RETROSTERNAL DISLOCATION OF THE CLAVICLE

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Retrosternal dislocation of the clavicle is uncommon, and there appear to be only forty-one cases recorded. Most authors have stressed the difficulty in confirming the diagnosis with routine radiographs.

It is proposed to discuss here the use of tomography in the diagnosis of this condition, and its treatment by open reduction, which has been used in three patients.

CASE REPORTS

Case 1—A labourer aged twenty-two injured his right shoulder in a motor car accident. He complained of pain over the medial end of the clavicle, and although no fracture of the clavicle was seen on the radiograph he was treated with a figure-of-eight bandage. The next day he was in severe pain, which was centred over the right sternoclavicular joint and extended into the neck and right shoulder. He held his neck tilted to the right.

There was an extremely tender swelling of the right sternoclavicular joint, and the medial end of the clavicle could not be felt. There was engorgement of the superficial veins of the right side of the chest and of the right arm, which was swollen. The radial pulse was normal and there were no neurological changes present.

Antero-posterior, lateral and oblique radiographs failed to give conclusive evidence of a posterior dislocation of the right sternoclavicular joint. Tomographs, however, showed that the medial end of the clavicle was displaced one inch postero-medially behind the sternum (Figs. 1 and 2).

Manipulation, by forcibly pulling on the abducted and extended arm with the proximal end of the clavicle held between the fingers, failed to reduce the dislocation but considerably relieved the symptoms.

Open reduction was done through a transverse incision. The anterior capsule was haemorrhagic and swollen; when it was incised the clavicle was found to have passed through a hole in the posterior capsule to lie behind the sternum close to the innominate vessels. There was a complete tear of both the sternoclavicular and costoclavicular ligaments. The angle of the sternoclavicular joint was about 20 to 25 degrees from the sagittal plane. The articular disc was still attached to the manubrium antero-inferiorly. Reduction, done with bone forceps after manipulation had failed, appeared to be stable. Two sutures, passed round the medial end of the clavicle, were used to tie it to the meniscus and the anterior capsule. A figure-of-eight bandage was applied and the patient lay for three days with a sandbag between his scapulae. A tomograph confirmed that the dislocation had been reduced (Fig. 3).

The bandage was removed after four weeks, and the patient began active movements. Three months later he had returned to work and his right shoulder had a full range of painless movement and the sternoclavicular joint was stable. After a further three months he had normal function of the sternoclavicular joint.

Case 2—A jockey aged twenty-three injured his left shoulder when he fell off a horse on to the back of his left shoulder.

When seen two hours later he was complaining of severe pain behind the left sternoclavicular joint with a feeling of pressure on his trachea which interfered with breathing and swallowing. The physical signs were essentially the same as in Case 1 and tomographs confirmed the diagnosis (Fig. 4).

Again manipulation failed, but gave symptomatic relief. At operation the findings were similar to those in Case 1, but the pulsating innominate vessels could be seen through the large hole in the posterior capsule. The angle of the sternoclavicular joint was a little greater than in Case 1. Considerable force was necessary to reduce the clavicle through the hole in the capsule. Despite this the reduction was very unstable until it had been sutured in the same way as Case 1. Similar treatment was given after operation and three months later the patient had full function in the shoulder.

Case 3—A man aged fifty-six fell ten feet from a ladder, falling on the back of his right shoulder. He was seen at the Royal Salop Infirmary within two hours complaining of intense pain over the
Case 1. Figure 1—A tomograph at 6½ inches shows the sternum and left clavicle clearly in focus but only a blurred outline of the right clavicle. Figure 2—At 5½ inches a tomograph shows the right clavicle in focus but the left clavicle and the manubrium out of focus. Figure 3—After operation a tomograph at 5½ inches shows both clavicles in focus.
Case 2—Similar findings to Case 1 were present. The dislocated head of the left clavicle is blurred, but was clearly in focus in another tomograph focused 1 inch behind the manubrium.

Case 3. Figure 5—Tomograph at 6 inches. The left sternoclavicular joint is shown in focus but the right is blurred. Figure 6—Tomograph at 5 inches. The medial end of the right clavicle is in focus. Figure 7—After operative reduction. Tomograph at 6 inches now shows the medial ends of both clavicles in focus.
right sternoclavicular joint, and pain on swallowing. There were swelling and tenderness over the right sternoclavicular joint, and the medial end of the right clavicle was thought to be depressed, though this was not as obvious as in Case 1. There was an abrasion over the lateral aspect of the spine of the right scapula.

Tomographs showed without any doubt that the medial end of the right clavicle was placed one inch posterior to the sternum (Figs. 5 and 6).

Manipulation having failed to reduce the displacement, open reduction was performed immediately. There was considerable oedema of, and haemorrhage about, the anterior capsule of the joint. This was incised in the line of the incision and showed the medial end of the clavicle to be displaced posteriorly. There was a complete tear of both the sternoclavicular and costoclavicular ligaments. The posterior capsule had been completely torn from its attachment to the sternum, taking with it more than half the meniscus of the joint. Contrary to what was found in the previous two cases, the angle of the sternoclavicular joint in this case was within normal limits. With traction on the abducted limb the clavicle could easily be replaced into its normal position but was found to be unstable. It was therefore supported by two mattress sutures of silk (Fig. 7).

**DISCUSSION**

Retrosternal dislocation of the clavicle can occur from direct or indirect violence but the latter is the most common and was probably the cause in two of our patients, in the other the cause could not be ascertained. From the literature anterior dislocation of the clavicle seems to be four to twenty times more common than a posterior dislocation.

Our patients were quite typical in having extreme pain, radiating upwards and laterally from the sternoclavicular joint. The relief of pain which they obtained after attempted closed reduction of the dislocation and by lying with a sandbag between the scapulae was striking and was a worthwhile emergency measure.

The swelling over the joint makes diagnosis difficult, for after a few hours the characteristic depression over the medial end of the clavicle is obscured. Respiratory distress, dysphagia, subcutaneous emphysema, death following damage to the trachea and great vessels, and double luxation of the clavicle have all been reported (Beckman 1923). Our patients had pressure on the superficial veins and trachea. It is interesting that in 1824 Astley Cooper said that pressure on the oesophagus was likely but he felt that elasticity of the trachea would prevent it being compressed. Cooper in 1930—according to von Stapelohr (1932)—reported symptoms of tracheal pressure in a patient treated by resecting the medial end of the clavicle.

Although the diagnosis of retrosternal dislocation of the clavicle can be made on clinical grounds, confirmation by routine radiography is not easy. Tomography, however, provides a simple and accurate method of showing the dislocation, as was first suggested by Kennedy in 1949 and was used by Holmdahl in 1954.

Tomographs of the normal individual lying supine show that the medial ends of both clavicles are in focus less than half an inch posterior to the manubrium, to which they bear an identical relationship. When a posterior dislocation is present the medial end of the clavicle is in focus in a plane posterior to the manubrium.

Gunther (1949); Butterworth and Kirk (1952); Stein (1957); and Ferry, Rook and Masterson (1957) were in favour of conservative treatment, but Greenlee (1944), Kennedy (1949), Holmdahl (1954), and Stein (1957) in one of his patients, advocated operation; arthrodesis, removal of the whole or of the medial end of the clavicle and repair of the damaged tissues have all been done. Kennedy (1949) and Holmdahl (1954) advised open reduction to relieve the pressure on the great vessels and other structures and to obtain stable reduction, using as little internal fixation as possible to allow the joint to return to full function. Kennedy also found that the articular disc remained attached to the manubrium and that the sternoclavicular and costoclavicular ligaments were torn, as was the case in our patients.

**EXPERIMENTAL FINDINGS**

It was not possible to produce an indirect force sufficient to produce this dislocation in cadavera. However, from experiments done during dissection of the region concerned it
The following diagram illustrates the normal and abnormal angles of the sternoclavicular joint:

**NORMAL**

- **SAGITTAL PLANE**
  - **PLANE OF THE JOINT**
  - O° - 5°

**ABNORMAL**

- **SAGITTAL PLANE**
  - **PLANE OF THE JOINT**
  - 20° - 25°

**FIG. 8**

A diagram to show the normal angle of the sternoclavicular joint above, and, below, the angle in two of the patients described.

**SUMMARY**

1. The symptoms, signs and treatment of three patients with a posterior dislocation of the clavicle are described.
2. The value of tomography in confirming the diagnosis is outlined.
3. Certain experimental work has been done in an attempt to determine the factors necessary to produce this dislocation.

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**REFERENCES**


