



CASE REPORT

# Posterior sternoclavicular joint dislocation with brachiocephalic vein compression in an elite hockey player

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Accepted 4 May 2006

## Introduction

Posterior sternoclavicular joint dislocation is a rare but potentially serious injury. It is most commonly seen in teenagers or young adults involved in major trauma<sup>2</sup> and can be difficult to diagnose clinically and radiologically. It is our experience that this injury is frequently associated with a delay in diagnosis and may be clinically insignificant initially. Despite this benign early clinical path it has recognized morbidity and mortality due to the close proximity of vital structures to the joint and up to 30% of patients have complications involving these structures.<sup>7</sup> We describe a 20-year-old elite hockey player with posterior sternoclavicular joint dislocation with brachiocephalic vein compression and discuss the issues of management and return to sport.

## Case report

A 20-year-old right-handed elite field hockey player presented immediately having sustained direct trauma to his left clavicle by a front on collision with another player. This resulted in immediate pain and swelling over the medial third of the clavicle. He had no medical history of note other than an anterior subluxation of the right sternoclavicular joint 3 years previously that was treated conservatively.

In accident and emergency there was no evidence of clavicular fracture on X-ray and the patient was discharged in a sling with a diagnosis of soft tissue bruising. Symptoms persisted and he attended the Sports Medicine Centre the following day.

Examination revealed marked tenderness over the medial clavicle and sternoclavicular joint. Jugular venous pressure was mildly raised and the patient reported swelling and bluish discoloration of the left upper limb during the morning, which had subsequently resolved. Distal neurovascular examination was unremarkable.

Computerized tomography confirmed severe subluxation of the sternoclavicular joint involving

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**Figure 1** Axial CT scan at the level of the sternoclavicular joint: the head of the left clavicle is markedly displaced posteriorly (arrow) and is compressing the brachiocephalic vein.

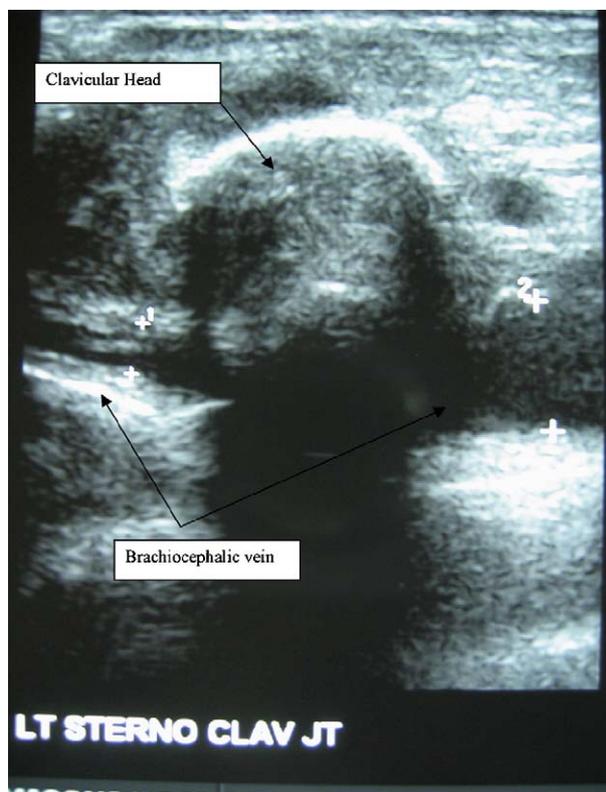
greater than 90% of the articular surface (Fig. 1). In addition there was displacement of the left brachiocephalic vein and associated venous compression. There was no evidence of pneumo/haemothorax. Ultrasonography confirmed compression of the brachiocephalic vein centrally compared to peripherally (3.5 mm versus 9 mm diameter) (Fig. 2) by the posteriorly subluxed clavicle and associated haematoma.

Closed reduction under general anaesthetic using the method described by Rockwood<sup>8</sup> was successful but unstable. Open reduction and stabilization using No. 5 tycron transarticular sutures was performed combined with soft tissue repair of the ligamentous structures. Post operatively the JVP normalized and there were no further upper limb vascular related symptoms.

A graduated progressive rehabilitation programme was prescribed combined with a period of 6 weeks in sling protection. Initial glenohumeral range of movement and flexibility exercises were complemented with isometric scapular stabilization exercises. Additional resisted isotonic concentric and eccentric exercises were added once a pain free full range of movement of the shoulder was achieved. The patient returned to non-contact sport specific skills at 3 months and full contact at 6 months.

## Discussion

Posterior dislocation of the sternoclavicular joint accounts for less than 1% of all dislocations.<sup>6</sup> This injury is seen most commonly in cases of major



**Figure 2** Transversely orientated ultrasound scan over head of left clavicle shows dilatation of the brachiocephalic vein distally. (1) Central portion of brachiocephalic vein. Distance = 3.5 mm. (2) Peripheral portion of brachiocephalic vein. Distance = 9 mm.

trauma such as motorcycle and motor vehicle accidents<sup>10</sup> but has been reported in American football and rugby football players.<sup>5,10</sup> It is associated with one of the two mechanisms of action, either a direct blow to the anterior medial aspect of the clavicle as seen in this case, or the more common mechanism of a blow to the posterior lateral aspect of the shoulder<sup>5,8</sup> with the arm flexed and adducted, the position typically adopted when carrying and protecting an American football or rugby ball.

The sternoclavicular joint is stabilized by a fibrous joint capsule anteriorly and posteriorly, and by the anterior and posterior sternoclavicular, interclavicular and costoclavicular ligaments. The posterior ligaments are significantly stiffer and a 50% greater force is required for a posterior, than an anterior dislocation.<sup>8</sup> The mobility and laxity of the joint decreases with age therefore this injury is more common in younger people. The medial epiphysis of the clavicle does not ossify until the 18th to 20th year, and only fuses with the shaft of the clavicle around the 23rd to 25th year<sup>5</sup> so physeal fractures of the medial clavicle can masquerade as a posterior dislocation.

Clinical diagnosis is often missed because of the rarity of the injury and as swelling of overlying tissue hides the deformity. Routine AP radiographic views as taken to detect a clavicular fracture often miss the dislocation.<sup>8</sup> Oblique X-rays have been recommended<sup>8</sup> but CT scan is the optimal method for displaying the articular and mediastinal injuries.<sup>4,6</sup> Due to the vital structures within the mediastinum, posterior dislocation of the sternoclavicular joint can have significant complications such as compression<sup>7</sup> and laceration of the brachiocephalic vein,<sup>3,10</sup> tracheoesophageal fistula and thoracic outlet syndrome.<sup>5,9</sup> Our preferred method of treatment is reduction and stabilization with non-absorbable sutures and repair of ligamentous structures.

In acute cases closed reduction of posterior dislocation is the treatment of choice.<sup>5</sup> If however the reduction is not stable, as in this case, then open reduction and joint stabilization is required. Fixation with K wires or Steinman pins have the potential for migration of the fixation device towards vital structures<sup>8</sup> and is therefore not recommended. In chronic cases of dislocation especially with evidence of thoracic outlet syndrome, excision of the medial aspect of the clavicle or reconstruction of the joint stabilizers using a variety of autograft materials has been recommended.<sup>8</sup>

Return to sport is a difficult but very important aspect of the management of this injury because of the potential serious consequences of re-injury. Each patient should be managed individually and when devising a management plan, particular attention should be paid to the severity of the initial injury including degree of subluxation/dislocation and the presence or absence of associated mediastinal injury, the type of reduction and stabilization procedure performed as well as the nature of the sport to which the patient is returning. Because of the potential severe local consequences of re-injury and the anticipated difficulty in achieving a satisfactory outcome following re-injury, we recommend a conservative approach, to allow for full soft tissue healing and adequate shoulder girdle rehabilitation particularly when returning to contact sport. We

prescribed a graduated rehabilitation programme based on expert consensus<sup>1</sup> as there are no set guidelines or evidence upon which to base decisions.

Posterior sternoclavicular dislocation is a rare but potentially critical injury. It is often difficult to diagnose clinically and radiologically, and a high index of clinical suspicion is required. Some posterior dislocations are stable after a closed reduction but others require surgical stabilization. The close proximity of the vital mediastinal structures to the joint mean that complications of the injury or of its surgical treatment can be catastrophic. A graduated progressive functional rehabilitation programme is recommended with an aim to return to sport in 3–6 months.

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