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CASE REPORTS

Traumatic retrosternal dislocation of the sternoclavicular joint of a young adult with generalised ligamentous laxity

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Introduction

In a person with generalised ligamentous laxity, indirect trauma to the shoulder can easily result in dislocation of the sternoclavicular joint. Retrosternal dislocation of the joint is rare. Persistent instability of the joint despite closed reduction necessitates open reduction and stabilisation.

Case report

A 20-year-old motorcyclist was admitted to our hospital after being involved in a road traffic accident in which he had fallen off his motorcycle and landed on his right shoulder. He complained of pain and swelling over the medial end of the right clavicle. Clinical examination revealed marked swelling and tenderness at the right sternoclavicular joint, with loss of the normal prominence of the medial end of the clavicle. There was no associated respiratory distress, dysphagia, vascular compromise or other injury. Examination of the contralateral sternoclavicular joint indicated significant anteroposterior laxity with no tenderness. The young man was found to have generalised ligamentous laxity, with a Beighton score of 7. Initial radiographs of the sternoclavicular joint were inconclusive. Hence CT was performed, which confirmed the presence of a retrosternal dislocation of the right sternoclavicular joint (Fig. 1). A CT angiogram showed no evidence of vascular injury, although the medial end of the clavicle was seen to be lying adjacent to the right brachiocephalic vein (Fig. 2).

Closed reduction was performed under general anaesthesia, using traction to the right upper limb with a sandbag in the interscapular region. The sternoclavicular joint appeared to be reduced on the intraoperative image intensifier. However, postoperative CT indicated recurrent posterior subluxation of the medial end of the clavicle (Fig. 3). Hence, open reduction and stabilisation were performed as follows.

Through a transverse incision over the medial clavicle, the sternoclavicular joint was exposed. The intra-articular disc was found intact and was preserved. The medial end of the clavicle was reduced with the aid of traction and a towel clip. The inferior border of the first rib was then dissected and exposed, with preservation of the neurovascular bundle. This was carried out with the assistance of a thoracic surgeon. Two loops of non-absorbable polyester fibre Mersilene™ (Ethicon, Johnson & Johnson) tapes were tied from the medial end of the clavicle to first rib in order to secure the reduction (Figs. 4 and 5). The patient was treated with a clavicular brace for 4 weeks. The Rockwood scoring system[6] showed a good functional outcome with no instability at 3 months postoperatively.

Discussion

The sternoclavicular joint is a saddle-type joint that normally exhibits minimal translation in the anteroposterior plane.

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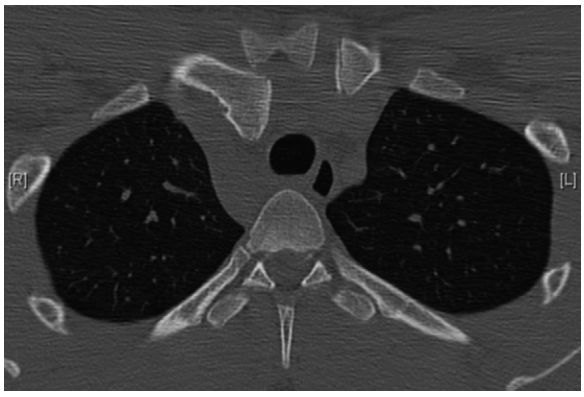

Figure 1 Axial CT demonstrates retrosternal dislocation of the right sternoclavicular joint.

Figure 2 CT angiogram reveals the close proximity of the medial end of the clavicle to the right brachiocephalic vein.

This anteroposterior stability is provided by the joint capsule and supporting ligaments. The anterior and posterior sternoclavicular ligaments are thickenings of the joint capsule, and anchor the medial end of the clavicle to the sternum. The interclavicular ligament connects the superomedial ends of both clavicles to the sternum, reinforcing the capsule superiorly. The costoclavicular ligament is extra-articular, and anchors the medial clavicular metaphysis to the first rib. This helps to restrict motion of the shoulder girdle at the extremes of elevation, protraction and retraction.

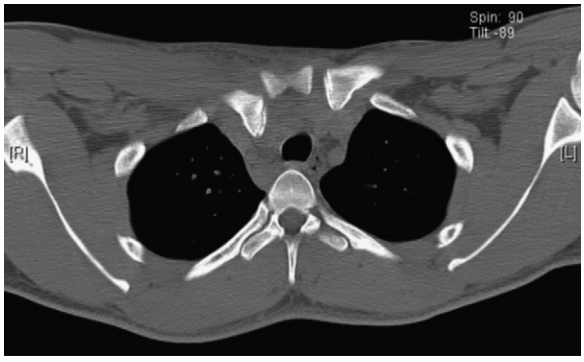

Figure 3 CT after attempted closed reduction shows recurrent subluxation of the medial end of the clavicle.

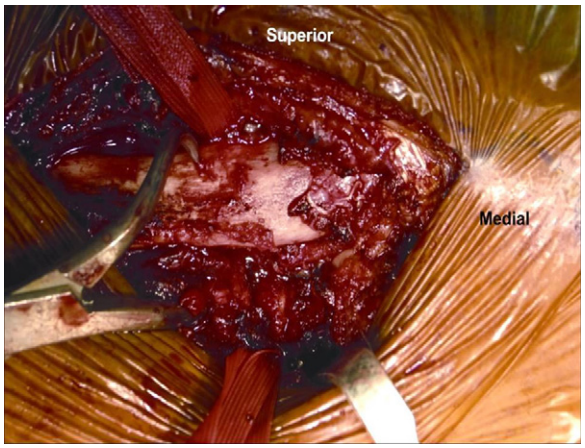

Figure 4 Intraoperative photograph of the reduction of the sternoclavicular joint and positioning of Mersilene tapes around the medial end of the clavicle and first rib.

A significant direct or indirect force to the shoulder region can cause a traumatic dislocation of the sternoclavicular joint. Posterior dislocation of the sternoclavicular joint is rare; the ratio of posterior to anterior sternoclavicular joint dislocation approximates to 1:9. This may be attributed to greater stiffness of the posterior sternoclavicular ligaments compared with the anterior ligaments.[2]

Sternoclavicular joint dislocations may result from direct trauma to the anteromedial aspect of the clavicle, driving it backwards to cause a posterior dislocation. More commonly, dislocations arise from an indirect force applied to the anterolateral or posterolateral shoulder, which compresses the clavicle toward the sternum. The direction in which the shoulder is driven determines the type of dislocation. When overwhelming compression protracts the shoulder, the force directed towards the clavicle produces a retrosternal dislocation of the sternoclavicular joint. If the shoulder is compressed and retracted, anterior dislocation results. Commonly, the sternoclavicular and costoclavicular ligaments rupture to permit the clavicle to completely dislocate from the manubrium. We infer that the underlying laxity of the posterior sternoclavicular ligaments of our patient predisposed him to the development of this injury.

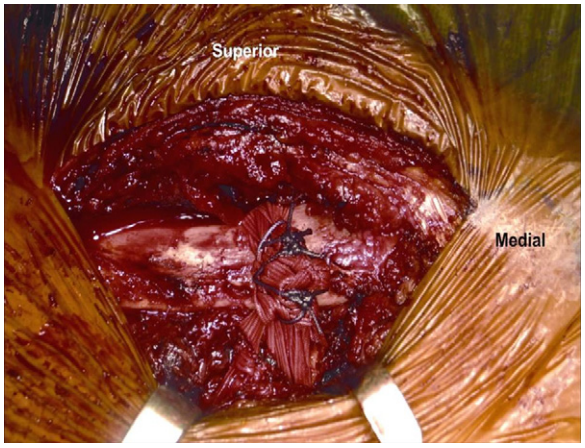

Figure 5 Completed stabilisation of the sternoclavicular joint.

Radiographic evaluation of the medial clavicle and sternoclavicular joint is difficult because orthogonal projections cannot be obtained without artefacts from adjacent or overlying osseous structures. This may be further complicated by the presence of an open medial clavicular physis in a skeletally immature person (up to 25 years of age). Hence in a young adult, fracture of the clavicular epiphyseal plate with posterior displacement of the metaphysis needs to be excluded.[3] At present, axial CT is the most reliable and informative radiographic technique in the assessment of these injuries.[8]

The region directly posterior to the sternoclavicular joint contains several important structures. Within the confines of the thoracic inlet are the trachea, oesophagus, lungs and great vessels. The medial end of the clavicle is relatively large in comparison with the size of the thoracic inlet. Hence prompt reduction of a retrosternal dislocation of the clavicle is important. Thoracic outlet syndrome has been documented, and dysphagia is the most common reported mediastinal symptom due to compression. In the event that concomitant injury to structures of the superior mediastinum is suspected, other imaging studies such as CT angiography or MRI would be indicated.

The standard method of closed reduction is first attempted usually under general anaesthesia. Most sternoclavicular joint dislocations can be reduced using closed techniques within 48 h of injury. A bolster thick enough to retract the shoulders off the table is placed between the scapulae, and the clavicle is levered anteriorly and laterally from the manubrium to restore the normal sternoacromial distance. Lateral traction is then applied to the abducted arm while percutaneous traction with a towel clip is applied if necessary to the medial clavicle. Alternative techniques of closed reduction include caudal traction on the arm to lever the medial end of the clavicle superiorly, followed by shoulder retraction as proposed by Buckerfield and Castle.[1] The intraoperative use of ultrasound as an imaging method of assessing adequacy of reduction has also been demonstrated.[7]

In our case, although initial reduction was obtained with closed techniques, dislocation recurred postoperatively. In this instance, open reduction was indicated in view of the dangers of leaving the joint retrosternally dislocated. Historically, internal fixation using Kirschner wires, Steinmann pins or flexible steel wires were advocated.[4] However, enthusiasm for this type of fixation has diminished over time because of reports of hardware failure and migration, with catastrophic complications.[5] Open reduction and surgical stabilisation methods include repair of the sternoclavicular and costoclavicular ligaments, as well as ligament reconstruction using autologous tendon or fascial grafts. In view of the inherent laxity of the ligaments in our patient, we decided that a double-loop synthetic tape stabilisation to the first rib would be the ideal choice. This produced good functional results.

Conclusion

This is a rare case of retrosternal dislocation of the sternoclavicular joint, resulting from indirect trauma experienced by a young man with underlying ligamentous laxity. Despite early closed reduction, persistent instability of the joint rendered open reduction and stabilisation necessary. This case suggests that open reduction and stabilisation should be considered at the outset if these injuries occur in the context of underlying generalised ligamentous laxity.

References

1. Buckerfield CT, Castle ME. Acute traumatic retrosternal dislocation of the clavicle. J Bone Joint Surg Am 1984;66:379—85.
2. Dennis MG, Kummer FJ, Zuckerman JD. Dislocations of the sternoclavicular joint. Bull Hosp Jt Dis 2000;59:153—7.
3. Goldfarb CA, Bassett GS, Sullivan S, et al. Retrosternal displacement after physeal fracture of the medial clavicle in children. J Bone Joint Surg Br 2001;83:1168—72.
4. Lunseth PA, Chapman KW, Frankel VH. Surgical treatment of chronic dislocation of the sternoclavicular joint. J Bone Joint Surg Br 1975;57:193—6.
5. Lyons FA, Rockwood CA. Migration of pins used in operations on the shoulder. J Bone Joint Surg Am 1990;72:1262—7.
6. Rockwood CA, Groh GI, Wirth MA, et al. Resection arthroplasty of the sternoclavicular joint. J Bone Joint Surg Am 1997;79:387—93.
7. Siddiqui AA, Turner SM. Posterior sternoclavicular joint dislocation: the value of intra-operative ultrasound. Injury 2003;34:448—53.
8. Waters PM, Bae DS, Kadiyala RK. Short-term outcomes after surgical treatment of traumatic posterior sternoclavicular fracture-dislocations in children and adolescents. J Pediatr Orthop 2003;23:464—9.