



## Case report

## Proximal humerus fracture dislocation leading to axillary artery injury in an young adult: Case report of an unusual presentation

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## ABSTRACT

Proximal humerus fractures constitute five percent of all fracture cases. Though rare, severely comminuted proximal humerus fractures can cause injury to neurovascular structure. Majority of these injuries reported in literature were in elderly age group from low velocity injury owing to loss of elasticity of vessel wall. We report a case of proximal humerus fracture dislocation associated with axillary artery injury in a young male due to fall of heavy iron object. Timely exploration and removal of impinging bone fragment restored the blood supply. The purpose of this report is to heighten the clinical suspicion of the vascular injury in patients with proximal humerus fracture dislocations in all age groups.

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## 1. Introduction

Proximal humerus fractures account for around five percent of all cases seen in Accident and Emergency department.<sup>1</sup> The overall prevalence of axillary artery injury is 8.5 per 10,000 inpatients with fracture of the proximal humerus.<sup>2</sup> Roughly about 400 cases of axillary artery injury in proximal humerus fractures are reported in world literature to the best of our knowledge,<sup>2–4</sup> majority of them being in elderly population due to low velocity injury due to loss of elastic tone in their blood vessels. We present a similar case in young male due to fall of heavy iron rod highlighting the importance of high degree of clinical suspicion in all age groups.

## 2. Case report

A right handed 20 year old iron industry worker presented to the emergency department one hour after the fall of 100 kg (Kgs) heavy Iron Gate over his right shoulder with huge swelling and decreased movement of entire limb. On clinical examination, swelling and ecchymosis was noted in the right axillary region.

(Fig. 1) The radial pulse was feeble compared to contralateral side both by manual palpation and by Doppler examination. Neurological examination demonstrated paraesthesia in right ulnar and median nerve distribution. Radiographs and CT angiography revealed four part proximal humerus fracture with medial displacement of fracture fragments and compression of the third part of right axillary artery by bone fragment with decreased distal flow respectively. (Fig. 2)

Emergency vascular exploration was performed. The standard deltopectoral approach was used and on deep dissection, part of the bone fragment compressing the intact 3rd part of the axillary artery was noted. The distal radial pulse reappeared immediately after removal of compressing fragment. Due to compromised skin condition and vascular insult, fracture fragments were reduced and temporarily fixed with screw and Krirschner wires (K-wires) to reduce surgery induced soft tissue injury and operative time. (Fig. 3A) U-slab was applied. Post operatively patient was carefully monitored for signs of ischemia and compartment syndrome which can occur as a result of reperfusion injury.

After improvement of the local skin condition, on 10th post operative day through the same incision internal fixation done with philos plate. (Fig. 3B) The standard shoulder rehabilitation exercises were started in the immediate post operative period. Neurological deficit gradually improved over three months. On six

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**Fig. 1.** Ecchymosis and swelling in the axillary region raising the suspicion of vascular injury.

months follow up, fracture united and patient regained full functional range of movements. (Figs. 4–6)

### 3. Discussion

Axillary artery is about 10 centimeter (cm) in length and divided into three parts. The third part is vulnerable to blunt injury as this part is inflexible and lies close to the humeral neck region, further it is superficial covered only by fascia and skin. Vast majority of axillary artery injuries (nearly 94%) occur as a result of penetrating trauma, only about 6% are due to blunt trauma following proximal humeral fractures.<sup>6</sup>

More than 90% of reported cases of axillary artery injuries in proximal humerus fractures are reported in patients over 50 years of age, the explanation being loss of vessel elasticity due to atherosclerosis.<sup>4</sup> Our patient was young adult and sustained direct heavy blow with the cast iron gate of 100 kg.

Thorsness et al. reports 3 cases of axillary artery injury associated with proximal humerus fracture with shaft medialisation and with fracture dislocation of shoulder. It has been advised against the attempt of closed reduction of fracture fragments in these setting as it may further aggravate the vascular injury. Patient should be taken immediately for open reduction and vascular exploration if the condition permits.<sup>4</sup>

Complete neurovascular examination is mandatory in all patients presenting with shoulder trauma. One should be aware of the pathognomonic triad of axillary artery injury which includes a) shoulder trauma, b) arterial flow changes as measured by a reduction in amplitude of distal pulses or Doppler ultrasound signal and c) presence of an expanding axillary mass.<sup>5</sup> Sometimes, collateral flow through the abundant arterial anastomoses around shoulder may mask the features of distal ischemia in presence of axillary artery injury. A watch on compartments of forearm and hand is necessary as it can result from ischemia and reperfusion injury.

Association of neurological injury with traumatic axillary artery injury is fairly common (about 20%) although the severity varies.<sup>2</sup> Our patient did suffer neuropraxia which recovered later. Among various imaging modalities for identification of axillary artery injuries like Doppler ultrasound, Digital subtraction angiography, CT angiogram and arteriogram, CT angiogram is most commonly used.

Management of these cases should involve both orthopaedic and vascular surgery team. Release of compartment syndrome if present should precede bony fixation or vascular repair. Fracture fixation should be done before vascular repair whenever feasible as it provides mechanically stable environment to carry out vascular repair and reduces the risk of further damage by the displaced fracture fragments.<sup>4</sup>

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