Neurogenic Thoracic Outlet Syndrome Secondary to Non-union of Unrecognised First Rib Fracture

S. Subramonia* and J. D. Holdsworth

Department of General Surgery, Cumberland Infirmary, Carlisle, UK

Isolated fracture of the first rib resulting from indirect trauma is well recognised but may remain undiagnosed. We present a case of non-union of this fracture leading to thoracic outlet syndrome, for which surgical intervention was required.

Key Words: Thoracic outlet syndrome; First rib fracture; Non-union of a fracture.

Introduction

Isolated fracture of the first rib is uncommon but well recognised and for which the mechanism of injury is thought to be indirect trauma associated with sporting and other activities.1–4 Uneventful healing is the rule. We report a case of isolated fracture of the first rib which was undiagnosed at the time of injury and presented 2 years later with symptoms of neurogenic thoracic outlet syndrome and radiological evidence of non-union.

Case Report

A 19-year-old farmer had, 2 years prior to presentation, jumped over a wall and suffered acute pain in the right shoulder that debilitated him for 4 weeks. From that time he had intermittent exacerbations of pain and discomfort in the shoulder and neck with tingling down the arm. This prevented him from driving farm vehicles and heavy lifting. On examination, there was no visible abnormality of the shoulder but supraclavicular tenderness was elicited and pulses were normal in all positions of the arm. Left lateral flexion of the head produced pain and paraesthesia radiating down the arm. Stress testing of the arm induced the symptoms and could only be sustained for one and a half minutes. There was no evidence of sensory loss or motor weakness. Radiography (Fig. 1) of the right first rib demonstrated a radiolucent gap in the centre of the rib with abnormal callus formation consistent with a non-union of a fracture. It was considered that this finding was responsible for the symptoms. A supraclavicular exploration was performed with anterior and middle scalenectomy and removal of the central portion of the rib to include the fracture and callus. Postoperative recovery was uneventful and at six weeks follow-up he had recovered completely and was able to undertake those activities that were previously limited.

Discussion

The first rib is situated deeply and is well protected by the muscles and bones of the shoulder girdle. Direct trauma resulting in a fracture of the first rib usually occurs in association with injuries to the surrounding bones, subclavian vessels, brachial plexus or with significant intrathoracic injuries.5,6 In contrast, isolated fractures of the first rib may follow indirect trauma and have been reported to occur with various activities such as surfing,2 gymnastics3 and weight lifting.4 This injury probably results from sudden strong contraction of the scalenus anterior muscle combined

*Corresponding author. Mr S. Subramonia, Registrar in Surgery, Department of Surgery, Cumberland Infirmary, Carlisle, Cumbria CA2 7JL, UK. E-mail: arobit_ram@hotmail.com.
with traction of the arm. Scalenus anterior exerts an upward pull through its attachment to the scalene tubercle of the rib and serratus anterior exerts a downward pull through its attachment to the posterior third of the rib and these opposing forces cause a fracture through the weakest part of the rib at the groove for the subclavian artery lateral to the scalene tubercle.1

Thoracic outlet syndrome comprises arterial, venous or neurological components, or any combination of these, and results from compression of the neurovascular bundle at any point between the thoracic outlet and the axilla. Neurogenic thoracic outlet syndrome, the most frequently occurring symptom complex, results in pain, paraesthesia and numbness in the distribution of the affected nerves of the brachial plexus. Late sequelae include sensory loss, motor weakness and atrophy. Most cases of neurogenic thoracic outlet syndrome follow some form of neck trauma but non-union of a fracture of the first rib has only been reported on rare occasions.2,7,8 In our case, the rib fracture was unrecognised for 2 years prior to presentation. Thus an isolated fracture of the first rib can remain undiagnosed especially since this can follow relatively insignificant trauma. Furthermore, if non-union occurs, as in this case, there is the potential for developing thoracic outlet syndrome and this has to be considered as one of the causes of this syndrome.

![Fig. 1. AP and lateral views showing non-union of a right first rib fracture.](image)

References

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