Posterior dislocation of the sternoclavicular joint

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Posterior dislocation of the sternoclavicular joint is a rare but serious and life-threatening injury. Case reports describing injury to mediastinal structures including the trachea, esophagus, and the great vessels from posterior displacement of the medial clavicle (1-6) have been discussed in the literature. It is important that radiologists are aware of the limitation of plain radiographs in detecting posterior SCJ dislocation and that they carefully evaluate the soft tissues with CT imaging to exclude mediastinal injury.

Case report

An 18-year-old male presented to his family physician approximately 45 minutes after sustaining an injury to his right shoulder. He was tackled by another player while playing football. He noted a "pop" at his right sternoclavicular joint (SCJ), and resultant difficulty moving the right arm secondary to pain and a reproducible popping sensation of the clavicle. He denied numbness or tingling, shortness of breath, neck pain, jaw pain, or facial swelling, but noted mild difficulty swallowing. The patient's past medical history was unremarkable.

On physical examination, there was asymmetric swelling at the right SCJ. His skin was intact. Range of motion and strength was limited by pain. Tenderness to palpation was present at the right SCJ, and shoulder motion produced a palpable clavicular "clunk." The neurovascular exam of the right upper extremity was unremarkable. Radiographs revealed an asymmetry of the SCJ joints (Fig. 1). The patient's arm was placed in a sling, and an emergent CT scan was then obtained (Figs. 2 and 3).

Figure 1. X-ray of bilateral SC joints. There is asymmetric alignment of the SCJs with superior displacement of the right clavicle, superimposed on the third costovertebral joint.

Figure 2. Axial CT scan of posterior fracture dislocation of right SC joint, demonstrating relative posterior displacement of the right clavicle. There is a small bony fragment (the ossifying epiphysis) on the anterior aspect of the distal right clavicle (arrow). The vessels are not fully evaluated due to lack of intravascular contrast; however, the medial clavicle is immediately anterior to the SVC. There is no large hematoma or pneumomediastinum.
The orthopaedic team on call was notified. Given the patient's stable examination, he was discharged home with a referral to the shoulder and elbow clinic for management. He was seen the following day in the shoulder clinic. His exam was unchanged. His diagnosis was posterior sternoclavicular fracture-dislocation, with fracture through the medial clavicular physis (Salter-Harris I). Risks and benefits of surgical reduction and stabilization were discussed with the patient and his father. They elected to proceed with surgery. Arrangements were made with a vascular surgeon for assistance if needed. The patient was taken to the operating room one week after injury for open reduction and internal fixation.

Procedure

Following routine preoperative procedure, the patient was carefully positioned in the supine attitude with a rolled towel between the shoulder blades.

Under general anesthesia, and after administration of 2 grams of Ancef, a 5-cm necklace incision was made overlaying the medial clavicle onto the manubrium. Meticulous dissection and hemostasis then followed to expose the periosseum on the clavicle. The two heads of the sternocleidomastoid were identified and protected throughout the case. The epiphysis was noted to be still attached to the articular disk and in appropriate orientation with the manubrium; however, the medial clavicle had dislocated posteriorly through the physis (Figs 4, 5).

Following debridement, the clavicle wasatraumatically reduced using a point-to-point clamp. The medial clavicle was then sewn back to the epiphysis with transosseous and transepiphyseal #2 FiberWire sutures (Arthrex, Naples, FL), with excellent stability achieved to the repair (Figs 6, 7). The periosteum was oversewn, and this was reefed back to the surrounding sternoclavicular ligament and articular disk medially. Excellent fixation was achieved. The shoulder was taken through a full range of motion, and no motion was appreciated at the fracture site. The wound was copiously irrigated and closed in layers. The arm was put into an UltraSling. The patient was observed overnight and discharged one day after surgery.

Postoperative management

The right shoulder was kept immobilized in a sling for four weeks to allow for fracture healing. Elbow and wrist range-of-motion and grip exercises for the hand were started immediately after surgery without restriction. At his two-week postoperative followup, the patient reported resolution of his dysphagia and was relatively painfree. His incision was healing appropriately, without evidence of infection or complication. He was instructed to continue with sling wear, removing it frequently for Codman, elbow, wrist, and hand exercises. He was not allowed to participate in contact sports for 6 months. A postoperative CT scan demonstrated near-anatomic reduction of the SCJ fracture-dislocation (Figs 8, 9).

Discussion

Posterior dislocation of the sternoclavicular joint is a rare but potentially life-threatening injury. Case reports have described injury to mediastinal structures including the trachea, esophagus, and the great vessels from posterior displacement of the medial clavicle (1-6). Due to the rarity of this injury, long-term studies with large numbers are not available.

Treatment of the dislocation has changed over the years based on the complications seen with fixation techniques. Drs. Wirth and Rockwood reported that “By 1992, there had been reports of seven deaths and three near-deaths due to complications as a result of transfixing the sternoclavicular joint with Kirschner wires or Steinmann pins” (7). Other methods have been tried to stabilize the joint without the same associated complications. Due to the lack of significant soft-tissue coverage over the medial clavicles and superior sternum, plates and screws are consistently prominent, which can lead to associated wound breakdown or necessi-
tate further surgery to remove painful hardware. Soft-tissue repair or reconstruction of the injured ligaments allows lower-profile fixation (8, 10).

The clavicle is the first long bone to ossify. However, the medial clavicular physis is the last to close. It does not ossify until the 18th to 20th year, and it fuses with the shaft of the clavicle around the 23rd to 25th year (7, 9). This is important because injuries in this young and highly athletic group may not be limited to the classic posterior sternoclavicular dislocation, but instead may be displaced physeal fractures.

While closed reduction of sternoclavicular dislocations has proven to be a surgical option in the acute setting, this method is far less effective in cases of delayed presentation or with physeal fractures (10).

Though it was not true in our case, conventional radiographic diagnosis of the SC joint dislocation may be difficult due to radiographic-anatomic superimposition, which precludes ideal imaging. Special radiographic views (Rockwood, Hobb, Kattan, and Heinig) have been recommended by some authors (11), but are of limited utility. On the straight AP view, dislocation of the SC joint is suspected when a difference (measuring greater than 50% of the width of the clavicular heads) in relative craniocaudal position of the clavicles is present.
Numerous articles have stated the advantages of evaluating the medial clavicle and the SC joint by CT scan. Cross-sectional imaging (with IV contrast as necessary) is often the imaging study of choice, not only to show bony detail, displacement of the fracture, or dislocation, but also to evaluate underlying soft-tissue structures (7, 10, 12). Posterior dislocation of the SC joint is a more serious injury that may compromise structures of the thoracic outlet, anterior and posterior mediastinal space (esophagus and trachea), nerves, and the great vessels (innominate vein, superior vena cava, and aorta) (11, 13). On cross-sectional images, the relative position of mediastinal structures (specifically the vessels) to the fracture fragments should be noted. Evaluation of the fracture with CT scan and 3D reconstructions was particularly informative in our case, with identification of the medial clavicular epiphysis both before and after surgery.

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