

Elbow Fracture Dislocation in Adult: A Case Report

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Abstract

Elbow dislocation may lead to disabling consequences such as elbow instability or stiffness. Complex elbow dislocation is associated with expected fracture patterns such as radial head, coronoid process, and terrible triad. On the other hand, simple dislocation is the dislocation without bony injury and is associated with a favorable prognosis. The following report describes a thirty-eight-year-old male who developed complex posterolateral elbow dislocation with irreducible trochlear fractures that blocked the reduction and mandated open reduction.

Keywords: Elbow Dislocations, Capitellum fracture, Trochlear Fracture, Posterolateral elbow dislocation, Simple, Complex.

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1. INTRODUCTION

Elbow dislocation is an unpleasant injury associated with significant morbidities such as stiffness or instability [1, 2]. Isolated dislocation is called simple dislocation, while in the presence of associated osseous injury is called complex dislocation [3, 4]. Associated fractures usually follow common patterns [5]. However, some patterns are uncommon. Proper bone fixation and awareness of soft tissue injury with proper physiotherapy improve the outcomes [6, 7].

This report describes a thirty-eight-year-old male who developed complex posterolateral elbow dislocation with irreducible Trochlear fracture that blocked the reduction and mandated open reduction.

2. CASE PRESENTATION

A thirty-eight-year-old male slipped from ground level after twisting on the sidewalk edge and fell on his left side while the forearm turned behind his trunk and left elbow flexed on his back. The patient developed immediate pain and gross deformity of the

left elbow and paresthesia along with the distribution of the ulnar nerve but with no wounds nor bruises in his limb. The patient attended the emergency department within an hour of his injury.

Initial radiographs revealed a posterolateral elbow dislocation with an undefined fracture pattern. A trial of reduction under sedation revealed an irreducible, highly unstable elbow, **Figure 1**. Therefore, a cast was applied and pulses and neurological exams were checked. Apart from paresthesia along the ulnar nerve, the neurovascular exam was unremarkable.

For better evaluation of the injury, an elbow CT scan showed that the proximal forearm displaced posteromedially after the reduction trial due to high unstable elbow. The trochlea is fractured and incarcerated in the olecranon fossa and blocks the reduction. The capitellum is fractured and non-displaced. The lateral collateral ligament is avulsed from humeral insertion with a big bone piece, **Figure 2**.

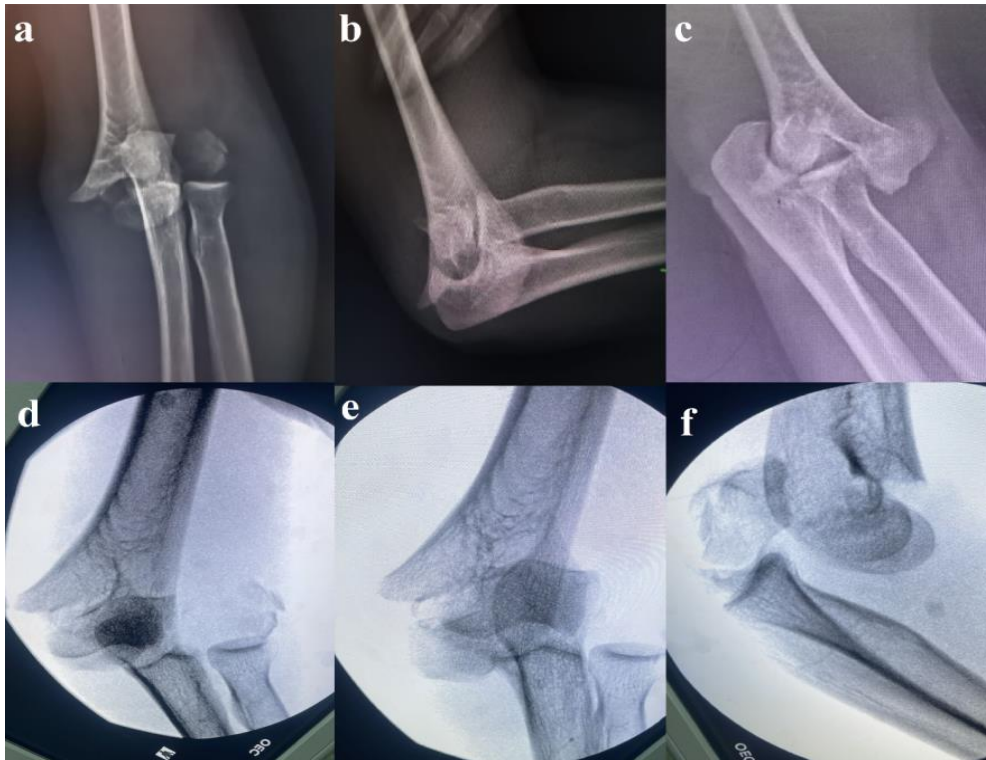


Figure 1: (a, b) Initial elbow radiographs obtained at the emergency room, poor quality images but the only available preproduction images. (c–f) Post elbow trial of reduction radiographs in different views demonstrated non-reduced elbow

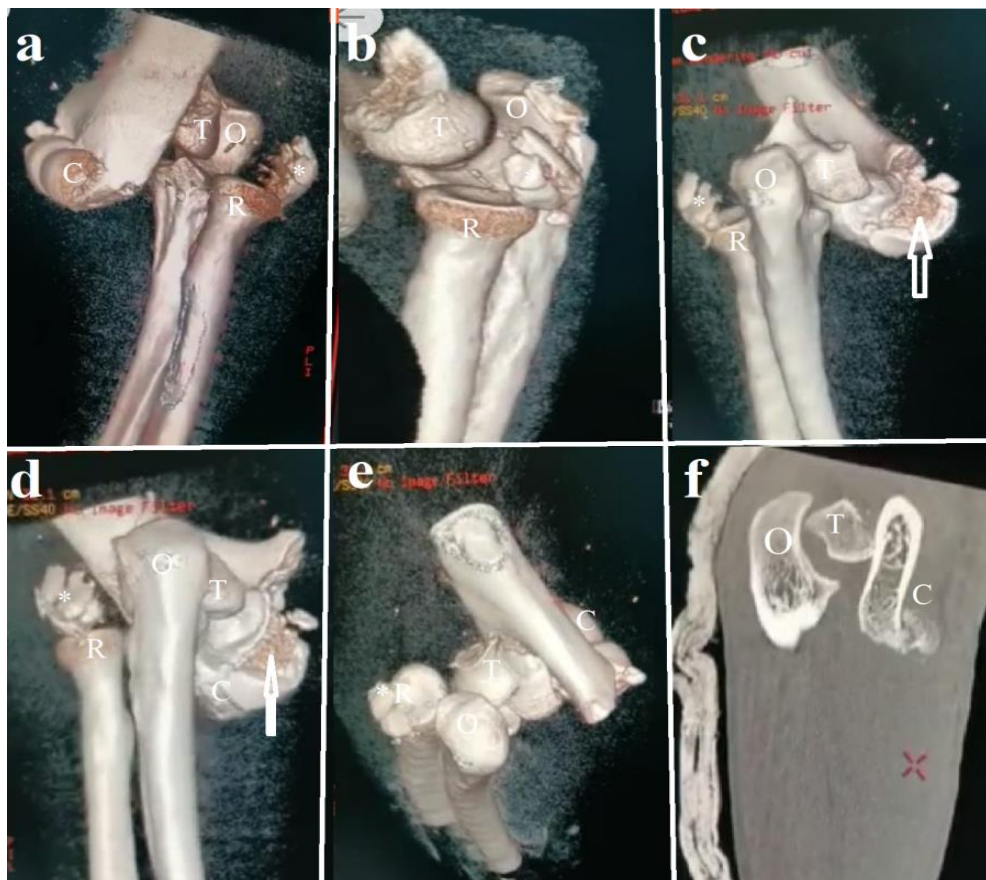


Figure 2: Post elbow trial of reduction CT scan. (a–e) Three dimensional CT scan revealed dislocated radiocapitellar joint and incarcerated trochlea within the olecranon fossa. (f) Sagittal cut demonstrated incarcerated trochlea within the olecranon fossa. (O: Olecranon, T: Trochlea, C: Capetellum, R: Radial head, Asterix: avulsed lateral collateral ligament).

The patient was prepared for the surgery in next morning as he presented to the emergency department in the evening. Surgery was performed under general anesthesia, the patient was placed in the lateral position, and his arm was supported on the arm board. No tourniquet was used. A standard midline posterior incision with an ulnar curve was made. The medial and lateral para-tricipital window was opened and the ulnar nerve was identified and protected. Chevron osteotomy was marked and predrilled; then, the osteotomy was performed with an oscillating saw and was completed by the osteotome. The osteomized olecranon was reflected with the attached triceps to visualize the fracture. The intraoperative findings revealed displaced trochlea compressing the ulnar nerve, non-displaced capitellar fracture, and avulsed lateral collateral ligament.

Fracture fragment was assembled and reduction was preliminary fixed by three 1.8 mm Kirshner wires. The reduction was confirmed clinically and radiologically and the definitive fixation of the trochlea and the capitellum was achieved by two parallel 3.5 mm Herbert screws from the ulnar to the

radial side. The fracture was very distal and the plate was not applied as the distal whole screw did not cross the articular fragment. Therefore, the articular fragment was fixed to metaphysis by four screws, and one 3.5 mm cannulated screw from medial epicondyle to humeral metaphysis and three locking screws fixing the lateral fragment as the maximum available Herbert screw was 30 mm. Two locking screws fix the capetellum to the lateral metaphysis, one through the articular surface after burring it under cartilage and the other one from the non-articular surface. The third screw fixed the capetellum to the medial epicondyle.

Fixation security was ensured, the lateral collateral ligament was attached using a 4.5 mm anchor, and the chevron osteotomy was repositioned and fixed by a 6.5 mm cannulated screw with a tension band, **Figure 3**. Elbow joint stability was tested and found stable. No need for ulnar nerve transposition upon intraoperative assessment. The wound was closed, and a dressing and a posterior slab were applied for two weeks. The patient complained of the same preoperative paraesthesia postoperatively, but his examination was normal.

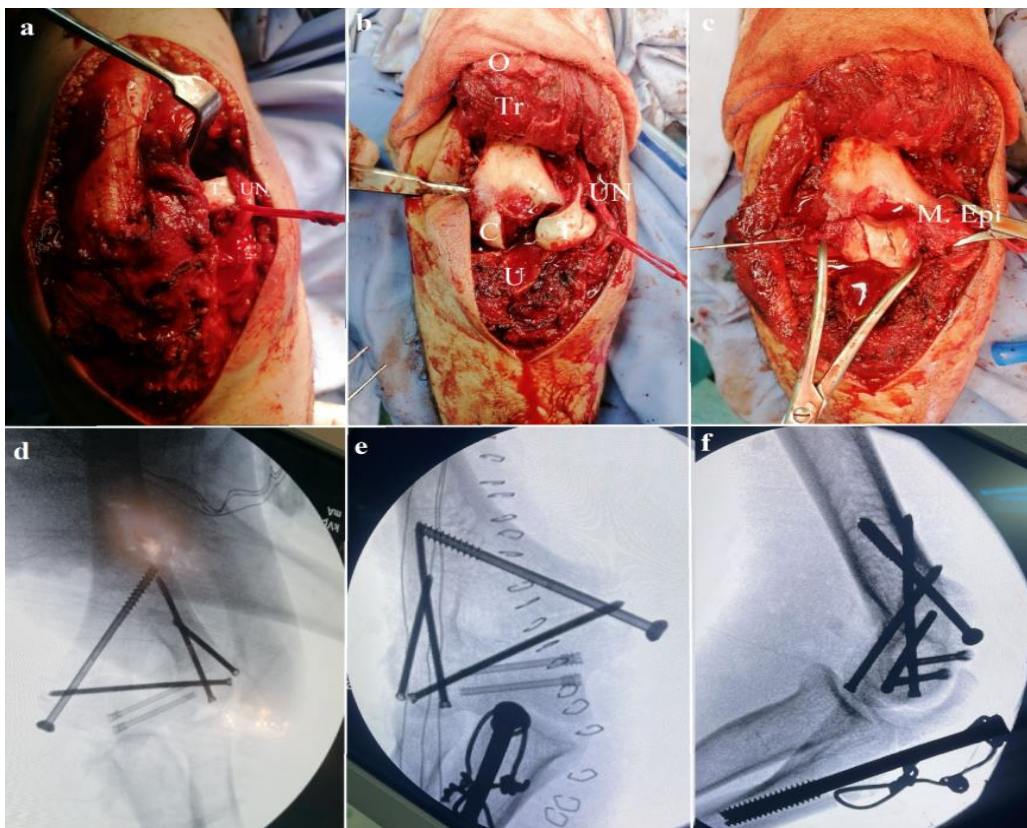


Figure 3: (a, b) Intraoperative findings demonstrated a displaced medial condyle fragment by pulling the flexor-pronator mass and attached ulnar collateral ligament; the ulnar nerve is swollen. (c) Preliminary fixation with reduction clamps and Kirshner wires. (d-f) Definitive fixation with two partially threaded 3.5 mm screws for the trochlea and the distal intra-articular column fixed by one medial and three lateral screws.

After two weeks, the slab and stitches were removed, and a hinged elbow brace was applied for a further four weeks to allow healing of the lateral collateral ligament while allowing an early range of movement. Ulnar nerve distribution paresthesia was still present. The patient was initiated into a rehabilitation program, and flexion-extension and supination-pronation movements were allowed while a hinged brace was maintained for a further four weeks to allow for collateral ligament healing.

The fracture healed at six weeks, **Figure 4**, and the patient regained at eight weeks after surgery 90° of flexion and 165° of extension (contralateral elbow 140° flexion – 180° extension) and 90° - 85° pronation supination arc (contralateral 90° – 90°), **Figure 5**. Paresthesia resolved, and the patient commenced an extensive physiotherapy program.

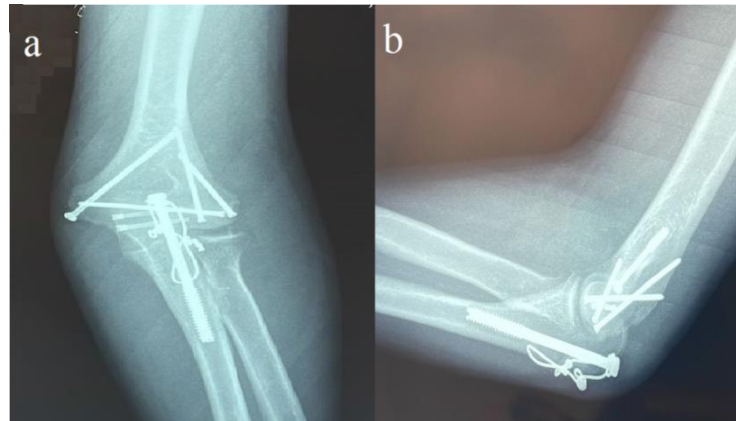


Figure 4: Eight-weeks post-operative radiographs. (a) Anterior-posterior view. (b) lateral view

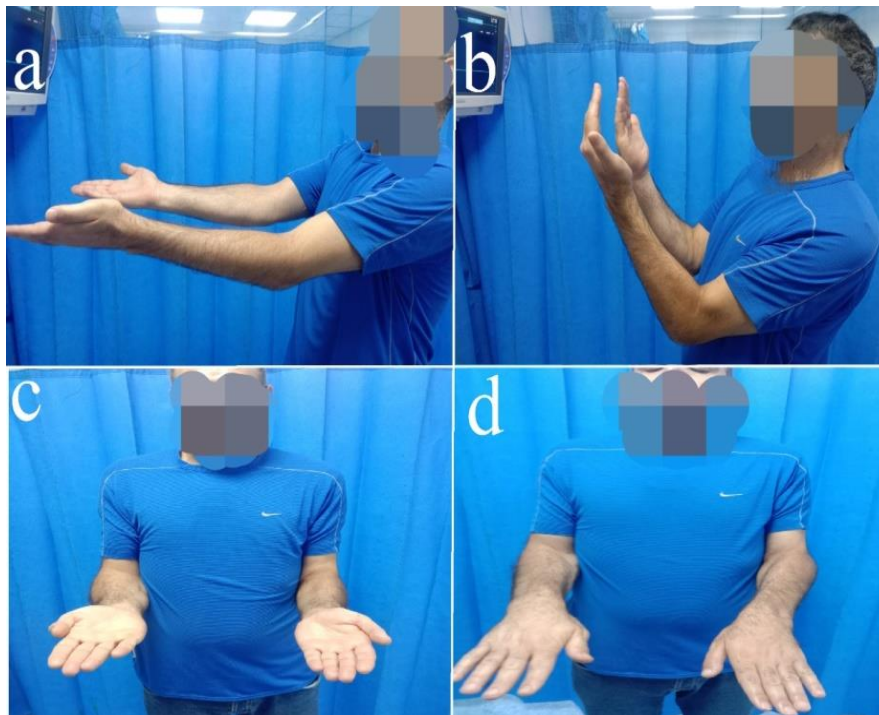


Figure 5: Elbow range of motion at eight weeks' post-operation. (a) elbow extension (left 165° , right 180°). (b) flexion (left 90° , right 140°). (c) supination (left 90° , right 85°). (d) pronation left (90° , right 90°)

3. DISCUSSION

Knowing the pattern of elbow fracture-dislocation help in planning for treatment and gives clues toward the prognosis. Accordingly, the surgeon can anticipate the complication of each injury. Therefore, a specific technique for each injury can aid in restoring elbow function and reducing complications.

Simple dislocation is treated by early rehabilitation and carries a superior prognosis. However, fracture-dislocation usually needs surgical treatment, and the prognosis is less favorable.

The kinematics of elbow dislocation are combined forces in three dimensions where axial

loading with valgus or varus load and the forearm rotation and position of the elbow determine the extent of the bony failure and the direction of dislocation [8].

Trochlea fracture is usually associated with the elbow dislocation, medial condyle, or capitellar fracture [9]. However, an isolated trochlear fracture is a rare injury secondary to its anatomical position within the trochlear notch and its lacking ligamentous and muscular attachment [10]. The radio-capitellar joint is prone to higher shear force than the ulno-humeral joint, which explains a higher fracture rate than the trochlea [11].

In our case, the initial radiographs revealed posterolateral dislocation. However, after a reduction trial, the elbow was highly unstable, and the elbow was displaced in the posteromedial direction, as the preoperative CT scan revealed. CT scan showed that the trochlea is fractured and incarcerated in the olecranon fossa and precludes the reduction. The capitellum is fractured and non-displaced. The lateral collateral ligament is avulsed from humeral insertion with a big bone piece.

Articular fractures require anatomic reduction and rigid fixation to allow early joint mobility to prevent stiffness. Although interfragmentary screws fixation provided rigid fixation, it was safer to apply a dual neutralizing plate on the medial and lateral distal humerus cortex. The fracture was very low on the lateral cortex, and therefore, the available plate could not hold the distal fragment. We feel that the fixation intraoperatively was rigid and a plate was not applied to the medial cortex. Fortunately, the fracture healed at six weeks without displacement regardless of the commencement of early and extensive range of movement.

4. CONCLUSION

Complex elbow dislocation is an unpleasant injury and is associated with significant morbidity. Proper bone fixation and awareness of soft tissue injury with proper physiotherapy improve the outcomes.

Data Availability: The data used to support the study can be available upon request.

Ethical Approval: The study protocol was reviewed and approved by the local ethical committee of the Jordanian Royal Medical Services.

Consent: Written consent was obtained from the patient to publish this case report and any accompanying images.

Conflict of Interest: The authors state no conflict of interest.

Authors' Contributions: The authors have accepted responsibility for the entire content of this submitted manuscript and approved submissions.

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