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Case Report

Ipsilateral proximal and distal radius fractures with unstable elbow joint: Which should we address first?

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ABSTRACT

Simultaneous ipsilateral fractures involving radial head and distal end of radius are uncommon. We present our thoughts on which fracture should be addressed first. A 68-year-old lady sustained an ipsilateral fracture of the right radial head and distal end of radius following a fall. Clinically her right elbow was posteriorly dislocated and right wrist was deformed. Plain radiographs showed an intraarticular fracture of the distal end of radius and a comminution radial head fracture with a proximally migrated radius. Magnetic resonance imaging (MRI) showed no significant ligament injuries. We addressed her distal radius first with an anatomical locking plate followed by her radial head with a radial head replacement. Our rationale to treat the distal end radius: first was to obtain a correct alignment of Lister's tubercle and correct the distal radius height. Lister's tubercle was used to guide for the correct rotation of the radial head prosthesis. Correcting the distal end fracture radial height helped us with length selection of the radial head prosthesis and address the proximally migrated radial shaft and neck. Postoperative radiographs showed an acceptable reduction. The Cooney score was 75 at 3 months postoperatively, which was equivalent to a fair functional outcome.

Introduction

Fractures of only the proximal radius or the distal radius are common injuries of the forearm account for 14% and 17% of all adult extremities in casualty.[1,2] However, simultaneous ipsilateral occurrences of these injuries are an uncommon occurrence with rarely reported. Management of this injury depends on fracture pattern, the degree of displacement, the stability of the fracture, age and physical demand of individual patient.

Case report

A 68-year-old lady presented with right elbow and wrist pain associated with limited motion and deformity following a fall down a flight of stairs. Clinically the right elbow was dislocated with deformity over both elbow and wrist joint. Neurovascular status of the affected limb was intact. Plain radiographs showed posterior dislocation of the right elbow with a comminution fracture of the right radial head and ipsilateral fracture of the distal end of the right radius (Fig. 1 and Fig. 2). Magnetic resonance imaging (MRI) showed no significant collateral ligament injury. Closed manual reduction of the dislocation was conducted however her elbow joint was clinically unstable post reduction.

Open reduction and internal fixation (ORIF) of the distal radius fracture was performed via a modified Henry's approach. An anatomical locking plate was used. Subsequently, we proceeded with radial head replacement utilising the Kocher posterolateral approach. Intraoperatively the lateral collateral ligament of the elbow was noted to be intact. There was a partial tear of less than 25% to the annular ligament. Seven mm radial head prosthesis was chosen and provided good stability to the elbow joint (Fig. 3). The range of motion of the elbow was evaluated prior closure and noted to be impingement-free. The capsule and annular ligament were repaired. Postoperative radiographs showed a good reduction (Fig. 4). The elbow and wrist were immobilised in an above elbow plaster slab for 2 weeks before the range of motion exercises were

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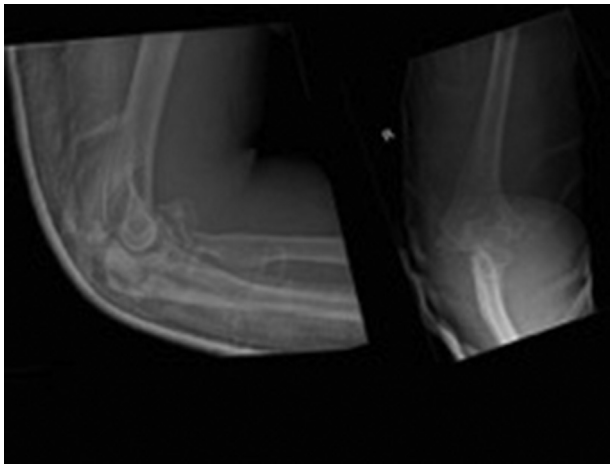

Fig. 1. Preoperative images of the elbow joint showing comminuted fracture radial head after closed manual reduction of elbow.

started. She was assessed at 3 months postoperatively and noted to have a Cooney score of 75.

Discussion

Unstable posterior elbow dislocations with ipsilateral comminution radial head fractures and distal end radius fractures without concomitant ligamentous injuries are an uncommon injury of the elbow. The injury usually results from a strong axial force when the patient falls on an outstretched hand with the elbow in a hyperextended position. The sequence of injury has been postulated to be the distal radius fracture occurring first causing the elbow to be forced into valgus, leading the radial head to impact on the humeri causing secondary fractures of the radial head and or radial neck. Often the resultant stretching force also causes injury to the ulnar collateral ligament. It is interesting to note that the carrying angle of the elbow further predisposes it to increased valgus stress upon radiocapitellar impaction following the fall.[3]

Fig. 3. Posterolateral elbow approach exposing the radial head and capitulum. The radial head prosthesis was implanted and its articulation and congruency of reduction with the capitulum was checked intraoperatively.

We postulate that the instability of the elbow joint following this type of injury could be due to the loss of one of the static stabilizers provided by the concavity-convexity of the articulation of the radial head and capitellum.[4] As seen in our case Mason type IV fractures of the right radial head have been known to cause valgus instability as well as a posteriorly unstable joint.

Whilst managing the distal end radius fracture was straightforward, we felt that the best option for treating the severely comminution radial head fracture was limited to radial head replacement. Radial head replacement surgery has been associated with complications like rotational malpositioning and postoperative proximal migration of the radius.[5] These complications have been associated with poor outcomes. Excision of the radial head has always been a viable treatment option. However, due to the comminution, in this case, we felt replacement was the better option to correct and prevent future proximal migration of the radius. Proximal migration is associated with a positive ulnar variance and ultimately chronic wrist pain.[6]

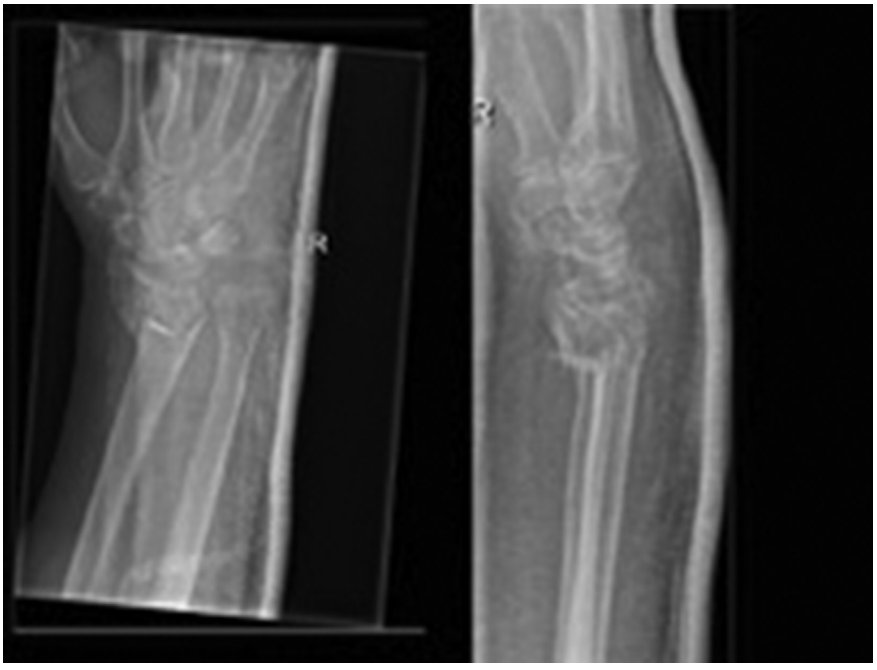

Fig. 2. Ipsilateral comminution fracture the distal radius.

Fig. 4. Postoperative radiograph of both elbow and wrist joint showing a congruent radiocapitullum joint and acceptable radial height and inclination.

Table 1
Summarises previous publications of this type of injury with different treatment options and sequence of fixation.

Study (year)	Age (years)	Gender	Distal Radius	Proximal radius	Sequence of operation
Nagaya et al.[6] (2001)	52	Female	Distal radius fracture (Melone type II)	Radial head (Mason II) and neck fractures + Ulnar collateral ligament injury (UCL)	Distal open reduction and bone graft plus external fixation then proximal screw fixation for radial head
Agarwal et al.[2] (2007)	45	Male	Undisplaced intra-articular fracture	Ipsilateral radial neck fracture	Simultaneous full length cast
Agarwal et al.[2] (2007)	30	Female	Comminuted fracture	Radial neck fracture	Simultaneous full length cast
Agarwal et al.[2] (2007)	45	Female	Comminuted fracture	Comminuted fracture neck of radial and olecranon fracture	Proximal closed manipulation reduction (CMR) and percutaneous wiring of neck of radial and tension band wiring (TBW) of olecranon.
Agarwal et al.[2] (2007)	12	Male	Salter-Harris type II distal end radius	Salter-Harris type II proximal end radius and fracture proximal and distal end of ipsilateral ulna	Simultaneous full length cast
Agarwal[2] (2007)	11	Male	Salter-Harris type II distal end radius	Displaced fracture dislocation proximal radial epiphysis and chip fracture olecranon tip	Addressing proximal fracture then distal fracture Proximal – Open reduction and K-wiring, distal CMR and K-wiring
Khalid[8] (2013)	42	Male	Fracture distal end of radius	Undisplaced radial neck fracture (Mason I)	Distal –open reduction with internal fixation, Proximal – full length cast.

We addressed ORIF for the distal end of radius first to restore the radial height and obtain an anatomical reduction of the intra-articular fragments. Restoring the distal end radial height helped us decide on the radial head prosthesis length size. Too short a length would have an inadequate offset at the elbow joint leading to instability of the joint and radiocapitellar instability whereas too long a length would have led to overstuffing. Anatomical reduction of the fragments allowed us to get a correct alignment of Lister's tubercle which was vital for us to use to get the correct rotation of the radial head prosthesis.

Table 1 summarises previous publications of this type of injury with different treatment options and sequence of fixation. It is important to state that none of these reported cases had a comminution Mason IV fracture which necessitated a radial head replacement like ours. Nagaya reported a Mason II fracture and a sequence of fixation similar to ours.[7] Agarwal chose to treat one paediatric case with a Salter-Harris type 2 fracture of the proximal radius first.[2]

Except for one case in Agarwal's series who suffered a radial head avascular necrosis, all the cases had acceptable to good function. Our patient had a Cooney score of 75 at 3 months which is equivalent to a fair functional outcome.

In conclusion, ipsilateral distal end radius and proximal end radius fractures are uncommon injuries. If surgery is indicated, we suggest fixing the distal end radius first followed by the proximal radius. If performing the radial head replacement, landmarks for correct prosthesis rotation and tensioning at the elbow joint are vital for good clinical outcomes.

Funding

Nil.

Ethical statement

Informed consent has been obtained from the patient or relatives.

Conflicts of interest

There are no conflicts of interest associated with this article.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cjtee.2018.04.007.

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