

RETROSTERNAL DISLOCATION OF THE CLAVICLE

E. J. DERKSEN, J. A. EYKELHOFF, K. E. SCHENK, P. PATKA, H. J. TH. M. HAARMAN

Retrosternal dislocation of the clavicle is an uncommon injury which may affect the mediastinal structures in a life-threatening way. Therefore, computed tomography is mandatory. Manipulation in the acute situation is the treatment of choice. In case of failure or old dislocation, open reduction with stabilization of the joint is required. The literature on this subject has been reviewed and an additional two cases are reported.

Keywords : sternoclavicular joint ; dislocation.

Mots-clés : articulation sterno-claviculaire ; luxation.

INTRODUCTION

Retrosternal or posterior dislocation of the clavicle is a rare finding with a variety of possible complications. The cause of the dislocation is most often a direct blow on the sternal end of the clavicle or an indirect force through the shoulder in a posterolateral direction. Most of the posterior dislocations described occurred during sports activities or traffic accidents, whereas anterior dislocations are also reported after incidents with little strain.

The potential for great vessel injury, as well as acute airway obstruction, makes the posterior dislocation a surgical emergency with need for immediate therapy, sometimes even prior to definitive repair.

We report two cases, review the literature and define the anatomy, together with the diagnostic and treatment modalities.

CASE REPORTS

Case 1

A 50-year-old female fell down the stairs and grabbed the bannister with her right hand, with

the forearm in supination. Immediately she felt a sharp pain in her right shoulder. While having breakfast she noticed that swallowing became increasingly difficult, whereupon she went to the emergency department. On physical examination the right shoulder was held forward and the prominence of the medial part of the clavicle was absent. The dislocation was not visible on routine plain radiographs. The special projection, 45° from above, clearly showed the position of the clavicle behind the sternum.

The dislocation was easily reduced under local anesthesia by posterior traction on the arm, while it was held in abduction. The reduction proved to be stable, and a figure-of-eight bandage and an additional sling were applied for 3 weeks. After 5 months the sternoclavicular joint had a normal appearance, the function of the shoulder was optimal and only slight tenderness was noticed on local pressure.

Case 2

A 22-year-old professional sportsman hit his left clavicle against the steering wheel in a car accident. He went to the emergency department, but routine physical examination and plain radiographs revealed no abnormalities. Two days later he returned because of severe pain and dyspnea.

A clinical diagnosis of retrosternal dislocation of the left clavicle was made. Special x ray investigations with the so-called 'cephalic tilt view' were not conclusive and only computed tomo-

Department of Surgery, Academic Hospital, Free University, De Boelelaan 1117, 1081 HV Amsterdam, The Netherlands.

Correspondence and reprints : E. J. Derksen.

graphy showed the posterior dislocation (fig. 1). After closed reduction under general anesthesia proved unsuccessful, open reduction was performed after removal of the disc, and fixation was achieved with two Kirschner wires. After 6 weeks the wires were removed. The patient was able to resume playing volleyball again after 4 months, with full range of motion of his left glenohumeral joint.

ANATOMY (fig. 2)

The sternoclavicular articulation is a diarthrodial joint between the shoulder girdle and the axial skeleton. It provides the clavicle with a wide range of movement in all directions. Anteriorly, the medial part of the sternocleidomastoid muscle covers the joint. The stability of the joint is maintained by the capsule and by the costoclavicular and sternoclavicular ligaments. The sternoclavicular ligaments are firm posteriorly and lax anteriorly, which explains why anterior dislocations are much more common than posterior dislocations. A strong interclavicular ligament runs between the two clavicles, through which forces are transferred to the opposite shoulder. The costoclavicular ligament is a 2-cm broad, loose band connecting the first rib and the clavicle, preventing elevation of the clavicle and opposing the pull of the sternocleidomastoid muscle. The great vessels, trachea, esophagus, brachial plexus and vagus nerves lie posterior to the sternoclavicular joint. The sternal end of the clavicle consists of a secondary ossification center that does not appear before the age of eight years and unites around the 25th year. Therefore most sternoclavicular dislocations before the age of 25 are epiphyseal fractures (Salter Harris type I).

SYMPTOMS AND DIAGNOSIS

The symptoms of a posterior dislocation of the clavicle are the result of stretching and tearing of the capsule and ligaments as well as of pressure upon the structures in the upper mediastinum. Dysphagia, due to pressure on the esophagus, as described in our first patient, has been reported in several patients (18, 22).

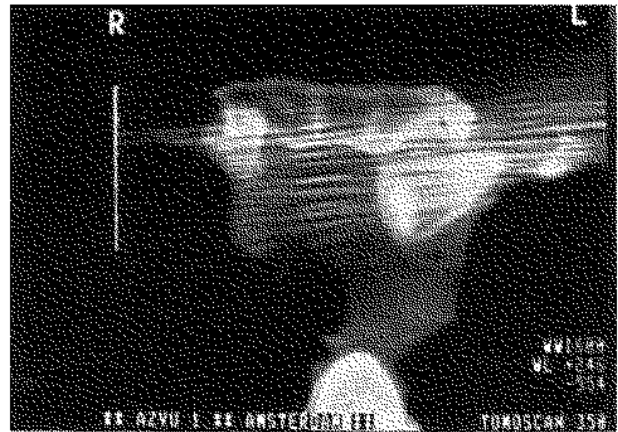


Fig. 1. Computed tomography in patient B.

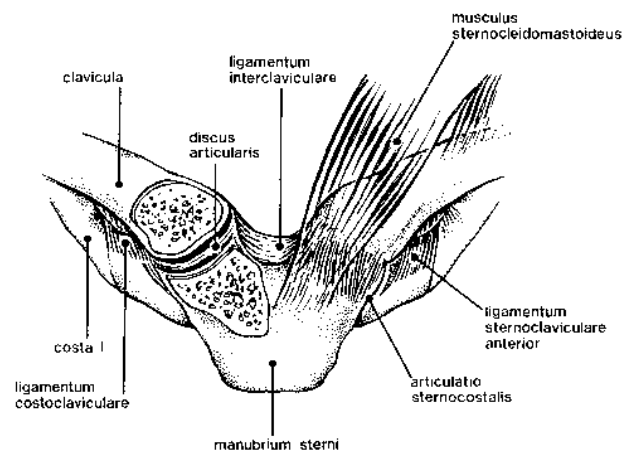


Fig. 2. Anatomy of the sternoclavicular region.

Slight pressure on the trachea will cause dyspnea or stridor. Four cases have been described with a fatal outcome, three after direct rupture of the trachea (10, 17, 20) and in the other as a result of tracheoesophageal fistula diagnosed several weeks after a motorcycle accident (19). Compression of the brachial plexus has been reported with permanent palsy in one case (3) and with complete relief of the symptoms after resection of the medial part of the clavicle in another case (9). Compression of the innominate artery causing a thoracic outlet syndrome was successfully treated with closed reduction (17) in one patient, but in two patients the medial half of the clavicle had to be resected when even an open reduction failed (4, 14). A fourth patient developed cramping

and cyanosis of the forearm after excessive use of the affected limb. No treatment was mentioned (18). Great vessel injuries with profuse blood loss have been reported for the subclavian artery and the internal carotid artery in one patient, the innominate artery in two patients (5) and the innominate vein in another patient (22). A very rare case was mentioned in which a patient noticed a voice alteration due to compression of the recurrent laryngeal nerve (6). Pain and discomfort with alteration in anatomical landmarks are suspicious symptoms for this potentially serious injury.

Radiographs and tomograms do not always reveal a posterior sternoclavicular dislocation (21). Diagnostic certainty is enhanced by the cephalic tilt view radiographs in which the beam is tilted 45° from the frontal plane (8).

We prefer to use computed tomography in order to make the diagnosis with certainty and to assess the hazardous mediastinal problems as well.

DISCUSSION

Retrosternal dislocation of the clavicle is a serious traumatic injury because of the possible complications. Surgical treatment is therefore mandatory. Local pain in the region of the sternoclavicular joint after trauma should indicate the diagnosis. Radiographic investigation demands special projections, with a superior result for the CT-scan where the concomitant mediastinal involvement can be seen as well (13).

After exclusion of great vessel injury, closed reduction is the primary choice of treatment (3, 11), as was successfully carried out in our first patient. If this reduction proves to be stable, a figure-of-eight bandage with an additional sling is recommended for at least 3 weeks. It is to be expected that sternoclavicular epiphyseal fractures will heal more rapidly than pure dislocations. In cases of immediate or late dislocation, internal fixation is warranted after open reduction and removal of the disc, as described in our second patient. Fixation is usually achieved with two Kirschner wires and suture of the ruptured ligaments. It is essential that the wires are bent and

are removed after healing because of the potential risk of migration. Perforation of the pulmonary artery (12, 15) and even aortic perforation followed by fatal cardiac tamponade, due to migration of Kirschner wires has been reported (1, 6, 7).

Some authors claim good results using tendon grafts or fascial loops, especially in case of late dislocation (2, 16). Poor results, with pain and weakness of the affected arm, are reported in most patients treated by resection of the medial end of the clavicle; this is not recommended, unless the indication is a thoracic outlet syndrome after a retrosternal clavicular dislocation.

REFERENCES

1. Clark R. L., Milgram J. W., Yawn D. H. Fatal aortic perforation and cardiac tamponade due to a Kirschner wire migration from the right sternoclavicular joint. *South Med. J.*, 1974, 67, 316-318.
2. Eskola A., Vainionpaa S., Vastamaki M., Slati P., Rokkanen P. Operation for old sternoclavicular dislocation. *J. Bone Joint Surg.*, 1989, 71-B, 63-65.
3. Ferry A. M., Rook F. W., Masterson J. H. Retrosternal dislocation of the clavicle. *J. Bone Joint Surg.*, 1957, 39-A, 905-910.
4. Gangahar D. M., Flogaites T. Retrosternal dislocation of the clavicle producing thoracic outlet syndrome. *J. Trauma*, 1978, 18, 369-372.
5. Gardner M. A. H., Bidstrup B. P. Intrathoracic great vessel injury resulting from blunt chest trauma associated with posterior dislocation of the sternoclavicular joint. *Aust. N. Z. J. Surg.*, 1983, 53, 427-430.
6. Gaston S. R. Discussion of Nettles J. L., Linscheid R. L. Sternoclavicular dislocations. *J. Trauma*, 1968, 8, 158-164.
7. Gerlach D., Wemhoner S. R., Ogbuihi S. Über zwei Fälle von Herzbeutel-tamponade infolge Migration von Spickdrähten aus dem Sternoklavikulargelenk. *Z. Rechtsmed.*, 1984, 93, 53-60.
8. Heinig C. F. Retrosternal dislocations of the clavicle: early recognition, x ray diagnosis and management. *J. Bone Joint Surg.*, 1968, 50-A, 830.
9. Howard F. M., Shafer S. J. Injuries to the clavicle with neurovascular complications. *J. Bone Joint Surg.*, 1965, 47-A, 1335-1346.
10. Kennedy J. C. Retrosternal dislocation of the clavicle. *J. Bone Joint Surg.*, 1949, 31-B, 74-75.
11. Leighton R. K., Buhr A. J., Sinclair A. M. Posterior sternoclavicular dislocations. *Can. J. Surg.*, 1986, 29 (2), 104-106.
12. Leonard J. W., Gifford R. W. Migration of a Kirschner wire from the clavicle into the pulmonary artery. *Am. J. Cardiol.*, 1965, 16, 598-600.

13. Levinsohn E. M., Bunnell W. P., Yuan H. A. Computed tomography in the diagnosis of dislocations of the sternoclavicular joint. *Clin. Orthop.*, 1979, 140, 12-16.
14. Mehta J. C., Sachdev A., Collins J. J. Retrosternal dislocations of the clavicle. *Injury*, 1973, 5, 79-83.
15. Pate J. W., Wilhite J. L. Migration of a foreign body from the sternoclavicular joint to the heart : a case report. *Am. J. Surg.*, 1969, 35, 448-449.
16. Pfister U., Weller S. Die Luxation im Sternoklavikulargelenk. *Unfallchir.*, 1982, 8, 81-87.
17. Schlegel A. Ein seltener Fall von Luxatio claviculae retrosternalis. *München. Med. Wchnschr.*, 1922, 69, 511.
18. Stankler L. Posterior dislocation of the clavicle. A report of two cases. *Br. J. Surg.*, 1962, 50, 164-168.
19. Wasylenko M. J., Busse E. F. Posterior dislocation of the clavicle causing fatal tracheoesophageal fistula. *Can. J. Surg.*, 1981, 24, 626-627.
20. Wehner. Zur konservativen Behandlung der retrosternalen Klavikularluxation. *Z. Orthop. Chir.*, 1931, 55, 409.
21. Winter J., Sterner S., Maurer D., Varecka T., Zarzycki M. Retrosternal epiphysial disruption of medial clavicle : case and review in children. *J. Emerg. Med.*, 1989, 7, 9-13.
22. Worman L. W., Leagus C. Intrathoracic injury following retrosternal dislocations of the clavicle. *J. Trauma*, 1967, 7, 416-423.

SAMENVATTING

E. J. DERKSEN, J. A. EYKELHOFF, K. E. SCHENK, P. PATKA en H. J. TH. M. HAARMAN. Retrosternale dislokatie van de clavicula.

Retrosternale dislokatie van de clavicula is een zelden voorkomende aandoening, die echter levensbedreigend

kan zijn, gezien de potentiële problemen in het mediastinum. Computer tomografisch onderzoek is dan ook geïndiceerd in voorkomende gevallen. Onbloedige repositie, is de eerste behandelingskeus in de acute situatie. Indien dit geen succes oplevert en in langer bestaande dislokaties, is een bloedige repositie met fixatie vereist. De literatuur over dit onderwerp wordt besproken, voorafgegaan door twee ziektegeschiedenissen.

RÉSUMÉ

E. J. DERKSEN, J. A. EYKELHOFF, K. E. SCHENK, P. PATKA et H. J. TH. M. HAARMAN. Luxation rétrosternale de la clavicule.

La luxation rétrosternale de la clavicule est une affection rare. Les problèmes médiastinaux potentiels peuvent cependant entraîner des complications vitales d'où la nécessité impérieuse d'un examen tomographique. La réduction non sanglante est la première mesure indiquée en urgence. En cas d'insuccès ou en cas de diagnostic tardif, la réduction sanglante, stabilisée par une fixation, est indiquée. Les auteurs présentent 2 cas et renvoient la littérature.