



Case Report

Medial epiphyseal fracture-detachment of the sternoclavicular joint with posterior displacement in a judo athlete – equivalent of posterior sternoclavicular dislocation

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Posterior sternoclavicular dislocation is a rare traumatic injury that presents a potential risk of injury to mediastinal structures. The diagnosis is fundamentally clinical and treatment is done on an emergency basis. The authors report the clinical case of a young judo athlete with post-traumatic medial epiphyseal fracture-detachment, with posterior displacement (lesion equivalent to posterior sternoclavicular dislocation at pediatric ages). He underwent open reduction and ligament repair by means of a mini-anchor. The radiological and clinical outcome was excellent, and the athlete returned to his sports activity without limitations. We discuss the particular features of this pathological condition, along with the different therapeutic approaches and their complications.

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Introduction

Posterior dislocation of the sternoclavicular joint is rare and diagnosing and treating this condition is a challenge for orthopedists. The stability of this joint is conferred by the joint capsule, the anterior sternoclavicular ligament (which is stronger), the costoclavicular ligament and the joint disc. In cases of posterior sternoclavicular dislocation, rupture of the joint capsule, anterior and posterior sternoclavicular ligaments and costoclavicular ligament occurs. At pediatric ages, medial epiphyseal dislocation with posterior displacement is possible, given that the nucleus of ossification develops at the end of adolescence and up to the age of 25 years. Clinically, such patients present spontaneous pain that is worsened by local palpation, along with functional impotence of the homolateral shoulder. They may present a depression in the level of the medial face of the clavicle, to a greater or lesser extent. Symptoms such as dysphagia and dyspnea may be present and would indicate compression of the mediastinum. The diagnosis is clinical, but radiography (X-rays) and particularly computed tomography (CT) are crucial for better characterization of the lesion. It is essential to reduce the dislocation, as an open or closed procedure, on an emergency basis.

Case report

The patient was a 17-year-old athlete and judo player who had suffered trauma on the right shoulder after being thrown to the floor during a fight. He was admitted to the emergency service with pain in the upper right half of the chest and inability to use his right arm. In the objective examination, he presented pain on palpation of the medial extremity of the right clavicle, without evident deformity, with associated dysphagia and without neurovascular deficits. The initial X-ray (Fig. 1) did not show any lesion clearly, but in the light of clinical suspicion of posterior sternoclavicular dislocation, a CT scan was produced. This confirmed that this was a case of medial epiphyseal fracture-detachment with posterior displacement (Fig. 2).

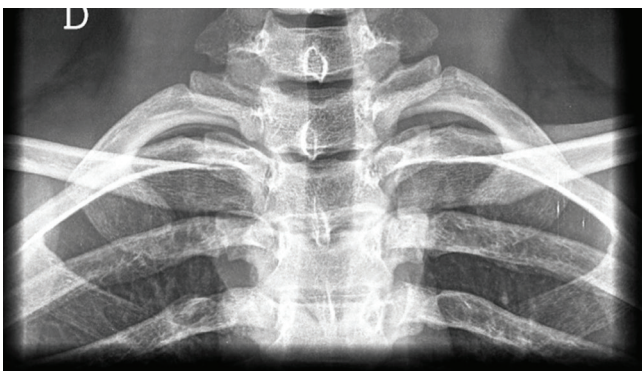


Fig. 1 - Initial X-ray.

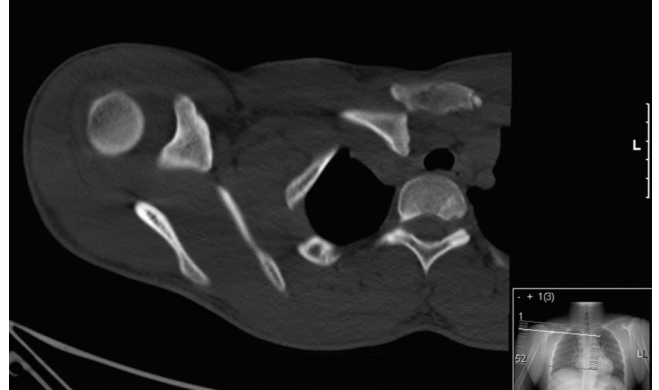


Fig. 2 - CT (axial view) showing incongruence of the right sternoclavicular joint, with posterior displacement of the clavicle.

Method

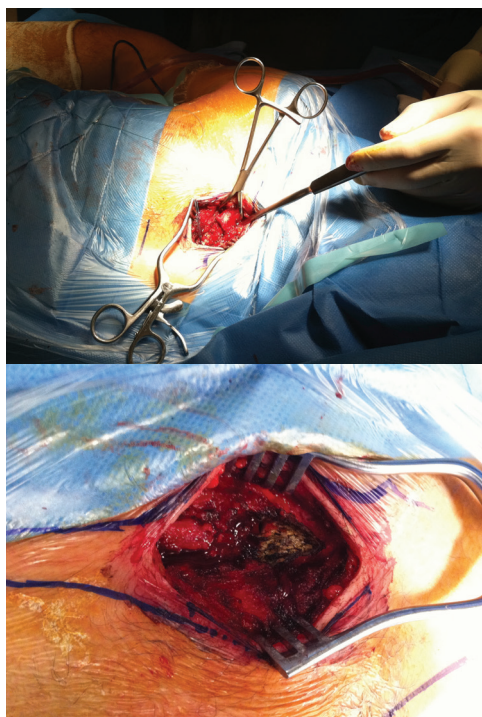
The patient was then operated under general anesthesia and attempts were made to reduce the fracture-detachment as a closed procedure: traction, abduction of the arm and manipulation of the medial extremity of the clavicle with the aid of a clothes peg. Although closed reduction was achieved, posterior instability remained and therefore open reduction was performed, with ligament reconstruction using a mini-anchor and transosseous stitches (Figs 3-7).



Fig. 3 - Depression of the medial edge of the right clavicle.



Fig. 4 - Surgical approach.



Figs. 5 and 6 - Intraoperative images showing comminuted epiphyseal fracture-detachment of the medial portion of the clavicle.

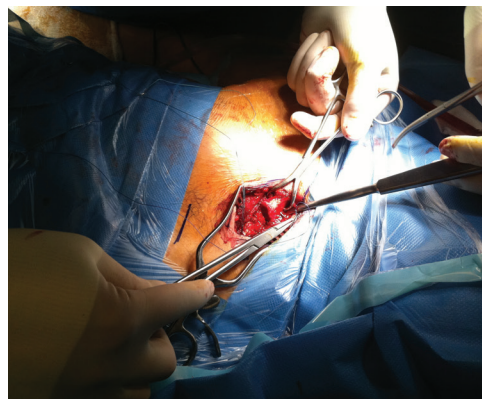


Fig. 7 - Ligament repair using mini-anchor and transosseous stitches.

Results

During the immediate postoperative period, there was complete remission of the dysphagia. The patient was followed up in the orthopedics consultation office, and remained immobilized with a sling for six weeks. Pendular movements were started in the fourth week, and physiotherapy with intensive functional rehabilitation in the sixth week. Abduction was the last movement to be worked on. Full mobility of the right arm was achieved after around eight weeks, and the patient returned to his sports activity at the pre-injury level after four months. One year afterwards, he was seen to be asymptomatic.

Discussion

Posterior sternoclavicular dislocations are rare injuries and are much less frequent than anterior dislocations. Their rate of incidence ranges from 5% to 27%.¹ They are often found in association with contact sports such as rugby and judo, or in sequences of traffic accidents. They are usually caused by direct trauma on the clavicle or by indirect trauma with lateral compression of the shoulders (homolateral or contralateral). Concomitant fracturing of the first rib is common. In cases of violent trauma around the shoulder, of either direct or indirect nature, lesions of the glenohumeral or acromioclavicular joint should always be ruled out, given that because these joints are much more frequently injured, they could mask an injury at the level of the sternoclavicular joint.²

In humans, the last growth cartilage to complete its ossification is located at the medial extremity of the clavicle. Its ossification nucleus persists until the age of 23-25 years, at which time the medial epiphysis fuses with the diaphysis. The sternoclavicular ligaments are inserted at the level of the epiphysis, thus leaving the growth plate in an extracapsular position and vulnerable to epiphyseal dislocation. This, together with hyperlaxity and the vast range of motion of the upper limbs, makes young people more exposed to epiphyseal fracture-detachment, rather than the traditional pure dislocation of the sternoclavicular joint. Thus, epiphyseal fracture-detachment can be identified in accordance with the Salter-Harris classification, and the great majority of them are type I and II lesions. These lesions may present anterior or posterior displacement, according to the nature of the deforming force. Posterior displacement occurs less frequently, but is much more serious,³ with the potential complications of compression of vital structures at the level of the superior mediastinum, namely the trachea, larynx, esophagus, brachial plexus, major blood vessels (brachiocephalic vein, aortic artery and thoracic duct) and lungs.⁴ For this reason, reduction of the fracture-dislocation constitutes an emergency, in order to avoid serious sequelae that could even lead to the patient's death. The diagnosis is fundamentally clinical and presence of dysphagia, dyspnea or voice alterations is a crucial symptom representing a severe condition due to compression of the structures of the mediastinum.

Thus, medial epiphyseal fracture-detachment of the sternoclavicular joint with posterior displacement is equivalent to pure posterior sternoclavicular dislocation, with identical treatment and management.

Firstly, simple radiography should be performed on the clavicles, in anteroposterior (AP) and lateral views. However, because of technical difficulty in obtaining correctly executed lateral images and given the interpretational difficulties due to bone superposition, AP radiographs and AP with cranially inclined incidence take on great importance. CT scans (ideally with contrast to verify the integrity of the vascular structures) make it possible to correctly diagnose the dislocation (or fracture-dislocation), and also to evaluate the compression of the mediastinal structures. In special cases, arteriography may be useful, if an arterial lesion is suspected, thus making it possible to ascertain its extent.⁵

In cases of posterior sternoclavicular dislocation, closed reduction under general anesthesia is usually achieved in 80% of the cases,⁵ by applying a combination of arm traction, abduction and extension. Placement of a posterior support (a silicone bar, for example) under the patient's back in the interscapular region helps in the maneuver by promoting hyperabduction and extension of the scapular belt. Sometimes it is necessary to use field forceps to reduce the dislocation. In the same way, in young patients with epiphyseal fracture-detachment with posterior displacement, it is fundamentally important to evaluate the stability of the reduction, using an image intensifier with oblique viewing.² After achieving the reduction, immobilization should be implemented in a "figure of 8" (the same as used in clavicular fractures) for four weeks, thus enabling ligament healing, followed by a physiotherapy program aimed at functional rehabilitation of the affected limb.

In patients with irreducible dislocation or clearly presented instability after the reduction, either due to late diagnosis of subacute or chronic lesions, or due to interposition of soft tissue in cases of acute trauma, open reduction in association with fixation should be performed. In these cases, ligament reconstruction may be enough. However, fixation using osteosynthesis materials like Kirschner wires, screws and plates is sometimes necessary.⁷ Given the rarity of this pathological condition and the scarcity of published studies, there is still no consensus regarding the best method for fixation of these lesions. Partial cleidectomy (excision of part of the clavicle) with removal of its medial portion ad minimum is admissible in cases of painful chronic dislocation.⁴

Despite the stability that is usually achieved after reduction and surgical fixation of the sternoclavicular joint, it is important to maintain follow-up for these patients until adulthood, since sequelae such as recurrent instability or loss of reduction can occur, thus leading to positioning of the medial extremity of the clavicle inside the mediastinum and consequent compression of local structures.

The most frequently seen surgical complications are pneumothorax and migration of the osteosynthesis material, most commonly in cases of fixation using Kirschner wires or pins, which may be fatal for the patient.⁶ The commonest sequelae relating to incorrect treatment of this pathological condition are recurrent posterior instability and pain when mobilizing the contralateral limb.⁸

In our clinical case, no compromising of neighboring structures or any presence of intramediastinal hematoma was seen, which was because of the early diagnosis and treatment at the emergency service. The reduction and joint stability achieved were excellent, as could be seen from the control CT scan produced seven months after the surgery (Fig. 8).



Fig. 8 - Control CT produced seven months after the operation (coronal view).

Posterior sternoclavicular dislocation and medial epiphyseal fracture-detachment of the sternoclavicular joint with posterior displacement are rare lesions that are equivalent to each other. Because of late closure of the medial ossification nucleus of the clavicle, young adults are more vulnerable to occurrences of medial epiphyseal fracture-detachment. Posterior displacement of the medial portion of the diaphysis of the clavicle is potentially severe and may give rise to serious complications and even lead to the patient's death. Although a high degree of clinical suspicion is important, CT is fundamental for diagnostic confirmation and evaluation of associated lesions. The treatment needs to be aggressive and implemented as a matter of urgency.

Conflicts of interest

The authors declare that there was no conflict of interests in conducting this study.

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