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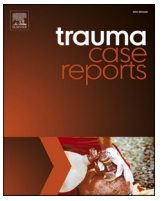

Case Report

Elbow dislocation associated with bifocal radial fracture: A case report

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ABSTRACT

Introduction: Radial diaphyseal fractures are relatively common in daily trauma practice. We present a unique case of a bifocal radial fracture associated with a posterolateral elbow dislocation.

Case report: A 36-year-old obese female patient was admitted to our service after a low-energy fall in stairs. She presented with a radial diaphyseal fracture, a radial neck fracture with approximately 15° angulation, and a posterolateral elbow dislocation. The first procedure involved an urgent reduction of the elbow dislocation, followed by surgical fixation of the bifocal radial fractures and reattachment of the external and posterolateral elbow structures.

Conclusion: A bifocal radial fracture associated with an elbow dislocation is, to our knowledge, a previously unreported injury. The clinical outcome after osteosynthesis and elbow stabilization was favorable.

Introduction

Elbow dislocations are relatively common and potentially serious injuries in upper limb trauma. Elbow dislocations are often associated with fractures of the radial head or coronoid process, indicating damage to the various stabilizing structures of the elbow [1].

The combination of a radial diaphyseal fracture and an elbow dislocation is much rarer, although several case reports have been published in the literature [2–5]. A radial diaphyseal fracture is typically associated with a distal radioulnar dislocation, known as a Galeazzi fracture [6,7]. The most recent article mentions 15 cases with favorable outcomes [8]. A rare case of an elbow dislocation with a radial diaphyseal fracture was described, but without radial head involvement, which spontaneously reduced after reduction of the radial diaphysis [9].

The objective of our study was to present the case of a patient who sustained a right upper limb trauma with an elbow dislocation associated with a bifocal radial fracture, which appears to be the first case described in the literature.

Patient and observation

A 36-year-old female patient with obesity (Body Mass Index: 34) presented to our service after a fall down the stairs, causing an indirect injury to her right elbow.

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Fig. 1. X ray before elbow reduction.

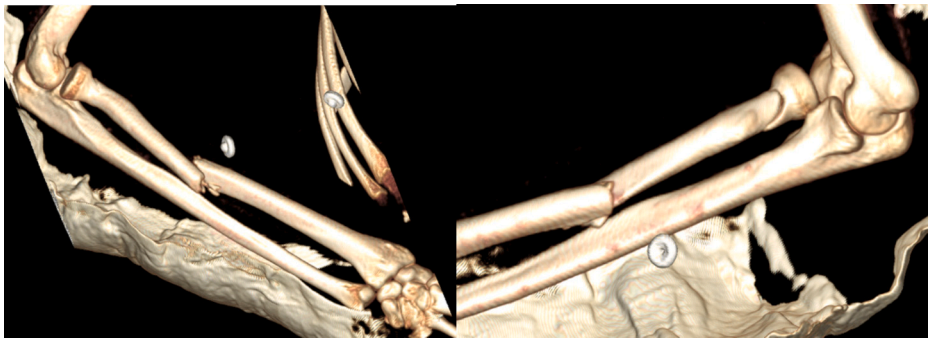

Fig. 2. 3D reconstruction of the bifocal radial fracture after elbow reduction.

Fig. 3. Post-operative X rays.

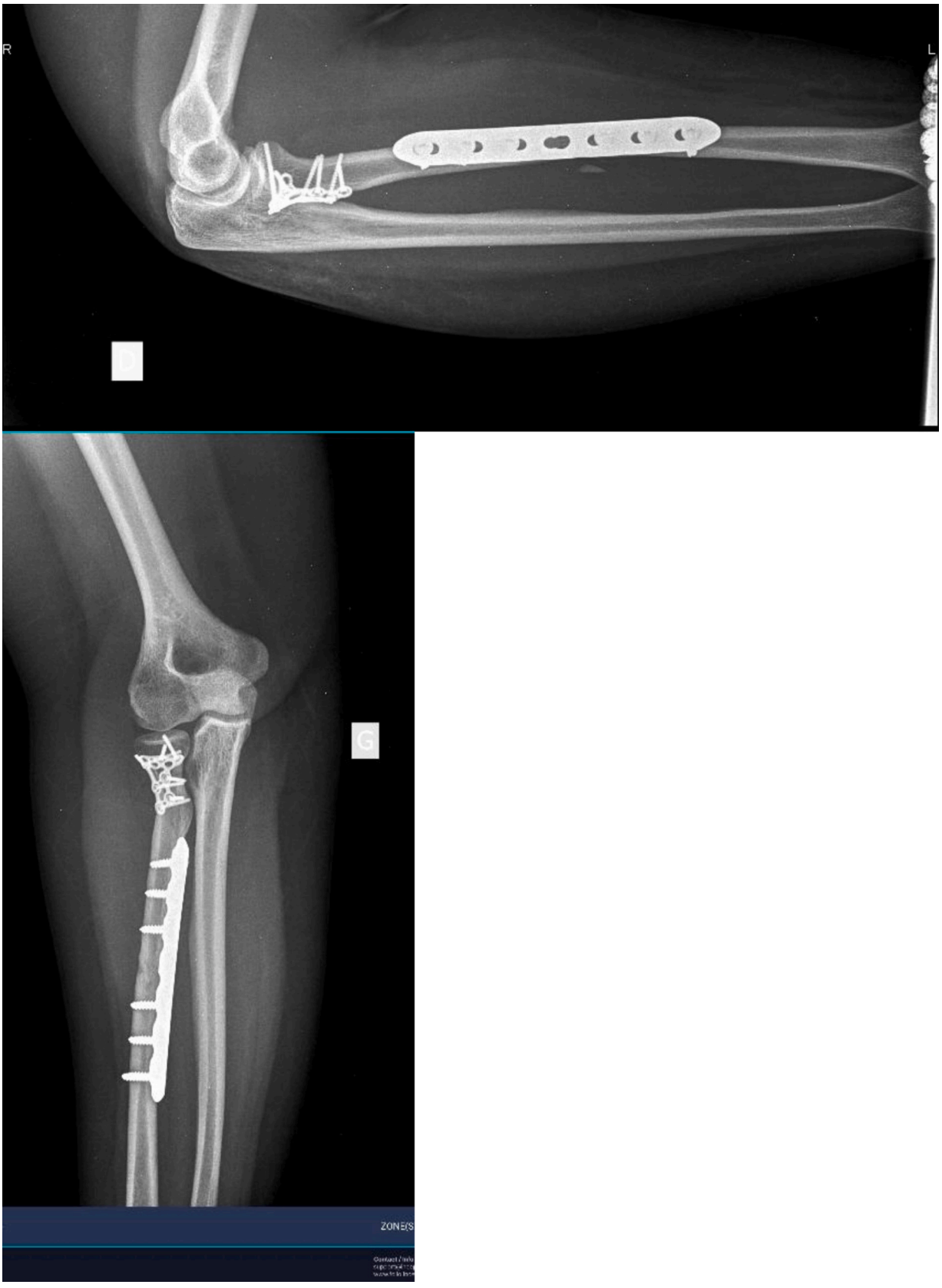

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Fig. 4. X rays at 5 months of follow-up.

The initial clinical examination showed signs of trauma to the upper limb, without any distal neurovascular deficit.

Radiographs (Fig. 1) revealed a 2R2A2 radial diaphyseal fracture and a 2R1A2 radial neck fracture with approximately 15° of angulation, along with a posterolateral humeroulnar dislocation.

The first step was an emergency reduction of the humeroulnar dislocation. Ligament testing was difficult due to the diaphyseal fracture. The patient was immobilized in a BABP splint, and a computed tomography (CT) scan was performed to assess the potential involvement of the stabilizing structures of the elbow (Fig. 2). No coronoid involvement was noted.

The second step involved osteosynthesis of the radial diaphysis under regional anesthesia using a compression plate (Synthes), with a working length two screw holes and a lever arm spanning six contiguous cortices on both sides (Fig. 3).

The third step involved elbow testing, which showed no recurrence of dislocation up to −40° extension, but a persistent displacement of the radial neck fracture.

The fourth step included a reduction and osteosynthesis via a Cadenat approach (between the ulnar extensor and the anconeus muscle), exposing the fracture, particularly the metaphyseal shift, while protecting the motor branch of the radial nerve by keeping the elbow in pronation. The fracture was then stabilized using an anatomical radial head plate (Trilock Radial Head Plates, Medartis), and the posterolateral structure was reattached. Given the good stability of the elbow, no additional medial procedure was performed.

The patient was immobilized for 6 weeks in a brachio-antebrachial-palmar splint, with immediate rehabilitation for flexion and extension. Pronation and supination were allowed starting from the third week.

At 6 weeks, the patient's range of motion was as follows (in degrees): Flexion-extension: 10°/0°/20°; Pronation-supination: 0°/0°/10°, with a deficit in thumb flexion. At 3 months, the range of motion was: Flexion-extension: 0°/40°/120°; Pronation-supination: 0°/60°/110°, with radial hypoesthesia but no motor deficit. At 5 months (Figs. 4 and 5), the range of motion improved to: Flexion-extension: 0°/10°/140°; Pronation-supination: 0°/20°/180°, with complete recovery of thumb flexion and partial hypoesthesia in the radial nerve territory. The patient was able to resume her professional activities at 5 months postoperatively, working as a funeral director.

Discussion

To our knowledge, this is the first reported case of a bifocal radial fracture associated with an elbow dislocation.

Radial head synthesis

While reduction of the elbow and fixation of the radial diaphysis seemed necessary in this young patient, the decision to perform additional osteosynthesis of the radial head is debatable.

The residual angulation of approximately 15° posed a risk of conflict during pronation-supination [10,11], as well as the potential for radial head dislocation if a metaphyseal malunion occurred, which might later require corrective osteotomy [12]. A recent study [13] showed a clinical correlation between angulation and poor function. In our case, correction of the angulation seemed necessary, especially since the radial head is a secondary stabilizer of the elbow.

Management of elbow stabilizers

In posterolateral elbow dislocation, O'Driscoll describes a circular involvement of the elbow's ligamentous structures. First, there is damage to the lateral collateral ligament, followed by posterolateral subluxation, with the coronoid acting as a secondary stabilizer. Finally, damage to the medial collateral ligament leads to the posterolateral elbow dislocation.

The mechanism of posterolateral dislocation is still debated [14,15]. Repair of the posterolateral structure, along with management of the radial head, is often sufficient to achieve stability. In our case, the osteosynthesis of the radial head, correcting the cervical angulation, along with robust repair of the ligamentous and posterolateral structures (including transosseous reattachment of the epicondylar insertions), resulted in an acceptable level of stability, allowing for early rehabilitation.

Bifocal radial fracture

Rare cases of bifocal radial fractures have been described, usually following high-energy trauma [16]. The patient's high body mass index likely contributed to the severity of the injury despite the low-energy fall [17].

Conclusion

This clinical case highlights a previously undocumented combination of injuries and the surgical strategy that resulted in successful healing and a good clinical outcome.

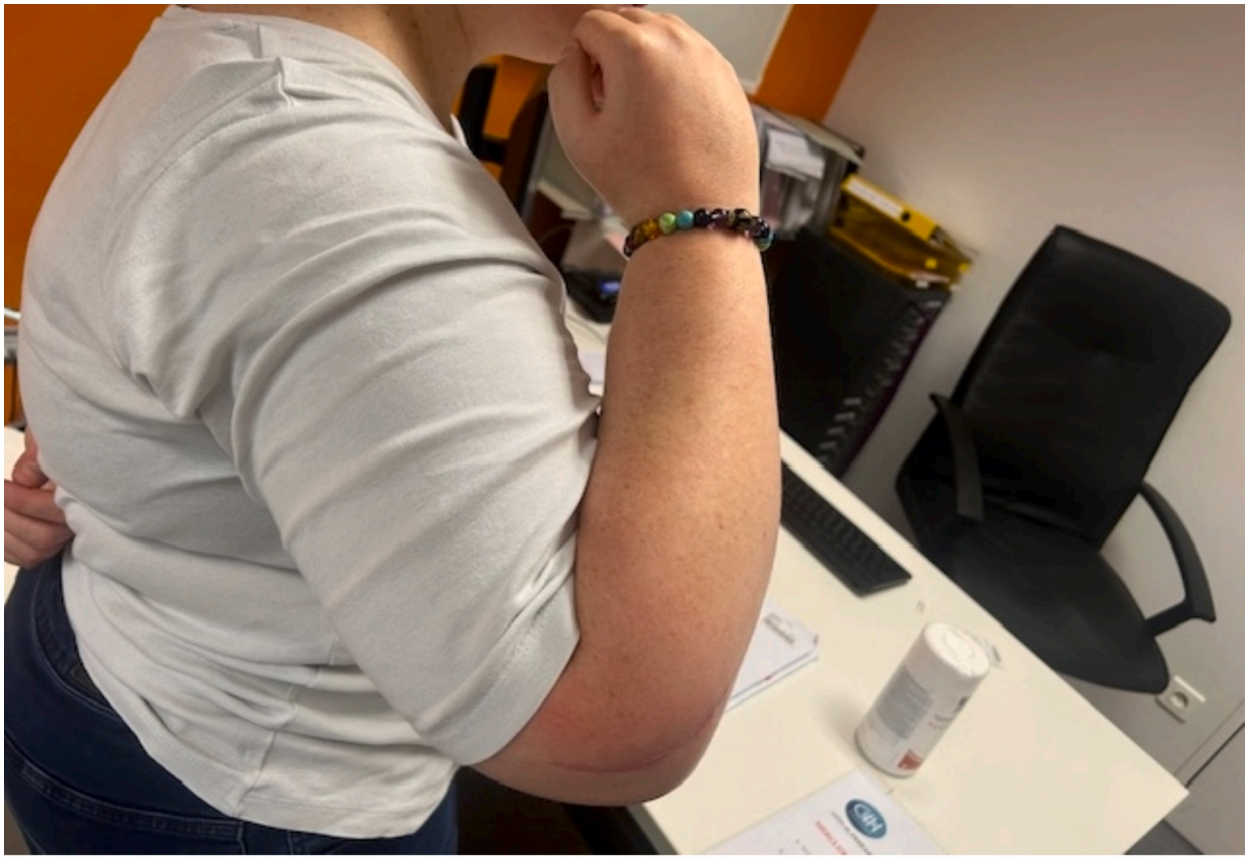

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Fig. 5. Elbow range of motion at 5 months of follow up.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used chatGPT in order to help for the traduction from French to American English. After using this tool, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the published article.

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CRediT authorship contribution statement

Guillaume Auberger: Validation, Writing – original draft, Writing – review & editing. **Philippe Leclerc:** Validation, Writing – review & editing. **Simon Marmor:** Supervision, Validation.

Declaration of competing interest

GA, PL, and SM have nothing to declare in relation with this work.

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