Thoracic outlet syndrome caused by chronic retrosternal dislocation of the clavicle

Successful treatment by transaxillary resection of the first rib

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Traumatic posterior dislocation of the sternoclavicular joint is an unusual injury. We report a rare, late complication in the form of a thoracic outlet syndrome. Resection of the first rib resulted in prompt and complete resolution of the symptoms and would appear to be the appropriate treatment, avoiding the complications associated with resection of the clavicle.


Traumatic posterior dislocation of the sternoclavicular joint and posterior physeal fracture-dislocations of the medial clavicle are rare injuries which are often missed because of the subtle physical signs and difficulty in the interpretation of plain radiographs.

Because of the proximity of the mediastinal structures, there may be associated damage to the brachiocephalic vein, the subclavian and internal mammary arteries, the brachial plexus, the trachea and the oesophagus, resulting in various complications. 1,2 Only three cases of thoracic outlet syndrome after posterior dislocation of the sternoclavicular joint have been reported in the literature. 3-5 We describe a case, which has several unique features, in a teenager who was successfully treated by transaxillary resection of the first rib.

Case report

A 14-year-old boy injured his left clavicle while playing rugby and a posterior dislocation of the sternoclavicular joint remained undiagnosed. The initial local symptoms settled, but he subsequently developed discomfort in the region of the medial clavicle while swimming and surfing, and especially during activities requiring forward elevation or extension of the shoulder. This was associated with paraesthesia in the C8 and T1 dermatomes, and diffuse numbness in the hand. Three years after the original injury the symptoms began to affect his daily life. Any activity involving forward elevation of the left upper limb, such as reading a newspaper or driving a car, caused brachial ischaemia.

Examination confirmed asymmetry of the medial aspect of the clavicle, with loss of prominence on the affected side. Extension of the shoulder caused a distinct movement of the medial aspect of the clavicle posteriorly and reproduced the symptoms in the arm. There was a strongly positive Roos test, which involved abduction of the shoulder and external rotation at 90° with slowly repeated clenching of the fist for up to three minutes, causing neurological and/or vascular symptoms, and early disappearance of the radial pulse (Fig. 1). There was no sensory or motor impairment.

CT confirmed posterior displacement of the medial aspect of the left clavicle (Fig. 2). A Duplex ultrasound scan showed occlusion of the left subclavian artery on elevation of the arm. Interestingly, there was compression of the subclavian artery to a less degree on the right side, with subtle symptoms affecting the right arm on elevation. Neurophysiological tests confirmed an axonal compressive neuropathy of the brachial plexus, mainly affecting the sensory action potentials of the medial and lateral antebrachial cutaneous nerves with abnormal reflex conduction, particularly in the C8 and T1 roots.

A left transaxillary resection of the first rib was performed. At operation the upper surface of the first rib was seen to be deeply grooved by the subclavian artery, and the artery and vein were both displaced inferiorly by the dislocated clavicle. He made a good recovery, with complete resolution of the symptoms, and was able to participate in a competitive yacht race to the Channel Isles three weeks after surgery. A Duplex scan after the operation was normal.

Discussion

Retrosternal dislocation of the clavicle resulting in dysphagia, and requiring excision of the medial aspect of the clavicle, was recorded by Sir Astley Cooper in 1824. 2 There have been several further case reports. 3-5,7-9

A high index of suspicion is required when diagnosing injuries to the medial aspect of the clavicle, especially in view of the potential complications of posterior displacement. The term ‘stealth dislocation’ has been proposed to describe these injuries. 7 In addition to the loss of prominence of the medial aspect of the clavicle and the more prominent corner of the sternum, signs of venous congestion in the neck or upper limb, dyspnoea, a sensation of choking, dysphagia, hypotension and even clinical shock should be sought. Special radiographic projections, including a Hobbs view 2 and a 40° cephalic tilt view have been recommended, but routine cross-sectional imaging is currently considered to be the appropriate technique for assessing the sternoclavicular joint.

The medial epiphysis of the clavicle does not ossify until the 18th to 20th year, and fuses with the shaft of the clavicle around
the 23rd to 25th year. Many so-called dislocations are in fact phyeal injuries of the medial aspect of the clavicle.\textsuperscript{1,2}

True post-traumatic thoracic outlet syndrome is a rare neurovascular disorder which may result from an injury to the clavicle, usually a fracture of its midshaft.\textsuperscript{6,10-11} An association with posterior dislocation of the sternoclavicular joint has been reported in three cases in the literature.\textsuperscript{3-5} In one of these the patient was thought to have a sternoclavicular dislocation with vascular rather than neurological symptoms, and no abnormal neurological signs or electrophysiological disturbance.\textsuperscript{3} It was treated by excision of the medial aspect of the clavicle six months after the initial injury. In the second case the patient presented four years after reduction of an ipsilateral dislocation of the glenohumeral joint, with persistent neurological symptoms and signs and ‘popping’ of the sternoclavicular joint; this was also treated by excision of the medial aspect of the clavicle.\textsuperscript{4} In the third case, the patient presented several months after injury, with compression of the subclavian artery and was treated by open reduction and soft-tissue stabilisation.\textsuperscript{5} A further procedure was required owing to recurrence of the dislocation and continuing symptoms. None of the previous cases reported mentioned the Roos provocative test, which has a high correlation with thoracic outlet syndrome.\textsuperscript{6}

Closed reduction within the first seven to ten days is recommended as the treatment of choice for posterior dislocation of the sternoclavicular joint, failing which, open reduction is required in view of the possibility of compression of the mediastinal structures. When treating chronic injuries, resection of the medial aspect of the clavicle, with reconstruction of the costoclavicular

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ligament, has been recommended.\textsuperscript{1,12,13} Cooper et al\textsuperscript{14} have reported the use of an external fixator to stabilise the reduced sternoclavicular joint.

Resection of the first rib is the most commonly performed procedure for non-traumatic thoracic outlet syndrome.\textsuperscript{6} This approach is attractive because of the high rate of success and the cosmetic scar in the axillomammary skin crease. It also avoids the potential complications associated with resection of the clavicle such as iatrogenic damage to mediastinal structures, instability of the medial clavicle after operation and a hypertrophic scar.

We suggest that transaxillary resection of the first rib rather than resection of the clavicle should be considered in cases of symptomatic posterior dislocation of the sternoclavicular joint.

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References