Missed Medial Clavicular Physeal Fracture and Posterior Dislocation Complicated by a Brachiocephalic Artery Pseudoaneurysm

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Sternoclavicular joint dislocation (SCJD) is an uncommon injury, and younger, active patients tend to be the most affected. The injury is typically due to high-energy trauma through direct impact on the medial clavicle, or sports injuries, typically through an indirect mechanism of lateral compression causing the shoulder to roll forward. In younger patients, the injury is often a physeal separation rather than a true dislocation. More commonly, the dislocation is anterior.

Posterior dislocations are often missed with plain radiographs. Therefore, when we suspect potential injury in this location, it is often necessary to get 3D imaging such as CT, or a CT with angiography to evaluate the underlying vascular pathology given proximity to the mediastinal vasculature.

After diagnosis there are several different management options. Closed reduction can be attempted in the ER with sedation vs the OR under GA. However, open reduction produces more reliable results with higher rates of joint stability and lower rates of recurrent displacement. There are many techniques in the literature some of which include braided composite sutures, suture anchors, plates, and allograft tendon reconstructions.

A systematic review by Thut et al. Reviewed 6 clinical reports and 2 biomechanical studies. They looked at techniques including treating the injury nonoperatively in a sling, a joint capsule repair, and three different reconstruction techniques. One conclusion from this study was that there was an advantageous outcome with a tendon allograft that is formed into a figure-of-eight pattern through the clavicle and manubrium.

Our case is a 17-year-old male who developed right shoulder pain after he was checked during an ice hockey game. X-rays done at an urgent care were interpreted as negative. His pain slowly improved, and he returned to sports within 14 days of the injury.

Unfortunately, the patient soon developed lightheadedness, a left facial droop, and difficulty with gripping his hockey stick in his left hand after his return to hockey. He presented to the UMass emergency room with an obvious left-sided facial droop, 4+/5 left upper motor strength, a GCS of 15 and an NIHSS of 2. A code stroke was activated, and the patient underwent a CTA of the head and neck.

The left image is a CT angiogram of the head and neck in the coronal view. An 18 mm pseudoaneurysm can be identified at the junction of the brachiocephalic and right common carotid arteries. The right view is a 3D reconstruction of the vessels showing a filling defect at the same location.

The patient went urgently to the OR with the vascular and cardiothoracic team for a sternotomy, debridement, embolectomy, and brachiocephalic artery repair. The radiologist's formal read post-operatively confirmed a posterior sternoclavicular joint dislocation.

Postoperatively, the patient was neurovascularly intact with complete resolution of his neurological symptoms. The cardiothoracic team and our Orthopedic team decided to plan for delayed definitive treatment of the posterior sternoclavicular joint dislocation for 6-weeks after his index surgery.

In the OR, the prior incision was extended proximally and dissection down to the clavicle revealed it to be displaced posteriorly. The manubrium's articular surface was first identified by dissection through scarred SCJ capsule. The medial articular surface of the clavicle was identified within the SCJ capsule, demonstrating a Salter Harris Type 1 clavicle fracture. A 2.8 mm suture anchor was placed into the medial clavicle to reduce the fractured articular surface fragment. 2 holes were drilled into the articular surface of the clavicle. The suture was threaded through the holes and the articular surface was tied down.

To address the dislocation, a tibialis anterior tendon allograft was used with plans for a figure of 8 configuration as depicted in the top right. A 4 mm drill bit was used to make a transverse hole across the clavicle from superior to inferior. Using a shuttle stitch, the tendon was passed through the created clavicular tunnel from superior to inferior. Then, two oblique drill holes were made in the manubrium parallel to the articular surface. In a similar fashion, the tendon was passed through the manubrial tunnel. To create the figure-of-eight, the leading edge of the tendon exiting the manubrium inferiorly was passed deep to the oblique portion of the graft and approximated to the original superior clavicular limb of the graft. The graft ends were sutured together. The wound was irrigated and closed. Pulse and capillary refill were checked and noted to be intact.

Postoperatively the patient had full and painless range of motion. He was discharged on postop day 1. He was able to return to non-contact sports at 3 months and full contact sports after 6 months.

In conclusion, a SCJD is a commonly missed diagnosis, and we advise a low threshold to obtain advanced imaging. A cardiothoracic or vascular surgeon should be on stand-by during operative management given the proximity to major vasculature. Studies support that allograft reconstruction, particularly in a figure of 8 configuration, is biomechanically superior to primary repair or instrumented fixation. It's important to pay attention to proper tensioning of the graft and

suture reinforcement. Oblique drilling can help avoid injury to vasculature. Our patient demonstrated excellent results with this technique.