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Isolated intraarticular fracture of distal ulna: Case report of a rare injury

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Abstract

The distal radioulnar joint (DRUJ) is an integral part of the structures necessary for performing the movements of pronation and supination of the forearm, wrist, and hand. Any alteration affecting this structure will lead to an imbalance in the kinetics of the wrist and forearm, resulting in limitations in the patient's daily life activities.

We report a rare case of an isolated intra-articular fracture of the head of the ulna, which has been poorly described in the literature, as well as the treatment instituted.

A 20-year-old healthy woman, who presented to the Emergency Department after a fall, that resulted in clinical symptoms of pain, swelling, and functional impairment of the left wrist. Wrist X-rays revealed an isolated distal ulnar fracture. A Computed Tomography scan confirmed an intra-articular fracture with dorsal displacement.

The patient underwent surgical treatment with Wide Awake Local Anesthesia No Tourniquet (WALANT). Open reduction and fixation with two Herbert-type cannulated screws was performed through a dorsal approach. Stability of the DRUJ was confirmed by a dynamic assessment after fracture fixation, which could be assessed dynamically because the use of WALANT.

The patient was immobilized in a sugar tong splint for 6 weeks. At that point, the patient had limitations in pronosupination. At 3 months postoperatively, the patient had complete range of motion. In the research conducted up to April 2022, we found only six published cases, and the incidence of this type of fracture is not well documented.

Currently, there are no guidelines or consensus regarding the mechanism of injury or the treatment to be instituted, as the different cases have varied considerably.

Keywords: Intra-articular fracture, ulna fracture, wrist injury, orthopedic procedures, open fracture reduction, case reports

Introduction

The distal radioulnar joint (DRUJ) is an integral part of the essential structures for performing pronation and supination movements of the forearm, wrist, and hand in synchronization with the proximal radioulnar joint. Any alteration in these structures can compromise the ability to rotate these segments.

In a neutral position, the ulnocarpal joint supports approximately 20% of the forces exerted on the wrist^[8]. Additionally, the ulnar head is one of the central pillars for the stability of the DRUJ, as the radius rotates around the fixed ulna^[9].

Distal ulna fractures commonly occur in association with concomitant fractures of the distal radius, while isolated fractures of the ulnar head are extremely rare^[7], typically resulting from direct trauma.

We report a case of an isolated intraarticular fracture of the ulnar head, along with the management and treatment instituted, as this is a rare fracture that is sparsely described in the literature.

Case Report

We report the case of a 20-year-old female student who presented to the Emergency Department after a fall from standing height onto her left upper limb, resulting in clinical symptoms of localized pain without radiation, swelling, and functional impairment of her left wrist (Dominant side).

On physical examination, the patient exhibited tenderness upon palpation on the ulnar aspect of the wrist, edema, limited mobility due to pain, and an inability to perform pronation and supination.

Initially, the patient underwent a wrist x-ray (Anteroposterior and lateral views), which revealed an isolated distal ulnar fracture (Fig.1). For a more detailed characterization of the fracture, a 3D reconstructed Computed Tomography (CT) scan was requested, which demonstrated an intraarticular distal ulnar fracture with dorsal displacement of the fragment (Fig. 2).

The following day, the patient underwent surgical treatment using the Wide Awake Local Anesthesia No Tourniquet (WALANT) technique in the outpatient operating room. A dorsal approach between the fourth and fifth extensor compartments was performed, the fracture was identified, reduction was carried out, and temporary fixation was achieved using two Kirschner wires. The correct reduction was confirmed using fluoroscopy, and two Herbert 2.0mm cannulated screws (ASNIS - Stryker®) were placed (Fig. 3). After reduction and fixation, the stability of the distal radioulnar joint (DRUJ) was assessed through stress tests and passive and active mobility. The patient was discharged later that day with a Sugar Tong splint, which she wore for 6 weeks.

Upon removal of the immobilization, the patient had a slight limitation in pronosupination. At three months postoperatively, the patient had no complaints or limitations in range of motion (Pronosupination, flexion, extension,

radial and ulnar deviation) compared to the contralateral limb, and no rehabilitation was necessary. The patient continued to follow up in the clinic for six months and no postoperative complications (acute or delayed) occurred (Fig 4).



Fig 1: X-rays performed in the emergency department



Fig 2: Computed Tomography (CT) scan performed in the Emergency Department

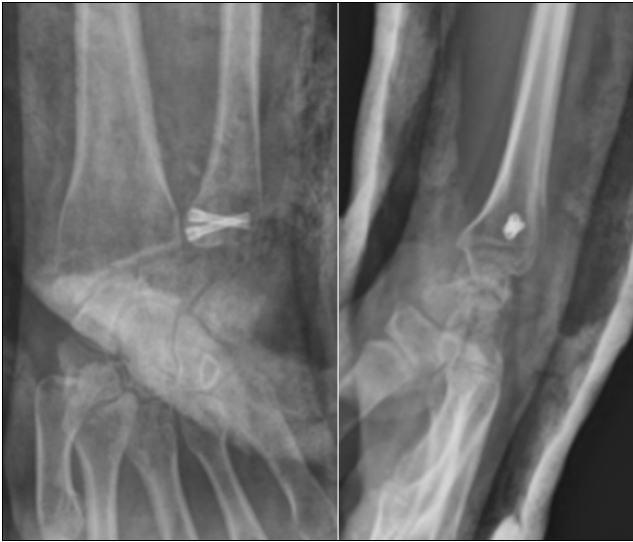


Fig 3: Post-operative follow-up x-ray



Fig 4: 6-month post-operative follow-up x-ray

Discussion

The DRUJ is a complex anatomical structure that moves in sync with the proximal radioulnar joint and ulnocarpal joint. Due to the different anatomical conformation of the radius and ulna, soft tissues are crucial for maintaining joint stability and enabling harmonious movements [8]. Any alteration affecting one of these structures will lead to an imbalance in wrist kinetics and consequent limitations in the patient's activities of daily living.

After opting for surgical treatment, we decided to use WALANT because, among the various advantages associated with this technique, such as avoidance of general anesthesia, reduced operating room time, cost-effectiveness, faster recovery time and improved patient satisfaction, it allowed us to assess the active mobility and stability of the DRUJ intraoperatively.

In the clinical case described, after the reduction and fixation of the fracture, there were no signs of wrist instability. Some authors argue that in cases of instability or when the patient continues to experience pain, an MRI should be requested to assess the existence of triangular fibrocartilage complex (TFCC) injury.

To date, there are very few published cases (Only six cases as of April 2022 according to our research) [1-6], and the incidence of this type of fracture is not well-documented.

There is no consensus on the mechanism of injury among the different reported cases. According to Jakab *et al.* and Rivi *et al.*, this type of fracture occurs due to direct trauma on the ulnar side with the wrist in maximum supination (A situation in which the ulnar head is nearly exposed, making contact primarily on the volar aspect of the sigmoid notch) [1, 5]. On the other hand, Goikoetxea *et al.* suggest that it occurs when the patient experiences direct trauma on the ulnar side with the wrist in extension and pronation and the elbow in flexion (In this situation, the ulnar head only partially contacts the dorsal portion of the sigmoid notch) [3]. In our case, the patient cannot specify the position of the wrist at the time of the trauma. However, both mechanisms could be responsible for this type of fracture but result in slightly different fracture patterns with different fragment displacements. Nevertheless, more studies are needed.

Among the published cases, the treatments included open reduction and fixation with cannulated compression screws in two cases, closed reduction and fixation with Kirschner wires in two cases, open reduction and fixation with Herbert screws in one case, and conservative treatment with immobilization in one case.

In all cases there was a period of immobilization that varied in duration (Minimum 10 days, maximum 6 weeks and average 4,4 weeks), type of immobilization (cast, brace or splint; above or below the elbow) (1-6). Given the absence of references in the literature and a lack of consensus on the therapeutic approach in such cases, we opted for an extended immobilization period (Possibly a shorter period of 3-4 weeks would be sufficient).

In all cases, fracture union, full range of motion recovery, and grip strength restoration were achieved.

Conclusion

Due to the lack of literature, we were unable to conclude which treatment is most appropriate or the type of immobilization, as well as its duration, since in the cases described there are different treatment modalities used and with good results. In our case, we obtained good clinical and imaging results, but we assume that recovery could be faster if the immobilization time was reduced.

The WALANT technique could be beneficial in the treatment of these fractures as it allows us to assess active mobility and stability intraoperatively.

Since these are rare fractures with no formal studies or guidelines on how to manage them, it is crucial to clinically and radiologically evaluate the patient to make the most appropriate decision, while never forgetting the basic principles of treating an intraarticular fracture.

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