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Case Report

# Ipsilateral comminuted distal radius and comminuted radial head fractures with posterolateral elbow dislocation: A case report and literature review

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ABSTRACT

We report an uncommon case of ipsilateral comminuted distal radius and comminuted radial head fractures with posterolateral elbow dislocation. A 51-year-old female had a fall that resulted in a comminuted distal radius fracture with an ipsilateral comminuted radial head fracture and posterolateral dislocation of the elbow. Clinical evaluation revealed that her left elbow was posteriorly dislocated and her left wrist was deformed. Plain radiographs showed an intraarticular fracture of the distal end of the radius and a comminuted radial head fracture with a proximally migrated radius. Magnetic resonance imaging (MRI) also showed lateral ulnar collateral ligament injuries. We addressed her distal radius with an anatomical locking plate and then treated her comminution radial head fracture with a radial head replacement. Postoperative radiographs showed a good reduction. The Cooney score was 90 at one year postoperatively.

## Introduction

Fractures of only the proximal or distal radius are common injuries of the forearm, accounting for 14 % and 17 %, respectively, of all adult extremity casualties [1]. However, the association of a comminuted distal radius fracture with a concomitant ipsilateral comminuted radial head fracture with posterolateral elbow dislocation has rarely been mentioned in the literature [2–6].

We report a 51-year-old female who presented with a closed comminuted intraarticular distal radius fracture and concomitant ipsilateral comminuted radial head fracture with the posterolateral elbow dislocation, both injuries were well managed surgically.

A 51-year-old woman complained of pain and swelling in her left wrist and elbow due to a fall off from her bicycle on an outstretched hand. There was no history of injury to any other part of the body. She was then sent to the emergency department of our hospital. On examination, her left wrist and elbow were swollen and deformed. Bone crepitus could be felt at the left wrist joint, suggesting a fracture, while the elbow was flexibly fixed and deformed, causing pain and loss of range of motion. The neurovascular status of the affected limb was normal. Plain radiographs and three-dimensional computed tomography (CT) revealed a severely-comminuted distal radius fracture along with ipsilateral comminuted radial head fracture and posterolateral elbow dislocation (Fig. 1a–g).

Closed manual reduction of the elbow joint dislocation was performed in the emergency department, followed by an above-elbow

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**Fig. 1.** A 51 years old female. Ipsilateral comminuted distal radius fracture and comminuted radial head fracture with posterolateral elbow dislocation of the left side.
a–d. CT of the left wrist after injury showed comminuted distal radius fracture with loss of radial height (as show by red line).
e–f. CT of the left elbow after injury showed comminuted radial head fracture with posterolateral elbow dislocation.

h–i. AP and lateral X-ray of the left wrist after emergency manual reduction showed comminuted distal radius fracture with unrestored of radial height (as show by blue line).
k–l. AP and lateral X-ray of the left elbow after emergency manual reduction showed dislocation of the elbow has been reduced.
m–n. CT of the left elbow after emergency manual reduction showed dislocation of the elbow has been reduced with comminuted radial head fracture.
o–p. fluoroscopy during operation after open reduction and internal fixation of comminuted distal radius fracture showed a good reduction with an improvement of radial height compared with a pre-operation (as shown by green line).
q–s. comminuted radial head fracture treated with radial head replacement showed the good position of prosthesis intraoperative and fluoroscopy during operation.
t. fluoroscopy with AP view of the left wrist after radial head replacement showed improvement of radial height compared that before radial head replacement (as shown by yellow line).
u–v. AP and lateral X-ray of the left elbow on the first day after operation showed the good position of the prosthesis.
w–s. AP and lateral X-ray of the left forearm on the first day after operation showed good reduction and alignment of distal radius fracture.
y–z. CT of the left wrist on the first day after operation showed good reduction and alignment of distal radius fracture as well as radial height restore (as shown by the orange line).

cast plaster immobilization. She was admitted after an X-ray reexamination (Fig. 1h–l). Routine CT and magnetic resonance imaging (MRI) reexamination was done upon admission. CT (Fig. 1m–n) indicated that the elbow joint dislocation was reduced but still with comminuted radial head fracture. However, her elbow joint was clinically unstable after reduction. MRI showed significant injury to the lateral collateral ligament of the elbow as well as an avulsion fracture of the left humerus lateral condyle. She underwent surgery under brachial plexus block anesthesia 10 days after the injury when the soft tissue swelling had subsided. First, open reduction and internal fixation (ORIF) of the comminuted distal radius fracture was performed with a locking plate by the modified Henry's approach firstly. We then proceeded with radial head replacement using the Kocher posterolateral approach. Intraoperatively, we found that elbow stability tests were positive while the lateral collateral ligament was completely torn; an anchor was then placed in the lateral condyle of the humerus to repair the torn collateral ligament, followed by the radial joint capsule and radial ring ligament. Elbow stability was retested negative. The passive range of elbow motion was normal without impingement. Antero-posterior and lateral view X-ray of the left elbow and forearm (Fig. 1u–s) on postoperative day 1 showed a good positioning of the prosthesis as well as good reduction and alignment of the distal radius fracture. The elbow and wrist were immobilized in an above-elbow plaster brace for two weeks before the range of motion exercises. The Cooney score was 90 at one year postoperatively (Fig. 2c–f). CT and X-ray of the left wrist one year postoperatively showed good union of the distal radius fracture and good aliment of the elbow after radius radial head replacement (Fig. 3a–f).

## Discussion

The association of a comminuted distal radius fracture with a concomitant ipsilateral comminuted radial head fracture with posterolateral elbow dislocation is an uncommon injury of the elbow. Such injuries have been rarely described in the literature [5,6]. Of these reported cases, only one required a radial head replacement for a comminuted radial head fracture as we did [5].

This injury is usually caused by strong axial forces when the patient falls while the extended elbow is in an over extension position. We assumed that the occurrence of the distal radius fracture caused the elbow to be forced into valgus and supination. Then, this resulted in the avulsion of the ulna collateral ligament from the lateral condyle of the humerus, and the radial head impingement on the humerus resulted in a secondary fracture of the radial head. It is interesting to note that the carrying angle of the elbow further predisposed it to increased valgus stress upon radiocapitellar impaction following the fall.

## Treatment

In this case, a comminuted fracture of the distal radius was associated with a comminuted fracture of the ipsilateral radial head with posterolateral dislocation of the elbow. Although elbow dislocations have historically been manually reduced, there may still be instability of the elbow after this type of injury [4] due to the loss of one of the static stabilizers provided by the concavity of the radial and microcephalic joints. Radial head excision leads to elbow instability, proximal mitigation of the radius, and distal radioulnar joint disorder causing chronic wrist instability. We deemed that the best option for treating such a severe comminution radial head fracture was a radial head replacement, which could avoid proximal mitigation of the radius and chronic wrist instability. Preoperative MRI showed a tear of the ulnar collateral ligament, which was confirmed to be completely avulsed from the lateral condyle of the left humerus. After radial head replacement, elbow stability tests were positive under anesthesia, so the ligament was repaired with an anchor.

## Which injury was treated first?

ORIF of the comminuted distal radius fracture was performed first. We then proceeded with radial head replacement as well as the ulnar collateral ligament repair. This is because by ORIF, we were able to restore the normal anatomy of the distal radius and anatomic reduction of the intraarticular fracture of the distal radius. Anatomical reduction of the fragments allowed us to get a correct alignment of Lister's tubercle which was vital for us to get the correct rotation of the radial head prosthesis.

Second, restoring the normal anatomy and distal radius height helped us determine the length and size of the radial head prosthesis.

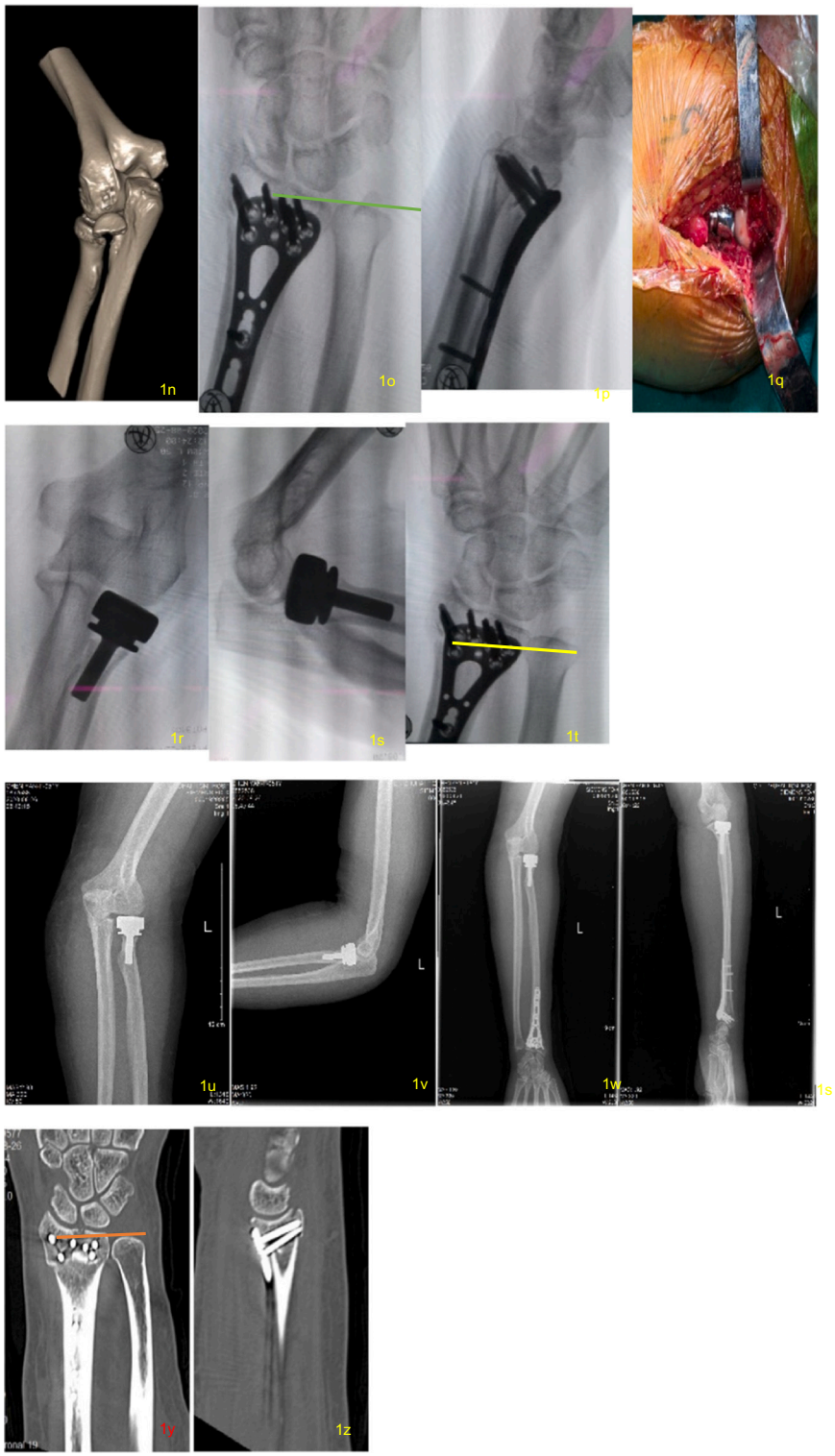


**Fig. 1.** (*continued*).

Too short a length would have an inadequate offset at the elbow joint leading to radiocapitellar instability whereas too long a length would lead to overstuffing. Although the height of the distal radius was improved after open reduction and internal fixation, proximal radius displacement was still present in the untreated comminuted fractures of the radial head. Intraoperatively, we found that the


**Fig. 2.** a–b. The left elbow joint recovered well one-week post-operation.
c–h, The left elbow and wrist joint recovered very well one-year post-operation.

radial height was on the same line as the distal ulna as shown by fluoroscopy (shown by the green line) (Fig. 1o), and the radial height showed more improvement than before radial head replacement which was higher than the line of distal the ulna (shown by the yellow line) (Fig. 1y). Contrary to the view of ORIF, the height of the distal radius can be restored, which helps us to determine the length of the radial head prosthesis [5].

In conclusion, concomitant ipsilateral distal end radius and proximal end radius fractures are uncommon injuries. This case reminds us of the possibility of an injury with elbow dislocation combined with a fractured ipsilateral distal end radius. It is very important to assess the wrist joint especially run in the patients with an elbow dislocation caused by a high-energy injury. For these patients, we should include wrist X-rays, which will help reduce or avoid misdiagnosis. The management of this injury depends on the fracture pattern, degree of displacement, stability of the fracture, age, and physical demand of the patient. If surgery is indicated, we suggest fixing the distal end radius, followed by the proximal radius fixing or radial head replacement.

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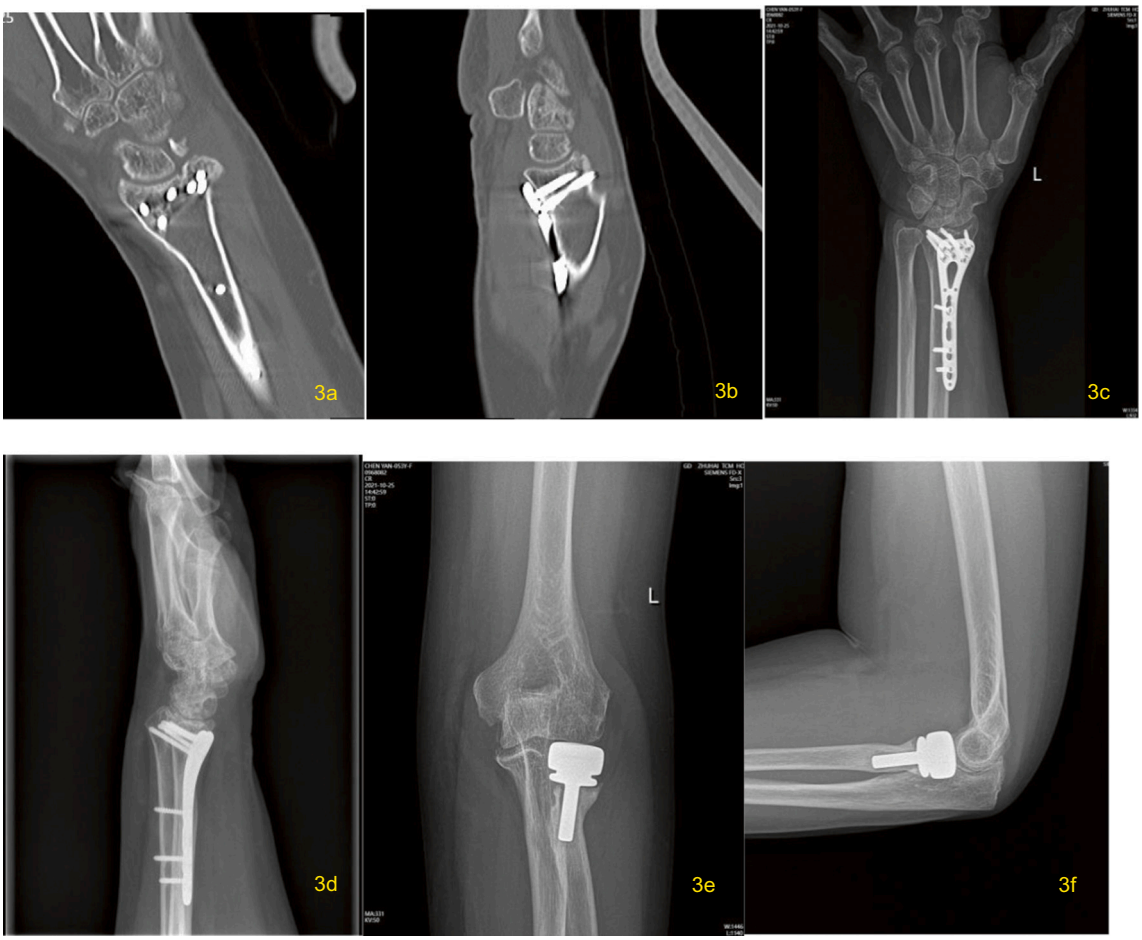


**Fig. 3.** a–d. CT and X-RAY of the left wrist one-year post-operation showed good union of distal radius fracture.
e–f. X-ray of the left elbow joint one-year post-operation showed good aliment of elbow after radius head replacement.

## Consent for publication

The patient was informed that data from the case would be submitted for publication. The authors confirm that informed consent was obtained from the patient for the publication of this case report.

## Conflict of interest

None.

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All authors declare that no benefits in any form have been, or will be received, from any commercial party related directly, or indirectly, to this study.

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