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## Case Report

# Jammed ulnar nerve after distal radius fracture: A case report

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## ABSTRACT

**Background:** Ulnar nerve lesions represent a rare complication of wrist fracture. The present manuscript describes the case of a particular traumatic mechanism in which the nerve resulted crushed between radial fracture fragments.

**Case presentation:** A 47-year-old man suffered a subtotal lesion of the ulnar nerve following an open displaced distal radius fracture. Symptoms of ulnar nerve deficiency worsened after reduction and temporary stabilization. Further surgery was performed to achieve definitive stabilization and ulnar nerve neurolysis. The ulnar nerve was found to be jammed inside the fracture side, and so was repaired with a direct suture. Progressive recovery was observed in the following months.

**Conclusions:** Given the paucity of reports of ulnar nerve injury in the literature, clear recommendations for treatment of nerve lesions after wrist fractures have not yet been defined. Nevertheless, in our experience, peripheral nerve function should be assessed before and after fracture reduction, as a worsening of symptoms

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after surgical intervention could indicate nerve entrapment inside the fracture site.

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## Introduction

The occurrence of ulnar nerve lesion after distal radius fracture is rare. While median nerve injury occurs as a complication of 5%–7% of distal radius fractures, the ulnar nerve is involved in only 0.05% of such fractures.<sup>1,2</sup> Similar to median nerve injury, ulnar nerve lesions are most frequently associated with open fractures, high-energy trauma, patients of young age and male gender and significant dorsal displacement of the distal fragment.<sup>3</sup>

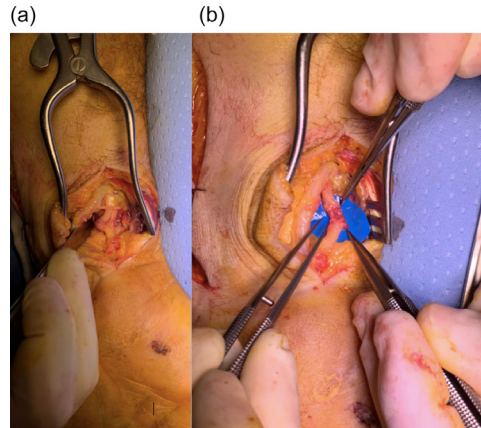
We report the case of a patient with ulnar nerve injury following a high-energy open distal radius fracture. Open reduction and fixation were performed and the nerve was found to be jammed in the fracture site.

## Case presentation

A 47-year-old male sustained right wrist pain and deformity after falling while playing soccer. He presented to the emergency department of his local hospital, where physical examination revealed bone exposure on the volar ulnar side of the wrist, paraesthesia on the fourth and fifth digits and deficiency of intrinsic muscles graded as 3/5 according to the Medical Research Council (MRC) scale. Plain radiographs revealed an extra-articular distal radius fracture with severe dorsal and radial displacement (AO/OTA 2R3A2.2) (Figure 1). Temporary reduction and stabilization was performed using an external fixator and two Kirschner wires inserted through the radial styloid process. After reduction, the patient complained of worsening sensitivity and motor symptoms associated with ulnar nerve deficiency. Three days after initial presentation, the patient was transferred to our hand surgery unit where he underwent definitive reduction and fixation by means of a volar wrist plate and surgical



**Figure 1.** AP and Lateral radiographs of the fracture.



**Figure 2.** (a) The ulnar nerve jammed at the fracture site. (b) Subtotal neurotmesis of the ulnar nerve.

exploration of the ulnar nerve 10 days after the initial trauma. A volar radial Orbay approach was used to achieve reduction and osteosynthesis of the radial fracture, while ulnar neurolysis was performed via a second surgical incision on the ulnar side of the wrist. Upon dissection, the ulnar nerve was found to be encased in dense scar tissue and kinked at about 1-cm proximal to the wrist crease (Figure 2a). At that level, the nerve was severely injured, with subtotal neurotmesis (Figure 2b), resulting in the nerve contacting the ulnar portion of the radius and becoming stuck between fracture fragments. The injured part of the nerve was excised in order to obtain two healthy nerve stumps. An epineural suture was applied without tension using 8-0 nylon. In the following months, numbness and tingling of the fifth digit gradually subsided and intrinsic-muscle deficiency gradually improved. By 6 months postoperatively, sensitivity of the fourth and fifth digits had returned to normal and residual intrinsic strength was 4/5 according to the MRC scale.

## Discussion

Although rare, nerve injuries are possible complications of wrist fractures which should be considered during clinical management. Combined median and ulnar nerve palsy has been reported, but this represents an exceedingly rare complication of distal radius fractures.<sup>4</sup> Some interesting anatomical studies have investigated the discrepancy in the incidences of ulnar and median nerve lesions following distal radial fractures. Vance et al. observed that the ulnar and median nerve have the same relationships with the bones in the wrist and are protected by the pronator quadratus and flexor digitorum muscles. As with the median nerve, the ulnar nerve can be bowstrung by the proximal fractured radius in the case of dorsal displacement of the distal fragment; the so-called Colles fracture. In order to explain the relative immunity of the ulnar nerve to such injury, Vance hypothesised that the ulnar nerve is less well tethered in Guyon's canal than the median nerve in the carpal tunnel.<sup>5</sup> In their anatomical study, Clarke and Spencer<sup>6</sup> demonstrated the ulnar nerve to have greater mobility and extensibility than the median nerve due to the shorter length of Guyon's canal and the fact that the volar carpal ligament is less substantial than the transverse carpal ligament.

The data regarding ulnar palsy after wrist fracture demonstrate that this lesion is typically observed among young patients, and generally occurs after high-energy trauma such as traffic accidents, falls from a height and sports injuries. Furthermore, it is associated with severe displacement and comminution, distal ulnar fractures and open fractures. In the present case, the wrist injury was a consequence of a high-energy trauma during sport, and severe dorsal displacement of the distal radial fragment was observed.

Considering the aspect of the ulnar nerve on dissection, we hypothesised that, at the moment of trauma, the ulnar nerve, which is tethered in the Guyon's canal, was first pulled dorsally and then

pinched by the sharp proximal radial fragment. During the reduction manoeuvre, it is likely that the nerve was jammed between fracture fragments, resulting in worsening of ulnar palsy symptoms. This mechanism has been previously described by Pazart et al.<sup>7</sup> in 1999, with the only difference being that the previous case exhibited complete severance of the nerve. Other authors have described different mechanisms of ulnar nerve injury including dorso-ulnar displacement to the ulnar styloid,<sup>8</sup> displacement through the distal radio-ulnar joint and encasement of the ulnar nerve in scar tissue after open fracture with a lacerated flexor carpi ulnaris and intact ulnar nerve.<sup>6,9</sup> Furthermore, it has been suggested that most cases of ulnar nerve palsy following distal radius fracture are caused by nerve stretching and contusion, resulting in neurapraxia or axonotmesis.<sup>10</sup>

Guidelines for management of these lesions have not yet been developed, and there are discordant opinions in the literature. Most authors agree that, in the case of acute ulnar palsy after open wrist fracture or associated acute carpal tunnel syndrome, early surgical nerve exploration is indicated.<sup>10</sup> The major controversy relates to closed fractures. In this case, some authors suggest adopting a wait-and-see strategy and recommend surgical ulnar-nerve release only if expectant management does not result in signs of recovery within 6 months.<sup>1</sup> In contrast, some studies indicate that early surgical exploration is beneficial even for closed fractures.<sup>5</sup> In the present case, the nerve injury was treated with early surgical exploration due to the presence of an open fracture and worsening of the symptoms of ulnar nerve compression following closed reduction.

In conclusion, ulnar nerve injury following wrist fracture is a rare condition, usually observed in young males and after high-impact trauma. The condition is often associated with severe dorsal displacement and open fracture. Here, we present the case of a patient in whom the ulnar nerve was jammed in the fracture site, as has been previously described by Pazart. Given the small number of cases reported in literature, appropriate treatment guidelines for ulnar nerve injury are unclear, especially in the case of closed fractures. Based on our experience, we suggest that nerve function should always be assessed before and after reduction is performed, as worsening of symptoms after reduction can indicate that the nerve is being squeezed at the fracture site.

### **Consent for publication**

Written informed consent was obtained from the patient for publication of clinical details and clinical images. A copy of the consent form is available for review by the Editor of this journal.

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### **Authors' contributions**

AP and SP performed the surgical intervention, AB followed the clinical recovery of the patient, AMN was a major contributor in the writing of the manuscript. All authors have read and approved the final manuscript for publication.

### **Declaration of Competing Interest**

The authors declare that they have no competing interests.

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