Fracture of the first rib is uncommon. The first reference to it is that of Lane (1885), and until recently there were only a few references to it and the mechanism of injury. During and after the second world war fresh attention was drawn to the fracture, and interesting contributions were made by Aitken and Lincoln (1939), Sjögren (1942), Etter (1944), Alderson (1944, 1947), Hartley (1945) and Bowie and Jacobson (1945).

In the absence of a history of injury, some authors have doubted whether a radiological "fracture" means a fracture at all (Sycamore 1944, Bowie and Jacobson 1945) and have attributed the appearance to a development anomaly. Gershon-Cohen and Delbridge (1945) considered it as a synchondrosis between the two segments of the first rib when it arises from two centres of ossification. The literature reveals that bilateral fractures of the first rib are rare, and we know of only twenty cases reported.

CASE REPORTS

Case 1—A woman of thirty was seen in 1962 after a car in which she was occupying the rear seat collided with a truck. At the time of collision she was thrown forward and her forehead struck the edge of the front seat. She complained of severe pain in the nape of her neck and the inner aspect of both arms. She had a contused lacerated wound in the frontal region, abrasions below the right eye, and contusions on the right upper eyelid and bridge of the nose. There was tenderness in the nape of the neck. Movements of the cervical spine and shoulders were normal, and there was no neurological lesion. Radiographs showed fractures of both first ribs posteriorly and a fracture of the right second rib (Fig. 1). Two weeks later she was free from symptoms. At the end of three months there was radiological evidence of union of the fractures.

FIG. 1
Case 1—Tracing of the radiograph showing bilateral fractures of the first rib posteriorly and fracture of the right second rib.
Case 2—A man of thirty who was seated by the side of the patient in Case 1 at the time of the accident reported that his head struck the front seat. He complained of pain in both shoulders and the cervico-thoracic region. There was a contused lacerated wound of the front of the scalp, a contused lacerated wound of the chin, and a laceration of the right side of the tongue. There was tenderness on either side of the seventh cervical vertebra, but none over the shoulders. There was no neurological lesion. Radiographs showed fractures of both first ribs near their necks (Fig. 2). Two weeks later he had no symptoms.

Study of the reported cases reveals that patients who are seen immediately after the accident complain of pain in the region of the shoulder forcing them to support the arm with the other hand, as though they had a fracture of the clavicle. Pain is aggravated by abduction at the shoulder, and sudden movements of the arm cause severe pain radiating down the inner aspect of the arm. Weakness of the affected arm or grip may also be present and coughing or deep respiratory movement may cause pleuritic pain at the root of the neck or high up in the axilla.

Radiographs are essential to reveal the fracture and to exclude injuries to the cervico-thoracic spine. In cases of doubt Alderson (1944) advised radiography in multiple planes.

DISCUSSION

The first rib differs from other ribs in that it is deeply placed and protected on all sides by the shoulder girdle and by muscles. It is not surprising therefore that isolated fractures of this rib are uncommon, indirect trauma accounting for the majority. Hilton (1852) taught that "ribs generally fractured by application of external force, but you should likewise be aware that such fractures may occur solely from violent muscular actions performed by the patient." Aitken and Lincoln (1939) reported a man who, while climbing a ladder with a box on his head, suddenly jerked his head to the right in an attempt to keep his balance, and fractured his left first rib. Such a fracture has also been a result of unaccustomed muscular exertion like weight lifting, physical training exercises (Garber 1944) and status asthmaticus (Ginsburg 1947). Thoracoplasty for pulmonary tuberculosis has been known to be responsible for fracture of the first rib on the opposite side. Guggenheim and Cohn (1948) pointed out the relationship of the site of fracture to the scalene tubercle. Powell in 1950 described three cases of fracture of the first rib after indirect injury, like shoulder-to-shoulder collision in football players, a fall on the outstretched hand, and forcible hyperabduction at the shoulder. In the literature most fractures occurred just behind the scalene tubercle. This has been
explained on the basis of violent contractions of the scalenus anterior muscle at the time of injury causing severe bending strain at the relatively thinner portion of the first rib, the subclavian groove.

In the two cases reported here the probable mechanism was a head-on collision causing a sudden forward movement of the head, neck and trunk; the movement of the head being stopped by the front seat and the trunk continuing to move downwards and forwards, resulted in hyperextension of the neck and violent contractions of the scalene and sternomastoid muscles. The more powerful scalenus medius acting together with the other scalene muscles produced a bending strain resulting in a fracture just behind the attachment of the scalenus medius. Simultaneous contraction of the scalenus posterior muscle may have caused the unilateral fracture of the second rib in Case 1.

**SUMMARY**

1. Two cases of bilateral fracture of the first rib are reported. The fractures were situated near the neck of the first rib.
2. A possible mechanism responsible for the bilateral fracture of the first rib at this particular site has been suggested.

**REFERENCES**


