CLINICAL REPORT

Variants of the shoulder side impact syndrome: The posterior sternoclavicular dislocation

J.-M. Laffosse a,*, N. Reina a, b, J.-L. Tricoire a, b, P. Chiron a, J. Puget a

a Musculoskeletal Institute, Orthopaedic Surgery Department, Toulouse-Rangueil Teaching Hospital Center, 1, avenue Jean-Poulhès, TSA 50032, 31059 Toulouse cedex 9, France
b Anatomy Research Laboratory, Toulouse-Rangueil Teaching Hospital Center, 31059 Toulouse cedex 9, France

Accepted: 14 June 2010

Summary Side impact syndrome of the shoulder is rare and usually associated with concomitant mid-shaft clavicle, rib and scapular fractures. Visceral complications involve pleural cavity and/or lung injuries. The authors report two rare instances of posterior sternoclavicular dislocations with this entity. This association is rare and diagnosis can be overlooked in multi-trauma patients especially when blunt thoracic lesions can be life threatening. The absence of a fracture of the clavicle after a high-energy side impact to the shoulder should suggest this diagnosis, which can be facilitated by systematic total body CT scan with 3D reconstruction. Management is surgical.

© 2010 Elsevier Masson SAS. All rights reserved.

Introduction

Lateral impaction syndrome of the shoulder or scapuloclavicular-thoracic syndrome associates fractures of the scapula, the clavicle and several ribs [1]. It occurs after a high impact trauma with direct impact delivered to the lateral shoulder [1,2]. It is frequently associated with thoracic injuries and other neurovascular damage, in particular to the brachial plexus [2]. During the trauma, the impaction force can be broken down into a posterior-inferior component causing the scapular fracture and an anterior-superior component which cases the fracture to the anterior shoulder arch which can extend from the acromioclavicular joint to the sternoclavicular joint [2]. In the large majority of cases, a fracture of the medial clavicle is found, and any associated visceral injuries are pleuropulmonary (pneumothorax, hemothorax, pulmonary contusion). Mediastinal injuries are extremely rare in this situation [1,2].

We show that in very rare cases the fracture of the clavicle during a lateral impaction syndrome of the shoulder can be replaced by a posterior sternoclavicular dislocation which can be life threatening to the patient. The diagnosis is sometimes difficult and delayed. Two cases are reported here.

Clinical case no. 1

Mr D, a 35-year-old right-handed man presented after a car accident where he ran into a tree on the left side of the road. He was not wearing a seat belt and had a concussion,
had lost consciousness, an open fracture of the left tibia, injury to the left shoulder and fracture of the scapular neck (Figs. 1 and 2) as well as fractures of the third to sixth ribs. Initial CT Scan of the chest did not show any injuries to the abdomen or thorax. Mr. D therefore underwent emergency surgery for the open tibial fracture, and conservative treatment was decided for the scapular fracture. Five days after admission, due to pain and discomfort in the left sternoclavicular region, CT Scan of this region showed posterior sternoclavicular dislocation (Fig. 3). There was no marked dyspnea, no dysphagia or signs of vascular compression, and Mr. D underwent surgery 4 days later. Because of the delay (over 48 hours) and associated homolateral bone injuries (rib and scapular fractures), no closed reduction was attempted. The dislocation was surgically reduced then stabilized with a costoclavicular cerclage or tenodesis with a PDS™ suture associated with a costoclavicular ligament suture and on the anterior capsular plane. Stability seemed satisfactory during surgery, and no other procedures seemed to be necessary. Conservative treatment of the scapular fracture was continued. Mr. D was immobilized for 6 weeks with the elbow splinted to the body, rehabilitation was begun at the end of the third week. At 15 months of follow-up, recovery was excellent with a Constant score of 97/100 without pain or reduction in range of motion [3]. The patient was able to begin his previous activities at the same level as before. The Single Assessment Numeric Evaluation (SANE) [4] was 95/100.

Clinical case no. 2

Mr. C, a 49-year-old right-handed man was a passenger in a helicopter accident. He presented with multiple injuries associating a severe craniofacial injury with unconsciousness, crushing of the right glenoid fossa, injury to the cervical spine without bone lesions and injury to the right shoulder and right thorax. Standard X-ray and emergency CT Scan showed a fracture of the diaphyseal neck of the scapula, multiple rib fractures, posterior and superior sternoclavicular dislocation associated with a posterior chondrosternal dislocation of the first rib (Fig. 4 et 5). Hemopneumothorax with only a slight fluid accumulation and which was well tolerated clinically was also identified and Mr. C underwent surgery the day after admission. No closed reduction was attempted. The sternoclavicular and chondrosternal dislocations were treated by open reduction and because of persistent instability, stabilization was obtained with sternoclavicular and chondrosternal wire cerclage (Fig. 6). Tenodesis was performed on the subclavian ligament due to severe injuries to the costoclavicular ligament by the Burrows technique [5] as well as a capsular

Figure 1  Patient 1. Standard AP view X-ray of the left shoulder showing a slightly displaced fracture of the neck of the scapula. The sternoclavicular joint cannot be seen in this view.

Figure 2  Patient 1. Emergency CT Scan centered on the scapula. It confirms the fractures, but no diagnosis of sternoclavicular dislocation can be made.

Figure 3  Patient 1. CT Scan centered on the sternoclavicular region shows posterior dislocation of the left clavicle.
Figure 4  Patient 2. Standard AP chest X-ray with the patient lying in the emergency room. A fracture of the scapula is visible (arrow) but not the pneumothorax with minimal fluid collection or the sternoclavicular and chondrosternal dislocation.

Figure 5  Patient 2. 3D CT Scan reconstruction showing posterior sternoclavicular and sternochondral dislocations (white arrow) compared to the contralateral joints.

Figure 6  Patient 2. Standard AP chest X-ray showing stabilization by sternocostal and costoclavicular cerclage during postoperative follow-up.

Figure 7  Patient 2. Standard AP chest X-ray at 8 years of follow-up showing union of the scapular fracture without secondary displacement as well as a break but no migration of the cerclage wire.

suture. Mr C was immobilized for 6 weeks postoperatively in a splint, rehabilitation with pendular exercises was begun on the fourth week, and the patient gradually began his regular activities four months after surgery. Eight years after the accident, the clinical results are excellent. Range of motion of the shoulder is normal and there is no pain. The Constant score was 95/100 and the SANE 90/100. The sternoclavicular joint appears stable. X-ray at the final follow-up (Fig. 7) shows that the wire has broken but has not broken skin.

Discussion

Lateral impaction syndrome of the shoulder, like posterior sternoclavicular dislocations are very rare. [1,2,6], therefore it is extremely rare for them to occur together. Zucman et al. [7] reported the case of a 30 old stonemason who presented after falling from a high place, with a scapular body fracture and a sternoclavicular dislocation without mentioning the direction. The patient did not undergo surgery and was lost to follow-up. Féry et Sommelet [8] reported a series of 49 sternoclavicular dislocations (40 were anterior, nine posterior, and one with multidirectional instability). Sternoclavicular dislocations were found to be associated with rib and scapular fractures in nine patients, but the direction of the dislocation was not mentioned. Our team has already reported two separate series of posterior sternoclavicular...
Side impact syndrome of the shoulder with posterior sternoclavicular dislocation

Dislocations: one series of 30 cases which occurred during sports accidents [9] and another six cases from various traumas (three rugby accidents and three road accidents) [10]. We have never encountered this association of injuries in our experience, and we did not find any other cases reported in the literature.

Because anterior sternoclavicular dislocations are much more frequent [6], their association with scapular and rib fractures should also be more frequent, even if dislocations occur during lower impact traumas. Thus, to our knowledge, the cases reported here are the first reports in the literature of this very rare association of injuries.

This is a severe injury, for the mechanism of lateral impaction syndrome of the shoulder is the result of a violent impact and the presence of posterior sternoclavicular dislocation is always associated with a high impact posterolateral trauma. The sternoclavicular joint is one of the most stable cations is always associated with a high impact posterolateral trauma. The sternoclavicular joint is one of the most stable joints of the locomotor system [6,11]. It can therefore cause severe displacement of the medial clavicle, which can result in severe mediastinal injuries, in particular vascular injuries [12], which may be life threatening to the patient [12–15]. However, when there are signs of mediastinal injuries, which is only the case in one out of four patients [9], they are compressive, and usually limited to moderate dyspnea, dysphagia or venous return disturbances. As a result, the diagnosis can easily be missed, especially in cases with serious chest injuries, or multiple injuries in the absence of a clavicle fracture after a high impact trauma of the lateral shoulder, sternoclavicular joint injuries must always be looked for [16]. Imaging techniques, in particular spin echo CT scan, if possible with contrast enhancement, followed by reconstruction, which is now nearly systematic in the presence of this type of trauma, facilitates the diagnosis. Standard X-rays, and in particular conventional Hening view is of little help in these cases.

Sternoclavicular dislocation (anterior and posterior) like clavicle fractures affect the continuity between the arm and the thorax. When associated with a scapular fracture, the equivalent of a floating shoulder occurs because of the disruption of the superior shoulder suspensory complex [17]. Reduction and stabilization of the sternoclavicular joint will prevent any bone union defect of the scapular fracture. [17,18]. Although it is well accepted that closed reduction manoeuvres can be attempted up to 48 hours after injury, which if they are successful are stable [6,9] the presence of associated chest injuries (pneumothorax to be drained, flail chest to be treated) often delays management and reduces the chances of success of closed reduction. Moreover, prudence is necessary in the presence of scapular and rib fractures to avoid causing further damage (displacing fractures that were not displaced, causing pleuropulmonary injuries or disrupting previously treated pleuropulmonary injuries). Open reduction should be performed in a specialized unit with a vascular or thoracic surgeon at hand, followed by repair to ligaments. Stabilisation of the sternoclavicular joint must often be associated with reduction because these high impact traumas cause extensive ligament injuries that must be repaired. Open reduction of the sternoclavicular dislocation should be the first step before operating on the scapular fracture if this procedure must be performed in the decubitus lateral position. The simple weight of the shoulder can cause significant displacement of the medial clavicle behind the sternum. In the presence of anterior sternoclavicular dislocation, surgical treatment can be considered because of the disruption of the superior shoulder suspensory complex, especially if the fracture of the scapula is to be treated conservatively. If the latter is treated by open reduction and stabilization, simultaneous reduction of the anterior sternoclavicular dislocation is indicated, once internal fixation of the scapula has been performed, although the surgical risks inherent in the close anatomical relationship to the trachea, the esophagus and the neurovascular elements behind the sternum should be carefully evaluated [6,19].

Conflict of interest statement

The authors have no conflict of interest.

References


