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Case Report

The management of a complex elbow injury with transection of the brachial artery

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ABSTRACT

Elbow dislocations are commonly encountered cases by orthopaedic surgeon. Vascular injury accompanying an elbow dislocation is a surgical challenge. The authors report a rare complication of complete transaction of the brachial artery following a posterior dislocation of the elbow joint. A fifty-year old male suffered a road traffic accident during which he injured his left elbow. Radiographs confirmed a posterior dislocation of the elbow joint. However the radial and ulnar pulse very not palpable. Arterial doppler confirmed injury to brachial artery. The patient was successfully treated and regained full functional use of his left upper limb. The aim of this report is to help readers understand why a vascular injury occurs following an elbow dislocations. A successful management of such injuries revolves around a prompt clinical diagnosis and early repair.

Keywords: Elbow dislocation, Brachial artery transaction, Posterior dislocation, Vascular injury, Complex elbow trauma

INTRODUCTION

Elbow dislocations form 25% of all joint injuries.[1] The anatomical proximity of neurovascular structures renders them vulnerable to injury following an elbow dislocation.[1] The mechanism of injury is mainly direct compression of the neurovascular structures by the ulnar and radial epiphysis. The prevalence of vascular injury associated with elbow dislocation varies from 0.3% to 12.7%.[1-3]

Brachial artery lies just behind the medial edge of the biceps brachii muscle thus protected from direct injury. In the elbow, it lies more ventral deep to the bicipital aponeurosis expansion. The backward motion of the aponeurosis often is the cause of vascular injury in an elbow dislocation.[1,4]

The severity of vascular injury depends on the amount of displacement of the radius and ulna during the dislocation. Open injuries usually are associated with more severe vascular injuries.[4] We report an unusual case of a fifty-year-old male who suffered a postero-lateral elbow dislocation with the associated transaction of the brachial artery. The authors successfully treated him to provide a functional elbow joint.

CASE REPORT

A 50-year old male patient presented to us following a road traffic accident where he sustained an injury to his left upper limb. He presented to the emergency department with the inability to move his left upper limb, with an obvious deformity and diffuse swelling of the limb. On examination, there was a 4×4 cm wound over the cubital fossa of the left elbow with the underlying

neurovascular structures exposed (Figure 1). The distal pulse of the left upper limb was not palpable. The wound was explored and the brachial artery was found to be transected. Radiographs of the left elbow, forearm, and wrist revealed a posterolateral dislocation of the elbow joint. Forearm radiographs showed a distal radius fracture with mid third shaft of ulna fracture (Figure 2).

Figure 1: Clinical photographs of the injury to the elbow.

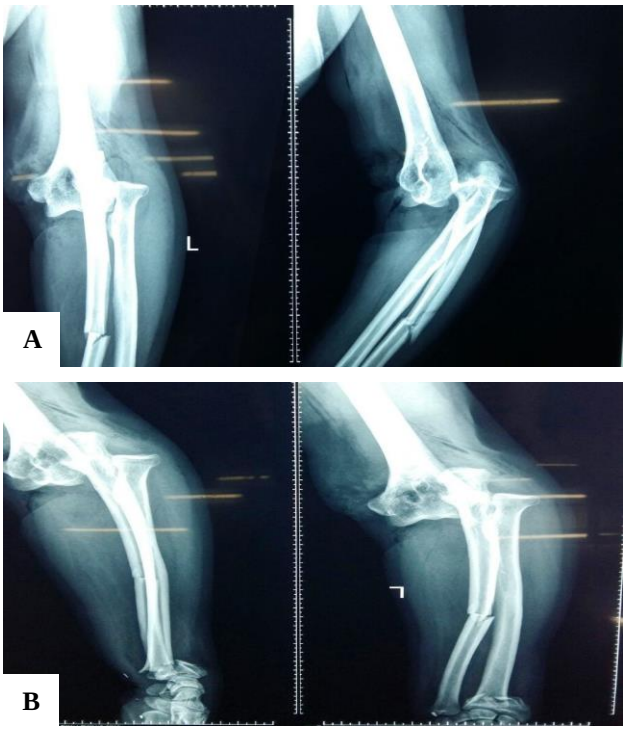

Figure 2 (A, B): Plain radiographs of the elbow showing posterolateral elbow dislocation with fracture of shaft of ulna and distal radius.

The patient was taken up for surgery immediately, the cut ends of the brachial artery were identified (Figure 3). A saphenous vein graft was used to bridge the cut ends of the artery. The elbow joint was reduced and stabilized with a transarticular K-wire. The ulna was fixed with a rush pin and distal radius with multiple K-wires (Figure 4). The postoperative period was critical in view of the vascular repair and uncontrolled preexisting diabetes mellitus. A secondary wound debridement was performed two weeks after the first surgery as the surgical wound got infected. Broad-spectrum antibiotics were continued for another week. The surgical wound healed well. The patient's upper limb survived the vascular repair. The transarticular K-wire was removed at three weeks. The K-wires for the distal radius were removed at four and half weeks. He was initiated on a graded physiotherapy program for two months after which he could perform all his daily activities like eating and handling objects independently.

Figure 3: Intraoperative photograph showing the transaction of brachial artery.

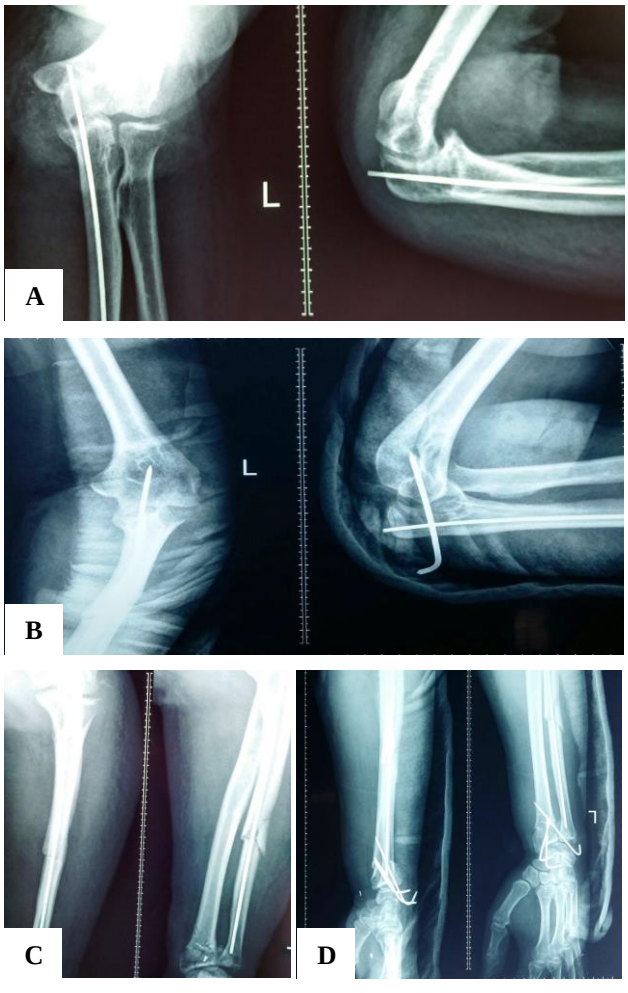

Figure 4 (A-D): Post-operative radiographs.

DISCUSSION

The case treated by us was an adult male with a complex elbow injury. A complex elbow injury or a complex joint trauma can be defined as severe injuries with two or more structural elements of the joint namely the articulating bones, the major surrounding ligaments, local soft tissue envelope and the neurovascular structure.[5] These injuries are fairly uncommon and their management can be difficult as treatment differs from that of simple fractures and straightforward standard methods cannot be applied due to the to the complexity of the injury and the need to address the various injured structures.[6-8]

25% of injuries of the elbow joint constitute elbow dislocations with the most common type being a posterolateral dislocation and rare anterolateral dislocations also being reported.[9] The frequency of vascular injury in dislocations may vary from 0.3% to 12.7% as described by various studies.[10-12] Vascular injuries associated with elbow dislocations are relatively rare due to the anatomy of the brachial artery being protected the medial edge of biceps brachii muscle and then distally by its aponeurotic expansion which may be responsible for the rupture of the artery during posterior dislocation.[1]

According to a case series by Ayel et al, 4 of the 9 studied complex elbow trauma cases required fixation with either cross pins or spanning external fixators. The associated arterial injury was repaired with either end to end anastomosis or autologous vein bypass. Excellent elbow function was achieved in 3 cases and good in 4 cases.[1] This is comparable to our case which also required stabilization of the elbow joint by a cross pin and stabilization of the associated ulnar shaft fracture and distal radial fracture along with end to end anastomosis of the brachial artery.

Kazakos et al did a case study on unusual monteggia fracture dislocations of the elbow.[13] The most common variant was a segmental ulna fracture with a monteggia fracture dislocation seen in 4 out of 14 patients. None of the patients had a vascular injury. Our patient, the proximal radioulnar joint appears to be normal. However, none of the described patients in the above study had a pattern similar to ours that is posterolateral elbow dislocation with ulnar shaft fracture and a comminuted distal end radius fracture suggesting the diverse presentations which can be encountered in a complex joint injury and the rarity of this particular injury.

Even after an arterial injury, the pulse could be initially present due to the presence of a good collateral circulation around the elbow, which could later diminish due to increased swelling. Secondly, a thrombus might develop eventually thereby blocking the vessels. This can lead to a delayed presentation of the injury, highlighting the importance of occult occlusions, which can be present in closed as well as open injuries.[14,15] Our patient had a complete transaction of the brachial artery and he was successfully managed with the saphenous venous graft. He was followed-up for eighteen months with a good function of his elbow and upper limb.

CONCLUSION

Complex fracture dislocations of the elbow need a high index of suspicion for associated brachial artery injuries. Prompt diagnosis using appropriate diagnostic modalities, early repair and regular post-operative monitoring along with the reduction of dislocation and fixation of associated fractures, either externally or internally, forms the cornerstone of management of such injuries.

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