JSES Open Access 2 (2018) 100–103

Contents lists available at ScienceDirect

JSES Open Access

journal homepage: www.elsevier.com/locate/jses

Proximal humeral fracture-dislocation with axillary artery involvement treated with reverse shoulder arthroplasty

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ARTICLE INFO

Keywords:
Proximal
Humerus
Dislocation
Fracture
Axillary
Artery
Reverse
Arthroplasty

Proximal humeral fractures are extremely common fracture patterns in the elderly population.[1,2,4,6,7] These fractures typically occur without any associated neurologic or vascular injuries. A smaller subset has been reported to be accompanied by brachial neuropathy, which usually resolves with time. Axillary artery injury has been reported but is a much rarer event. Axillary artery injuries typically result from medial displacement of the proximal humeral shaft at the time of injury. We report a patient with a proximal humeral fracture-dislocation that involved a near axillary artery injury and an axillary nerve injury. The effects on subsequent reverse shoulder arthroplasty are detailed.

Case report

A 91-year-old man presented to the emergency department after a fall onto an outstretched hand. He was diagnosed with a proximal humeral fracture-dislocation. An attempt at reduction was performed in the emergency department. Orthopedics was consulted to participate in his care. The patient was seen in his hospital room, where he complained of diffuse right shoulder pain. He denied any neurologic symptoms. The physical examination noted swelling about his right shoulder. All compartments were soft. He was in a shoulder immobilizer.

His motor examination and vascular examination were intact distally. Assessing the sensation or motor function of his axillary nerve was difficult. Some sensation was definitely intact at the normal distribution of the axillary nerve although the patient had significant swelling and felt some decreased sensation around the entire shoulder. He had a strong palpable radial pulse, warm and pink fingertips, and good capillary refill.

Imaging studies consisted of x-ray imaging and a computed tomography scan. The images revealed a complex proximal humeral fracture with a large portion of the head displaced inferiorly (Figs. 1-3).

Treatment options were discussed with the patient at length. In particular, the options of nonsurgical treatment, hemiarthroplasty, and reverse total shoulder arthroplasty (RTSA) were discussed. The patient elected to proceed with an RTSA.

The patient was brought to the operative room 3 days after the injury. He was placed supine with his head elevated 20°, and a bump was placed under the scapula. After the shoulder was prepared and draped in the standard manner, the shoulder was approached with a standard deltopectoral incision. The fracture was identified and found to be a 3-part proximal humeral fracture. The shaft and greater tuberosity fragment were identified without difficulty. The humeral head fragment was absent from the joint. A large rent in the inferior joint capsule was found. With careful digital palpation, the head fragment was found approximately 8 cm below the joint capsule.

A Kocher was placed on the head fragment with the intention of retrieving it through the capsular rent and back into the joint. During retraction, the axillary artery was noted to be immediately anterior to the head fragment and in contact with the fragment. It was also noted that the fractured aspect of the head had several sharp edges that were directly in contact with the artery.

After careful deliberation, the vascular surgeons were consulted due to concern that the artery would become lacerated by the head fragment upon removal. The vascular surgeons were able to isolate the artery through the same approach with minimal dissection. They then were able to mobilize the artery and retract it

The patient provided verbal and written consent to publish this case report. Instutional Review Board approval was not required.

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https://doi.org/10.1016/j.jses.2017.12.008

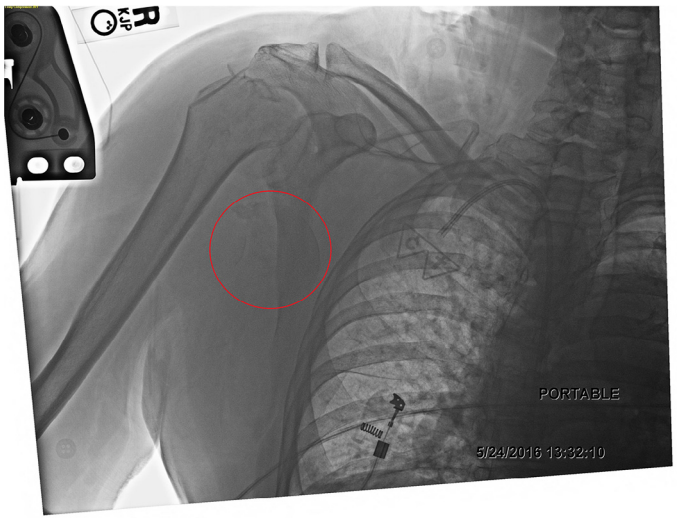

Figure 1 Initial portable anteroposterior x-ray image reveals humeral head displacement.

anteriorly, allowing for safe removal of the head fragment. The axillary nerve was also visualized during this approach and was found to be intact. For this reason, the plan was to continue to perform the RTSA, and the remainder of the procedure was performed without difficulty.

The patient's hospital stay was uneventful. He was seen in clinic for follow-up at 1 month and 2 months. He remained in his sling for these 2 months without any physical therapy. Decreased sensation in the axillary nerve distribution was noted at the 2-month follow-up. His postoperative x-ray images also revealed laxity of the joint, likely due to deltoid dysfunction (Fig. 4). The patient was kept in a sling until the 3-month postoperative point and began physical therapy at this time.

Electromyography (EMG) and nerve conduction velocity (NCV) tests were also ordered at this time to determine the cause of his motor dysfunction. Testing confirmed axonal axillary motor

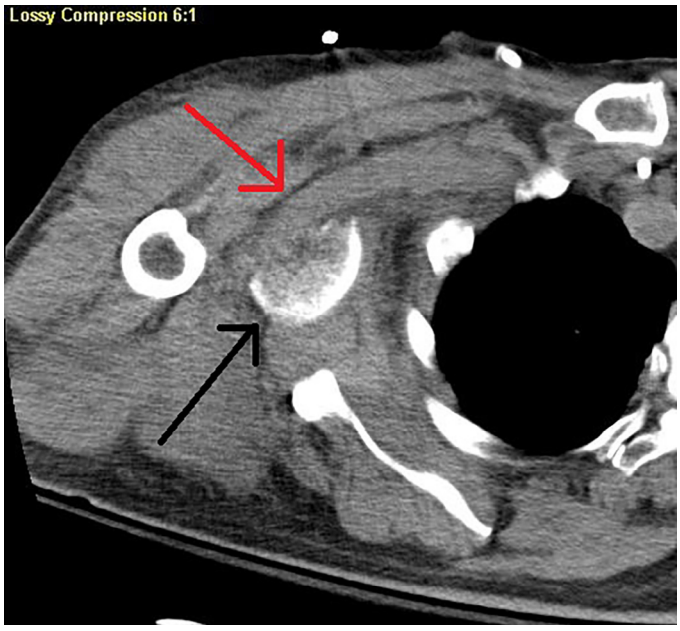

Figure 2 Axial computed tomography scan highlights the close proximity of the axillary artery (*red arrow*) and the humeral head fragment (*black arrow*).

Figure 3 Coronal computed tomography scan reveals abnormal displacement of the humeral head fragment.

Figure 4 Immediate postoperative x-ray image reveals poor tension on the arthroplasty implant due to decreased deltoid innervation.