealing with first rib fracture. Thorough examination and investigations are required before labeling it isolated thoracic injury requiring conservative management. Isolated first rib fracture can be managed by conservative management using simple analgesics and rest.

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