

Bipolar Radial Fracture: A Unique Injury Pattern

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ABSTRACT

Introduction: Isolated fractures of the head radius and distal radius head in adults are uncommon injuries. Moreover, simultaneous fracture of the head radius and distal radial seems to be extremely rare. Only few cases of elbow dislocation with ipsilateral distal radius fracture have been previously reported. Cases of fracture head radius with distal radius and other associated injury with presentation and treatment are discussed here.

Case Report: we report series of three cases of bipolar radial bone injury with different spectrum of pattern, depending upon the position of forearm and energy of trauma. Although no proper guideline regarding the management is there in literature but one patient with acceptable reduction was treated conservatively and other two patients with comminuted head were treated with excision of head and close reduction and percutaneous pin followed by Plaster of Paris cast application.

Conclusion: This case series has helped to speculate about the spectrum of fore-arm injury which is directly related with energy of trauma and position of elbow joint at the time of injury although no guideline for the management of such type of injury are there but patients with less bone comminution can be managed successfully with this minimal invasive method and with good acceptable outcomes. This case series also shows importance of detailed clinical and radiological examination as there might be high index of suspicion of bipolar injury.

Keywords: Bipolar fracture radius, distal radius, head radius, spectrum of injury

INTRODUCTION

Fractures are common on weight bearing bones. Trauma is the leading cause of fractures and it occurs in fixed patterns which depends upon the level of energy of trauma and the position of joint at the time of injury. In forearm, the major weight bearing bone in wrist is radius and at elbow, major weight bearing bone is ulna. Distal radius fractures (DRFs), the group that covers all the fractures of the distal articular and metaphyseal areas is among the most common type of fractures in the wrist. DRFs are common in both younger (18-25) and older age groups (>60). In usual cases of trauma either proximal 1/3rd of radius with involvement of DURJ (Galeazzi) or proximal 1/3rd of ulna with dislocation of radial head (Monteggia) or very often fracture of both bones of fore-arm are common pattern of injuries.

The pattern of radial head fractures can range from being isolated just to the radial head (and neck) dislocation or to that of a combined complex fracture injury pattern involving the other structures of the elbow, distal Humerus, or forearm and wrist. The radial head is fractured in about 20% of cases of elbow trauma, and about 33% of elbow fractures and dislocations include injury to the radial head and/or neck. The patient with radial head fracture-dislocations usually presents with a history of a fall on the outstretched hand. However, the incidence of simultaneous fracture of the head radius and distal radial is extremely rare and till date only two cases are reported

in English literature to the best of our knowledge.^{1,2}

Only few cases of elbow dislocation with ipsilateral distal radius fracture have been previously reported.³

CASE REPORT

Case 1: A 30 year-old healthy male patient with history of fall from altitude, presented in the orthopaedic emergency department with complain of pain, swelling and deformity of the left wrist and elbow and inability to move these joints. On clinical examinations, the forearm was held in mid-prone position with elbow in flexed position and the wrist in radial deviation. He was unable to move the elbow and wrist, whilst finger movement and sensation were normal. No neurovascular injury could be detected. No other parts of the body were injured. Patient was examined and proper X-ray was done which showed fracture of distal radius AO Type A2 with comminuted fracture head radius according to Mason classification type 3. Initially cast was applied above elbow for the purpose of splintage and pain relief, then patient was prepared for surgery 12 hours after injury. First of all our aim was to manage distal radius so as to avoid proximal migration of radius after excision of its head. Traction with counter traction was given and reduction of distal radius was achieved. After that, fixation was done by percutaneous K-wire fixation and head of radius was excised by Cochr's approach. Cast with forearm in mid-prone position was applied above elbow. Cast was removed after 4 weeks and gradual mobilization of elbow and wrist was started. The healing of fractured distal radius was examined in follow-up visits by clinical and radiological aspects. K-wire was removed when solid bony union was ensured. Patient was followed for 2 years post surgery and good range of motion was achieved around elbow and wrist along with pronation and supination. Pre injury grip strength was also achieved.

Case 2: A 25 years young male with history of fall from bicycle presented in the emergency department with chief complain of pain, swelling and deformity of the left wrist and elbow and inability to move these joints. On clinical examinations, the forearm was held in mid-prone position with elbow in flexed position and the wrist in radial deviation. He was unable to move the elbow and wrist, whilst finger movement and sensation were normal. No neurovascular injury could be detected. No other parts of the body were injured.

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Patient was examined and proper X-ray was done which showed fracture of distal radius AO Type A2 with comminuted fracture head radius according to Mason classification 1. Initially Cast was applied above elbow for the purpose of splintage and pain relief. Then the patient was prepared for conservative management by close reduction under image intensifier. Cast was applied after achieving acceptable reduction. After 6 weeks Plaster of paris (POP) cast was removed followed by physiotherapy and good range of motion was achieved.

Case 3: A 45 years old adult male patient with history of road traffic accident presented in the orthopaedic emergency department with complain of pain, swelling and deformity of the left wrist, forearm, elbow and arm with inability to move these joints. On clinical examinations, the forearm was held in mid-prone position with elbow in flexed position and the wrist in radial deviation. He was unable to move the elbow and wrist, whilst finger movement and sensation were normal. No neurovascular injury could be detected. No other parts of the body were injured.

Patient was examined and proper X-ray was done which showed fracture of proximal 1/3rd of ulna with distal radius AO Type A3 with comminuted fracture head radius according to Mason classification Type 3. POP cast was applied above elbow for the purpose of splintage and pain relief meanwhile patient was prepared for surgery. Patient was managed by open reduction and fixation of shaft humerus by AO LC DCP on antero-lateral surface, open reduction and fixation of ulna was done by 3.5 AO LC DCP. Close reduction was carried out with traction and counter traction. K wire fixation of distal radius with excision of radial head was done. POP cast was applied above elbow. POP was removed after 3 weeks. Patient was followed for 3 years and acceptable range of motion was achieved at both wrist and elbow with restriction of few degrees at terminal ends.

DISCUSSION

Most common cause of upper limb trauma is fall on outstretched hand, and during that fall position of elbow is important. Secondary vector of forces are mainly responsible for various spectrum of injury around forearm which ranges from Colles fracture to fracture of both bones forearm.

There is common association between radial head dislocation and fracture of the proximal third of the ulnar diaphysis which is known as Monteggia fracture dislocation. Simpson et al.⁴ reported a case of anterior dislocation of head of radius with an ipsilateral fracture of the shaft of radius after a hyperpronation injury of the forearm. The other case was of a 25-year-old male who was hit by a wooden stick and had anteroinferior dislocation of the radial head with interosseous membrane injury and radial shaft injury. Similarly, Nagaya et al.¹ have reported simultaneous ipsilateral fractures of distal and proximal ends of the radius in a 52 year old female. The fracture of the radial head was treated by open fixation with a cancellous bone screw, and the fractured distal end of the radius was treated by bone graft, with the subsequent application of an external fixator. Again, Gupta et al.⁵ have reported ipsilateral dislocation of the radial head associated with fracture of distal end of the radius in a 42 year old female. Almost similar pattern has been reported by Mehara and Bhan⁶ and Cherif et al.⁷

Wang Y,et al (2015)² report similar type of case, and management



Figure-1: Showing pre-op radiographs

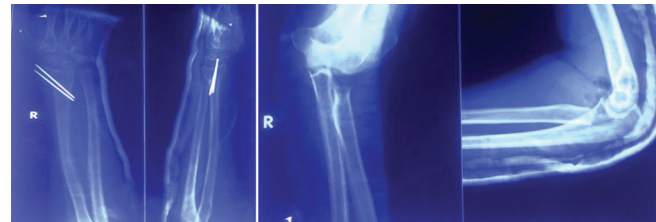


Figure-2: Showing post-op radiographs



Figure-3: Showing range of movement after one year of follow-up.

was done by open reduction and internal fixation of both ends of radius and good results were achieved in 10-12 week after injury.

Thus, only two of the above studies present any case involving fracture of radius at head and at distal part. Here, we have compiled series of three cases with simultaneous fracture of head radius and distal radius with spectrum of injury in increasing pattern of severity as energy of trauma increases. We speculate the mechanism in our patient to be a fall from altitude on outstretched left hand with elbow in semi-flexed position and in valgus strain, causing direct impact injury to the wrist leading to fracture of distal end of radius. Probable mechanism of injury was that the limb sustained a complex vector force leading to a forceful hyperpronation, valgus strain.

Although literature describes the individual management of fracture of radial head and distal end of radius, however, there are no guidelines for treatment of such bipolar radius injuries. Management option for distal radius may be conservative, by close reduction and POP application. Close reduction and k-wire fixation or ligamentotaxis by means of distractor in case of high degree of comminution and lastly open reduction and plate fixation can be done. For head fracture mini plate fixation can be opted if fragments are reduced properly. Excision may be tried if it is not reduced.

It was interesting to see if these treatment options have caused problems in the patient's wrist after some period of time. We were able to follow-up the patient for three years post-operatively. After three years, we found that there was terminal restriction of wrist movement with acceptable range of motion with 45 degree of pronation and supination and full range of elbow movement.

No consensus has been reached on, indications for surgery, or a particular choice of surgery till date.

CONCLUSION

So in the present cases, we highlighted the importance of detailed clinical examination and radiological examination as there might be high index of suspicion of double injury of the forearm including both proximal and distal joints with injury described here being probably at the severe end of spectrum of double injuries in the forearm bones. Thereby, it is important to recognize its occurrence, unusual mechanism of injury, and management.

REFERENCES

1. Nagaya H, Saito Y, Warashina H. Simultaneous ipsilateral fractures of distal and proximal ends of the radius. *J Orthop Sci.* 2001;6:439-43.
2. Wang Y, et al., Comminuted fractures of ipsilateral radial head and distal radius: A rare injury pattern. *Chinese Journal of Traumatology.* 2015;18:106e108.
3. Batra S, Andrew JG. Ipsilateral compound distal radius fracture with missed elbow dislocation. A rare injury pattern. *Eur J Emerg Med.* 2007;14:363-4.
4. Simpson JM, Andreshak TG, Patel A, et al. Ipsilateral radial head dislocation with radial shaft fracture. *Clin Orthop Relat Res.* 1991;266:205-8.
5. Vinay Gupta, Zile Singh Kundu, Maneet Kaur, Pradeep Kamboj, Jitesh Gawande. Ipsilateral dislocation of the radial head associated with fracture of distal end of the radius: a case report and review of the literature. *Chinese Journal of Traumatology.* 2013;16:182-185.
6. Mehara AK, Bhan S. Ipsilateral radial head dislocation with radial shaft fracture: case report. *J Trauma.* 1993;35:958-9.
7. Cherif MR, Chehimi A, Ben Ghazlen R, et al. Traumatic dislocation of the radial head associated with ipsilateral fracture of the radial shaft: a case report. *Acta Orthop Belg.* 2002;68:529-31.

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