CASE REPORT

A Case of Humeral Head Fracture-dislocation with Vascular Injury: How We Managed it

K Meenakshisundaram[1], Nagesh C Sangolgi[2], Kandaswamy KG[3], Hari Sivanandan[4], Athipathi Sundararaj[5], Chiranjeevi KP[6]

Abstract

Axillary artery injury is uncommon, although proximal humerus fractures are prevalent. The majority of axillary artery injuries in the literature have been attributed to anterior glenohumeral dislocation; a few have been linked to single proximal humerus fractures or fracture-dislocation. The axillary artery is vulnerable to injury because of a proximal humerus fracture due to its anatomical placement. Due to the quantity of collateral circulation in the upper limbs, vascular damage may occur even though the radial pulse is perceptible. The most common vascular injury produced by a proximal humerus fracture was an intimal rupture with subsequent thrombosis because there are no palpable peripheral pulses and no ischemia, axillary artery injury often goes undiagnosed at first, putting the hand at risk of necrosis and amputation if ischemia persists, and the forearm at risk of compartment syndrome after revascularization. A comprehensive physical examination, as well as a low threshold for Doppler tests or angiography, can diagnose axillary artery injury. Although the vascular insult resolves spontaneously, it is vital to recognize the link between such fractures and vascular injuries in order to diagnose them early and avoid major complications, such as amputation. We provide a case of axillary artery injury associated with proximal humerus fractures to show the risk of axillary artery injury in the setting of proximal humerus fractures.

Keywords: Axillary artery injury, Humeral head fracture-dislocation, Proximal humerus fracture dislocation, Vascular injury.

Journal of Orthopedics and Joint Surgery (2022): 10.5005/jp-journals-10079-1100

Background

Minimally displaced humeral neck fractures are seldom associated with axillary artery damage.[1] Unless a comprehensive clinical examination is performed in the emergency department, the harmless appearance of the X-rays can mislead the treating clinician into a feeling of complacency. Even though arterial injuries in these fractures are uncommon, they can have serious implications.

A pertinent case is examined, and mechanisms associated to vascular injuries in proximal humerus fractures are detailed, with a focus on having a low threshold for identifying and treating such injuries as soon as possible to avoid catastrophic outcomes.[2]

Case Description

A 77-year-old male, Mr. Krishnan, was brought to casualty after alleged H/o high-velocity trauma, skid, and fall from a two-wheeler. Complains of pain over left shoulder joint and left knee for 3 hours. K/c/o T2 DM and HTN on treatment. Known smoker for 20 years. On examination of left shoulder, there was swelling present, deformity of shoulder seen, tenderness present, crepitus felt, left radial pulse was feeble, and patient was unable to move his left elbow wrist, and fingers. The patients' X-ray showed Neer type II fracture-dislocation of surgical neck of left humerus and the proximal fragment was dislocated posteriorly and rotated anteroposterior. Distal fragment displaced medially, associated with proximal tibia fracture left knee (Figs 1 and 2).

The patient was taken in for surgery with open reduction of fracture-dislocation and fixing it with a 3 hole Philos plate and the proximal tibia secured with a locking plate, according to the nature of the patient's presenting disease (Figs 3 and 4).

Postoperatively on day one (POD-1), it was noted that pt. was unable to move his left elbow, wrist and fingers. Loss of sensory sensations below the elbow. Radial, ulnar, brachial artery pulse was not palpable. The patient was immediately taken for an angiogram of the left axillary artery and was diagnosed with:

- Acute left upper limb ischemia
- Left axillary artery 100% occlusion + thrombus
- External compression of artery.

So, it was seen that the axillary artery was kinking at the distal fracture fragment (Fig. 5). So, it was planned to take the patient for emergency exploration of fracture to remove the pressure from the artery and the fracture was refixed once axillary artery pulsations were. Even after this, the distal pulse was not palpable, vascular surgeons were called in and mechanical thrombectomy was planned. An incision was made over the cubital fossa and *via* brachial artery, Fogarty's catheter was passed proximally into axillary artery but no thrombus was found, and then the catheter was passed distally into the radial artery and an atheromatous thrombus and plaque were removed (Fig. 6). After the procedure patient was shifted to the postop ward. Even after 6 hours of the procedure patient's pulse was not palpable and a CT angiogram was planned and it showed that there was an interruption in blood

[1–6]Department of Orthopedics, Vinayaka Missions Kirupananda Variyar Medical College & Hospital, Salem, Tamil Nadu, India

Corresponding Author: Nagesh C Sangolgi, Department of Orthopedics, Vinayaka Missions Kirupananda Variyar Medical College & Hospital, Salem, Tamil Nadu, India, Phone: +91 8123451238, e-mail: nagesh.Csangolgi@gmail.com

How to cite this article: MK, Sangolgi NC, G KK, *et al*. A Case of Humeral Head Fracture-dislocation with Vascular Injury: How We Managed it. J Orth Joint Surg 2022;4(2):91–93.

Source of support: Nil

Conflict of interest: None

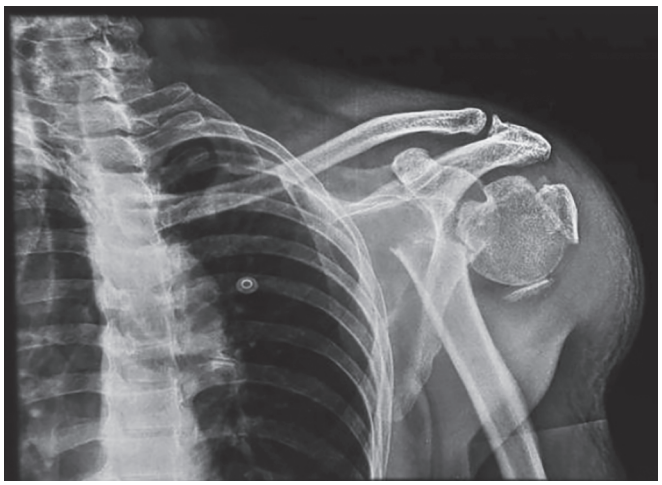


Fig. 1: Showing fracture-dislocation of left proximal humerus

Fig. 2: Showing proximal 1/3rd fracture of left tibia

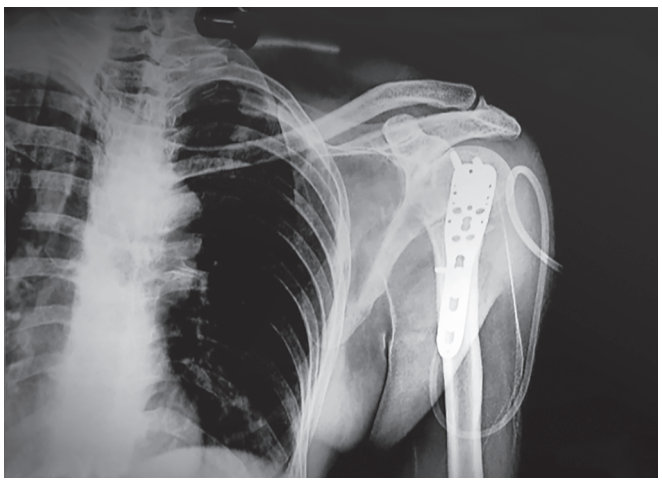


Fig. 3: Postop X-ray of open reduction of proximal humerus fracture-dislocation treated with Philos plating

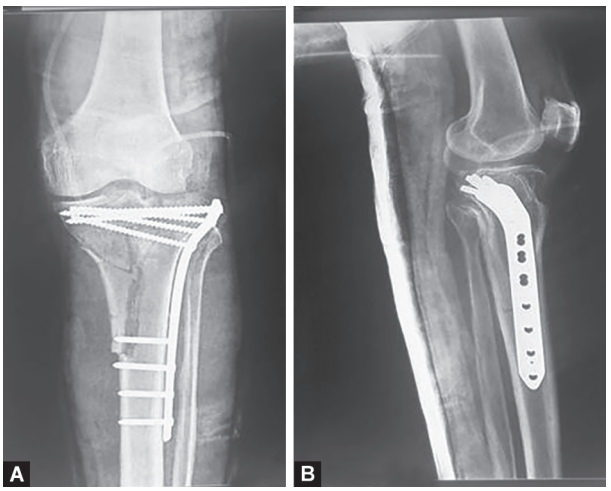


Fig. 4: Postop X-ray of proximal tibia fracture treated with ORIF with plate osteosynthesis

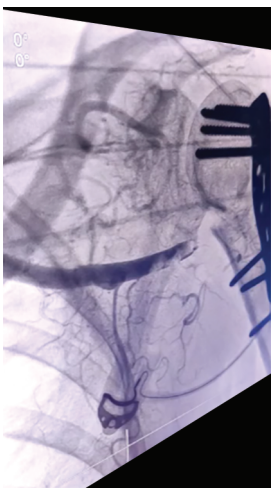
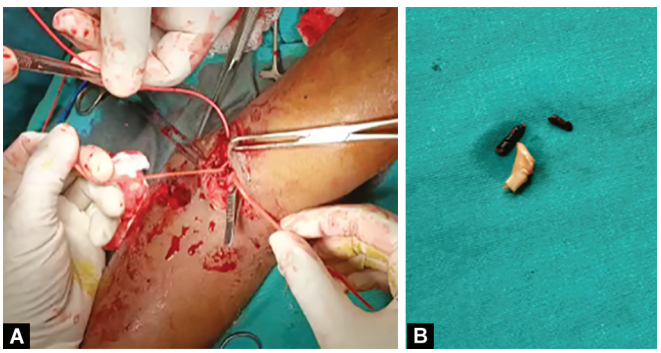


Fig. 5: Showing occlusion in the axillary artery

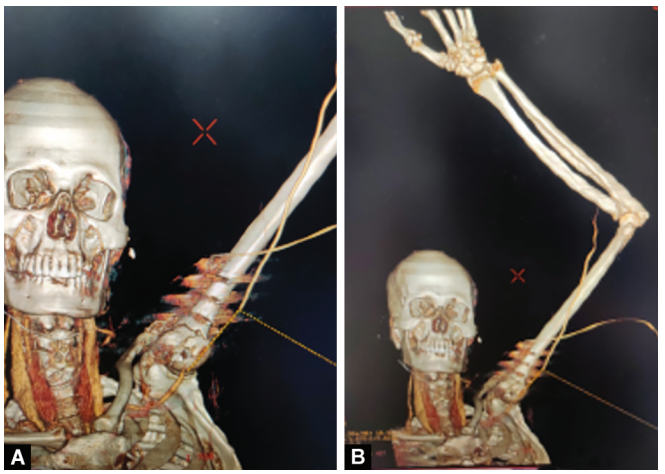


Figs 6A and B: Showing atheromatous plaque with thrombus

supply for 7 cm below the axillary artery after which flow was seen till the brachial artery further below there was no flow seen (Fig. 7).

Hence a cardiologist's opinion was sought and chemical thrombolysis was done with tenecteplase infusion 0.25 mg/hr for 6 hours. Return of axillary artery pulse but no distal pulses. So, hence catheter-directed thrombolysis was done on postop day 3.

Now there is a return of feeble radial pulse and warmth has returned SPO_2 in the left fingers IS 98–100%. Elbow extension eliminating gravity alone has returned and partial sensations up to elbow and wrist. The upper limb was saved from amputation.



Figs 7A and B: CT angiogram showing block in blood flow 7 cm below axillary artery and continuation in blood blow till brachial artery and further block in flow

Discussion

In spite of the close anatomical interlink between the proximal humerus and the axillary artery, neurovascular damage as a result of a fracture in this location is assumed to be uncommon, with the national incidence unknown. We present our institutional experience with these injuries in this paper.[3]

Displaced proximal humerus fractures caused the axillary artery to rupture, which is consistent with the majority of previously described cases.[4–7]

The axillary artery has been injured by a variety of processes following proximal humerus fractures, including direct trauma from sharp fracture fragments, artery rupture or tear due to over stretching, hematoma of the arterial wall, and intimal disruption.[6]

Acute or a delay in onset of symptoms can be caused by various causes of vascular damage. Kelley and colleagues established the pathognomonic triad of axillary artery injury, which includes shoulder trauma, reduced amplitude of distal pulses or a Doppler ultrasonography signal, and the presence of a growing axillary mass.[8]

Intimal rips, on the contrary, can cause a delayed presentation due to subsequent thrombosis, with perceptible peripheral pulses at the outset. Despite axillary artery injury, effective collateral circulation at the shoulder level can result in current peripheral radial artery pulses.[9] Both clinical circumstances were seen in our series. Said that a pulse which is palpable is a no guarantee that axillary artery damage has not occurred, paresthesia is likely the most dependable sign of reduced distal blood flow.[7] A Doppler ultrasonography should be conducted to quantify the arterial circulation if a physical examination raises suspicion of axillary artery damage. Angiography can be used to look for signs of decreased arterial perfusion.[5,7]

The axillary artery is a 10 cm long artery that is separated into three sections. Because the third part is rigid and adjacent to the humeral neck region, it is sensitive to blunt injury. It is also shallow, covered only by fascia and skin. The vast majority of axillary artery injuries (almost 94%) are caused by penetrating trauma, with only about 6% caused by blunt trauma after proximal humeral fractures.

Conclusion/Clinical Significance

Although the incidence of axillary artery injury as a result of proximal humerus fracture is unknown, it is unusual.[5,6] As the frequency of inpatient admissions for fractures of proximal humerus looks to be scaling high nowadays, it's possible that we're going to see more injuries to axillary artery now than we were previously.[10-12] The increasing detection rate could be due to an increase in emergency department visits as well as a growing trend to treat these fractures surgically. Because of detectable peripheral pulses and the absence of ischemia, detection can be challenging at first presentation, according to our experience. In older and infirm patients, increased awareness of this injury should be maintained, especially if paresthesias and concomitant injuries (e.g., brachial plexus injuries or scapula fractures) are present. The diagnosis of axillary artery injury can be established with a thorough physical examination along with a low threshold for Doppler testing or angiography. More study using big datasets is needed to assess the prevalence and predictors of axillary artery injury due to proximal humerus fracture, which could lead to early identification of at-risk individuals upon admission.

References

1. Hayes JM, Van Winkle GN. Axillary artery injury with minimally displaced fracture of the neck of the humerus. J Trauma 1983;23(5):431–433. DOI: 10.1097/00005373-198305000-00014
2. Sukeik M, Vashista G, Shaath N. Axillary artery compromise in a minimally displaced proximal humerus fracture: a case report. Cases J 2009;2:9308. DOI: 10.1186/1757-1626-2-9308
3. Peters RM, Menendez ME, Mellema JJ, et al. Axillary artery injury associated with proximal humerus fracture: a report of 6 cases. Arch Bone Jt Surg 2017;5(1):52–57.
4. Thorsness R, English C, Gross J, et al. Proximal humerus fractures with associated axillary artery injury. J Orthop Trauma 2014;28(11):659–663. DOI: 10.1097/BOT.0000000000000114
5. Yagubyan M, Panneton JM. Axillary artery injury from humeral neck fracture: a rare but disabling traumatic event. Vasc Endovascular Surg 2004;38(2):175–184. DOI: 10.1177/153857440403800210
6. Theodorides T, de Keizer C. Injuries of the axillary artery caused by fractures of the neck of the humerus. Injury 1976;8(2):120–123. DOI: 10.1016/0020-1383(76)90045-0
7. Zuckerman JD, Flugstad DL, Teitz CC, et al. Axillary artery injury as a complication of proximal humeral fractures. Two case reports and a review of the literature. Clin Orthop Relat Res 1984;189:234–237.
8. Kelley SP, Hinsche AF, Hossain JF. Axillary artery transection following anterior shoulder dislocation: classical presentation and current concepts. Injury 2004;35(11):1128–1132. DOI: 10.1016/j.injury.2003.08.009
9. Jensen BV, Jacobsen J, Andreasen H. Late appearance of arterial injury caused by fracture of the neck of the humerus. J Trauma 1987;27(12):1368–1369. DOI: 10.1097/00005373-198712000-00010
10. Menendez ME, Ring D, Heng M. Proximal humerus fracture with injury to the axillary artery: a population-based study. Injury 2015;46(7):1367–1371. DOI: 10.1016/j.injury.2015.04.026
11. Neuhaus V, Bot AG, Swellengrebel CH, et al. Treatment choice affects inpatient adverse events and mortality in older aged inpatients with an isolated fracture of the proximal humerus. J Shoulder Elbow Surg 2014;23(6):800–806. DOI: 10.1016/j.jse.2013.09.006
12. Palanisamy JV, Vaithilingam A, Arkesh M, et al. Proximal humerus fracture dislocation leading to axillary artery injury in an young adult: case report of an unusual presentation. J Clin Orthop Trauma 2017;8(Suppl 1):S62–S66. DOI: 10.1016/j.jcot.2017.05.006