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Case report

Isolated radial shaft fracture with unreducible posterior dislocation of the radial head and rupture of the lateral collateral ligament: A case report

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ABSTRACT

Combined injuries associated with forearm shaft fractures and elbow dislocations are well recognized. We describe an uncommon case of an isolated radial shaft fracture with an unreducible posterior dislocation of the radial head and associated rupture of the lateral collateral ligament of the elbow.

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1. Introduction

Isolated fracture of the radial diaphysis with dislocation of the radial head is a rare injury, which requires careful evaluation for concomitant ligamentous injury. Combined injuries associated with forearm shaft fractures and elbow dislocations are well recognized. Fractures of the distal radial shaft with disruption of the distal radio-ulnar joint are referred to as Galeazzi fractures. In Monteggia fractures, dislocation of the radial head occurs in conjunction with fracture of the proximal ulna shaft. And lastly an Essex-Lopresti lesion is characterized by a radial head fracture with distal radio-ulnar joint dislocation caused by an interosseus membrane disruption. We present an uncommon case of an isolated radial shaft fracture with an unreducible posterior dislocation of the

radial head and associated rupture of the lateral collateral ligament of the elbow. The authors have obtained the patient's informed written consent for print and electronic publication of the case report.

2. Case report

A 30-year-old man was in a motorcycle accident, and sustained an injury to his right upper extremity, ligamentous injury to the right knee and a right acetabular fracture. Physical examination showed swelling of the elbow and upper forearm and an obvious deformity. The patient was neurovascularly intact in that extremity. His brachial and forearm compartments were soft with no evidence of compartment

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syndrome. The patient's joint was evaluated carefully and showed no varus instability on physical exam. Initial plain radiographic studies revealed a displaced fracture involving the mid radial shaft with a posterior-lateral dislocation of the radial head (Fig. 1). Attempts at reducing the radial head under sedation in the emergency ward were unsuccessful. The patient was then put in a long arm splint.

He was taken to the operating room the next day. An attempt was made to close reduce the radial head under fluoroscopy, but this could not be achieved. He then underwent open reduction and internal fixation of the radial shaft fracture through a Henry approach. There was a segmental and butterfly fracture fragments in the radius that were stabilized with several 2.7 mm screws placed in a lag fashion. The shaft component was reduced and then spanned with a 10-hole 3.5 mm compression plate on the volar aspect. Fluoroscopy in the operating room showed good reduction of the fracture but persistent widening of the radiocapitellar joint and the radial head dislocated posterior and laterally. Attempts to reduce the radial head with close reduction were unsuccessful. Next the elbow joint was approached through a separate lateral incision. The extensor muscle fascia was intact, but deep dissection revealed a complete tear of lateral collateral ligament. There was hematoma in the joint and an incarcerated piece of the ligament preventing the radial head from being reduced. The radial head was reduced and then the lateral collateral ligament was repaired in a Krackow fashion. Intra-operative fluoroscopic views showed good reduction of his radial head on the anteroposterior and lateral views.

Postoperatively the limb was immobilized in a splint at 90° of flexion and 45° of pronation. He was started on gentle range of motion exercises post-operatively. At 2 months follow-up, range of motion of the elbow was 20° of extension to 100°, of flexion and forearm pronation of 40° and supination of 60°. On exam he had no pain over the right forearm and his wounds were healed. At his last visit, 8 months after the operation, he had excellent range of motion with no major complaints. Elbow range of motion was 10° of extension to 120°, and forearm rotation demonstrated supination of 70° and 80° of pronation. Radiographs showed that the fracture was healed in good alignment and the radio-capitellar joint remained reduced (Fig. 2). The patient reported no pain and was able to resume his normal daily activities, including working as a truck driver.

3. Discussion

Dislocation of the radial head is commonly associated with fracture of the proximal ulna. In 1814, Giovanni Battista Monteggia first described this type of injury.¹ It is somewhat unusual; accounting for only 1–2% of all forearm fractures.² Later, in 1967, Jose Luis Bado further classified the injury into 4 types, depending on the direction of the radial head dislocation and angulation of the fracture of the ulna.³ Type I, an anterior dislocation of the radial head and fracture of the ulna, Type II, a posterior dislocation of the radial head and fracture of the ulna, Type III, a lateral dislocation of the radial

Fig. 1 – (a) Initial injury radiographs of right forearm demonstrating posterolateral dislocation of the radial head and a segmental displaced radial shaft fracture. Post reduction (b) AP and (c) lateral x-rays show improved alignment of the radial shaft but persistent dislocation of the radial head.

Fig. 2 – (a,b) Radiograph 8 months post-operatively showing complete healing of the radial shaft fracture and maintained reduction of the radial head.

head and fracture of the ulna, and Type IV an anterior dislocation of the radial head and fracture of the radius and ulna. Dormans and Rang⁴ later added Type V to the Bado classification, which describes fracture of the radius with dislocation of the proximal radioulnar and the radio-capitellar joint. Cases of an isolated radial shaft fractures with elbow joint dislocations have been previously described.^{5–11} However, isolated dislocation of the radial head with an associated radial shaft fracture is an extremely rare injury.

Simpson et al¹² reported a case of a 29-year-old man that sustained an isolated proximal radial shaft fracture with anterior radial head dislocation caused by a fall on the outstretched forearm. Closed reduction of the radial head dislocation in the emergency room was unsuccessful. The patient was taken to the operating room. After applying direct traction on the proximal fragment, the radial head was reduced. The radial shaft was then reduced and stabilized with a dynamic compression plate supplemented with an autogenous cancellous graft. Mehara and Bahn¹³ reported a concomitant traumatic anterior radial head dislocation with radial shaft fracture in a 25-year-old man due to a direct blow by a heavy wooden stick during a fight. Open reduction of the radial shaft fracture was impossible due to the subluxation of the radial head. The radial head was exposed through a separate incision and was found to be dislocated anteriorly through a tear in the annular ligament. After reduction of the radial head, the shaft was reduced and fixed with a compression plate. Haddad,¹⁴ reported a case of a 37-year-old man who fell backward on his pronated right arm while playing football which resulted in radial shaft fracture with

posterolateral radial head dislocation. The radial head was easily reduced with traction and pronation and the radial shaft fracture was stabilized with dynamic compression plate. In our case report, the radial head was dislocated posterolaterally, and was unreducible due to an interposed radial collateral ligament, requiring open reduction and repair of the collateral ligament.

Recently Linzel et al¹⁵ reported four cases of radial shaft fractures associated with dislocation of the proximal radio-ulnar joint. In two cases, closed manipulative reduction and plating of the radial shaft resulted in reduction of the proximal radial ulnar joint. In another patient, attempt to maintain the proximal radioulnar joint reduced was difficult after fixation of the radial shaft. With flexion of 110° and full supination the radial head was able to be reduced in the operating room. Subsequent radiographs showed recurrent displacement of the radial head. This persisted despite a second operation which included realignment of the radial shaft fracture, open reduction of the proximal radioulnar joint and repair of the annular ligament. The patient opted not to pursue additional treatment. In the last case, dislocation of the proximal radio-ulnar joint was noted 1 month after repair of the radial shaft. This patient required excision of the radial head due to restricted range of motion by the deformity. They had no reported cases of unreducible radial head dislocations.

Although a rare occurrence, clinicians should be aware of possible subluxation of the proximal radio-capitellar and proximal radio-ulnar joints in association with isolated fractures of the radial shaft. This joint incongruity may not reduce with fixation of the radial shaft and could require open

treatment with repair of the collateral or annular ligament. After fixation of all forearm shaft fractures careful clinical and radiographic examination of both the proximal and distal associated joints is imperative. The patient in our report had a successful clinical outcome and functional range of motion after rigid fixation of the radial shaft fracture and exploration of the elbow joint, reduction of the radial head and repair of the lateral collateral ligament.

Conflict of interest

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

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