CASE REPORT

Bilateral First Rib Fractures: A Rare Case Report

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A 19-year-old man had bilateral first rib fractures and right temporal lobe contusion combined with severe brain edema, right side zygomatic fracture, mandibular symphysis fracture, and right cheek laceration after a motor vehicle accident. After brain edema subsided, the zygomatic and mandibular fractures were reduced and fixed. Fractures of bilateral first ribs are very uncommon. To our knowledge, there are only 26 cases reported in the English literature. We think bilateral first rib fractures may be a sign of more severe associated trauma. A search for other more severe injuries to the head, abdomen, and thorax may needed in these cases. The general condition of this patient was good during the followed-up period of 6 months.

Key words: Ribs, Fractures

Rib fractures constitute a major part of chest trauma [1,2,8]. The lower ribs are commonly fractured, often from relatively minor trauma. In contrast, fractures of the first ribs are uncommon and bilateral fractures are even rarer [3]. Twenty-six cases of bilateral first rib fractures have been reported in English literature. We report an additional case associated with major intracranial and facial injuries caused by a traffic accident. To our knowledge, this is the only one case within the past six years in our trauma center. First rib fractures are usually the result of major trauma and associated with major intrathoracic injury. A review of the literature revealed that patients with bilateral rib fractures do not require angiography unless there is other evidence of vascular damage [2]. A more important aspect is associated injuries of the head, abdomen, and thorax.

CASE REPORT

A 19 year-old man was admitted after a motor vehicle accident. Clinically, he had injuries consisting of bilateral first rib fractures, and right temporal lobe contusion combined with severe brain edema, right side zygomatic fracture, mandibular symphysis fracture, and right cheek laceration. There was no obvious neck or chest trauma, or spinal injury, and his Glasgow coma score was E2V3M2.

The neck and pelvic radiographs were normal. Chest radiography revealed bilateral posterior first rib fractures without other abnormal findings (Figure). There was no clinical or radiographic evidence of pneumothorax and subclavian, axillary and brachial pulses were present.

Because of severe brain edema, manitol 1.0 g/Kg intravenously was administered for 20 minutes and hyperventilation was performed to keep the Pa CO2 level at 30 mmHg. Then, the
patient was sent to the intensive care unit. Over the next two weeks, the patient’s condition improved and his Glasgow coma score was E3V1M6. We then referred him to a plastic surgeon for reduction and fixation of the right zygomatic and mandibular fractures, and repair of the right cheek wound. The patient was hemodynamically stable throughout these procedures.

During hospitalization, we used computed tomography to re-check the brain twice and the face once, and performed nine chest radiographs. The brain contusion and swelling improved, serial chest radiographs of the rib fractures were unchanged and imaging findings did not indicate mediastinal hematoma. Over the next three weeks, the patient went on to make a full recovery and was discharged.

**DISCUSSION**

Bilateral fractures of the first rib are very unusual because it is the shortest, and one of the strongest ribs, and has a protected position [1]. The mechanisms of fracture include direct trauma, indirect trauma, stress fracture, and sudden contracture of the neck musculature [1-3]. The locations of fractures can be divided into posterior segment, middle segment or anterior segment. Fractures of the posterior segment are caused by indirect trauma. Forced hyperabduction with resultant depression of the shoulder results in a fracture of the middle segment. Direct injury anteriorly may produce a fracture of the first rib in association with a fracture of the clavicle.

Fractures of the bilateral first rib are indicative of major trauma and damage to adjacent structures, including the lungs, greater vessels, and brachial plexus [1-3,5-7]. The possibility of associated injuries of the head, abdomen, and neck should be considered. Poole reviewed all published series of fractures of the first rib and concluded that first rib fractures are more strongly associated with injury to other organ systems than with vascular injuries [4]. According to the literature, aortography need not be performed unless there is evidence of neurovascular injury. During the evaluation of patients with first rib fractures, clinicians must check the vital signs and perform a careful, detailed neurologic examination. For patients with stable hemodynamics, contrast-enhanced spiral computed tomography has become the initial test for evaluation of aortic injury and associated trauma [9].

In conclusion, bilateral first rib fractures are relatively uncommon injuries. Management of major injuries, such as head abdominal injury, is important before pain control is undertaken. Supportive care and surgical management of the patient’s other injuries can be successfully performed without aortic arch angiography [1-4]. It is imperative that we undertake a thorough and meticulous examination of patients with bilateral first rib fractures. If no evidence of associated major injuries is found, symptomatic treatment and early mobilization are more than adequate.

**REFERENCES**

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雙側第一肋骨骨折：一稀有病例報告

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　　雙側第一肋骨骨折是極少見的外傷。本院在最近六年只發現此例。以往的觀念認為第一肋骨骨折是重大外傷的指標，因為它常合併頭頸部外傷、腹部外傷、氣胸、血胸、大血管及臂神經叢的傷害。文獻記載除非有證據證明神經血管傷害，否則不必施行主動脈血管攝影。本病例是一位十九歲的男性，因車禍導致雙側第一肋骨骨折，腦部挫傷及面骨骨折。臨床上主要問題在於頭部外傷，故以治療顱內水腫為第一要務，對於肋骨骨折及面骨骨折則先採取保守療法。故當發現第一肋骨骨折時，必須先考慮其他相關的重大外傷且優先處理。因此，第一肋骨骨折的重要性仍在於它的指標作用。

　　關鍵詞：肋骨，骨折