

# Delayed Axillary Artery Injury due to Displacement of Proximal Humeral Fracture

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## Citation

A Khanna, A Khanna, J Tricker. *Delayed Axillary Artery Injury due to Displacement of Proximal Humeral Fracture*. The Internet Journal of Orthopedic Surgery. 2007 Volume 10 Number 2.

## Abstract

Proximal humerus fractures are commonly encountered in orthopaedic practice. They are uncommonly associated with axillary artery injuries, more rarely with delayed presentation of the same. We report an unusual of delayed axillary artery injury following proximal humerus fracture due to displacement of the fracture fragment, despite standard recommended immobilisation. A more rigid immobilisation with a closely supervised physical therapy and awareness for this devastating complication can be life saving.

## INTRODUCTION

Fracture of the proximal humerus accounts for 4-5% of all fractures (1) with 15% being significantly displaced (2). Neurovascular injuries have been reported with displaced proximal humeral fractures (3). Injury to the brachial plexus is uncommon and axillary artery injury is rare (4). We report a case of unrecognised delayed

axillary artery injury following late displacement of a fracture of the surgical neck of the humerus in an elderly patient. We propose that in vulnerable groups, proximal humerus fractures require better immobilisation than is provided by the traditional collar and cuff to avoid this devastating complication.

## CASE REPORT

An 81 year old lady presented to the Accident and Emergency department with pain, bruising and swelling of her left shoulder following a fall at home. She had a history of Type II diabetes mellitus, ischemic heart disease, mild dementia and atrial fibrillation (for which she took Warfarin). Radiographs showed an undisplaced two-part fracture of the surgical neck of the left humerus (Fig 1 & 2).

## Figure 1

Figure 1: AP Chest radiograph showing fracture of left proximal humerus.



**Figure 2**

Figure 2: Lateral X ray of left shoulder at time of injury.



Neurovascular examination was normal. She was placed in a collar and cuff and was discharged with a review booked in the fracture clinic the following week.

Nine days later she re-attended the emergency department with a marked deterioration

in conscious level, left ventricular failure and renal failure with a metabolic acidosis. Her left arm was held in abduction at the fracture site with cyanosis distal to the mid-upper arm and an impalpable radial pulse with no capillary return. There was minimal movement of her forearm or hand and the patient's severe condition precluded assessment for sensory deficit. A portable chest radiograph revealed complete displacement of the fracture with migration of the proximal humeral shaft into the axilla at 90° of abduction (Fig 3).

**Figure 3**

Figure 3: AP Chest radiograph showing grossly displaced proximal humerus fracture fragments.



Following a discussion with the patient's partner, it became apparent that the arm ischemia had developed four days previously and that the patient had been assessed the following day by a local General Practitioner. It had been concluded that the discolouration was due to extensive bruising that was compounded by anticoagulant medication. Notably, there was no history of a second fall. By the time of the patient's admission, the arm could not be salvaged by vascular intervention and her physical state was such that she would not have survived general anaesthesia. It was agreed on discussion with the relatives that the patient should be kept comfortable. She died the following day.

## DISCUSSION

Proximal humeral fractures are commonly seen in orthopaedic practice. Infrequently they are associated with neurovascular injury<sup>[5]</sup>. Despite the cause, axillary artery damage often occurs concomitantly with injury of the brachial plexus<sup>[6]</sup>. Isolated axillary artery injury is extremely rare<sup>[7]</sup> and to our knowledge this is the only reported case of axillary artery injury due to late displacement of the fracture. The axillary artery lies just anterior and medial to proximal humerus<sup>[8]</sup>. This anatomical proximity makes it quite vulnerable to injury from displaced proximal humeral fractures. The cords of the brachial plexus surround the axillary artery at the level of the humeral neck and are therefore also vulnerable to injury<sup>[4]</sup>. The elderly are more prone to such fractures and are more likely to have a neurovascular injury due to diminished elastic ability, advanced arteriosclerosis and osteoporosis<sup>[9 and 10]</sup>. Various

mechanisms contribute to the axillary artery injury with fractures of proximal humerus. Direct injury, avulsion and stretching in a hyper abduction injury can all occur [7]. The classical signs and symptoms of arterial injury (pain, pallor, par aesthesia, paralysis and pulselessness) may be absent, particularly if only an intimal tear is present [9]. This may, as in our case, delay the patient getting to hospital for diagnosis and treatment.

Collar and cuff is widely used to treat proximal humeral fractures in frail elderly patients with osteoporotic bones to allow gravity to act on it [11]. A major disadvantage of the collar and cuff is that it fails to control abduction, flexion and extension at the fracture site. As a result, there is the potential for displacement, especially in the confused elderly patient who may not be compliant. Given the increasing numbers of elderly population and their predisposition to fragility fractures, the occurrence of such injuries can be expected to increase. We propose that in potentially non-compliant patients these fractures are immobilized for the first two weeks in a broad arm sling that has a strap that is passed around the back of the Polysling® variety. This has the advantage of preventing significant shoulder movements and so reducing the risk of fracture displacement and catastrophic sequelae. Closely supervised physical therapy is then required following this period. The importance of being aware of the risk of arterial injury with these fractures cannot be overstated and the distal neurovascular status should always be assessed regularly.

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