



# Displaced distal radius fracture presenting with neuropraxia of the dorsal cutaneous branch of the ulnar nerve (DCBUN)

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## Abstract

Nerve injuries, mostly to the median nerve, are common following distal radius fractures. Ulnar nerve injuries are rarely encountered, with only few case reports of motor or motor and sensory loss described in the literature. In this paper, we report two consecutive cases of young patients with a distal radius fracture and a pure sensory ulnar neuropathy. Both patients had a radially displaced fracture and presented with sensory loss and paresthesia in the distribution of the dorsal cutaneous branch of the ulnar nerve (DCBUN), which resolved after fracture reduction. We believe this clinical scenario is the result of traction or compressive neuropraxia of the DCBUN in the subcutaneous tissue around the ulnar styloid—a neurologic injury which had not yet been described for distal radius fractures.

**Keywords** Distal radius fracture · Dorsal cutaneous branch · Ulnar nerve · Complications · Ulnar neuropathy

## Introduction

Fractures of the distal radius are the most frequent fractures encountered by orthopedic trauma surgeons, accounting for 17.5% of all adult fractures. Most cases are the result of low-energy trauma, with high-energy trauma accounting for only 10% of wrist fractures. Common presenting symptoms are deformity, tenderness and swolleness around the wrist [1].

Neurologic symptoms, mostly neuropathies, are common and may be present in up to 9% of the patients [2]. These acute neurological symptoms may include any of the nerves crossing the wrist joint, but median nerve symptoms are by far the most common [2]. Ulnar nerve injuries are rare, and reported cases thus far included motor or motor and sensory deficits [3].

We would like to present two cases of young patients with displaced distal radius fracture who presented with ulnar nerve pure sensory deficit.

## Case report

The first case is a 25 years old healthy right hand-dominant male who presented to the emergency department (ED) after falling off a bicycle on his outstretched left hand, with gross deformity of the wrist. The patient complained of paresthesia and diminished sensation on the ulnar side of the dorsum of his palm, fifth digit and ulnar side of the forth digit. On physical examination, the patient had intact gross motor function of his digits, including flexion of his fourth and fifth digits and an intact cross-finger test. All his fingers were warm and had brisk capillary refill. Antero-posterior and lateral wrist radiographs revealed a distal radius fracture with dorso-radial displacement, accompanied by an ulnar styloid fracture (Fig. 1a, b).

The patient underwent closed reduction with sedation and was put in an above-elbow plaster cast. Follow-up radiographs (Fig. 1c, d) and CT (Fig. 1e, f) demonstrated a well aligned distal radius, and the patient was subsequently discharged from the ED with a recommendation to proceed with non-operative treatment. Follow-up examination, performed 1 day after the injury by a hand surgeon showed an intact ulnar sensation.

The second case is a 29 years old healthy right hand-dominant male who presented to the ED after falling from a height of 3 m, with gross deformity of his left wrist and an open 1 cm wound over his ulnar styloid. A full trauma workup did

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**Fig. 1** Case 1 **a, b** AP and lateral wrist radiographs show a radially displaced distal radius fracture. Note the tension of the skin over the ulnar styloid; **c, d** AP and lateral radiographs after closed reduction show adequate fracture reduction; **e, f** a CT scan confirms adequate fracture reduction

not show any other major injuries. The patient complained of paresthesia and diminished sensation on the ulnar side of the dorsum of his palm, fifth digit and ulnar side of the fourth digit. On physical examination, the patient had intact gross motor function of his digits, and all his fingers were warm and had brisk capillary refill. Antero-posterior and lateral wrist radiographs revealed a distal radius fracture with dorso-radial displacement (Fig. 2a). The patient underwent irrigation of



**Fig. 2** Case 2. **a** AP wrist radiograph show a radially displaced distal radius fracture; **b** AP post-reduction radiograph show poor fracture reduction with continued radial displacement of the carpus; **c** lateral wrist radiograph post-surgical open reduction and fixation with a volar plate and a tubular external fixator; **d** lateral radiograph 6 months after the fracture

his wound, followed by closed reduction under sedation and fixation with an above-elbow plaster cast. Follow-up radiographs demonstrated an inadequate reduction (Fig. 2b). He was hospitalized for surgical fixation and IV antibiotic treatment. Follow-up examination by a hand surgeon performed 1 day after the injury showed an intact sensation of his palm and fingers.

Five days after the accident, the patient underwent open reduction and internal fixation through a volar approach, using a volar locking plate (AcuLock2 by Acumed). Since the fixation was felt to be insufficient during surgery, a tubular external fixation was added spanning the wrist joint (Fig. 2c). The external fixation was removed after 6 weeks (Fig. 2d).

## Discussion

Acute neurological symptoms after distal radius fracture are common and may include any of the nerves crossing the wrist joint. Median nerve symptoms, mostly acute carpal

tunnel syndrome, are usually described [2]: In three large series with 1500 patients, the prevalence of acute median neuropathy after distal radius fracture was between 2 and 7% [3]. Ulnar nerve palsy is much rarer [4–6], and the literature includes mostly case reports.

The mechanisms of ulnar nerve injury associated with distal radius fracture reported in the literature include: severing of the nerve over the sharp edge of the fractured radius; entrapment in the distal radioulnar joint; encasement of the nerve in scar tissue leading to tardive neuropathy; and displacement of the nerve dorsal to the ulnar styloid [2]. All these mechanisms describe injury to the ulnar nerve inside or around Guyon's canal, presenting with typical motor or motor and sensory loss.

Unlike previously published cases, the two cases presented here exhibited pure sensory loss in the distribution of the dorsal cutaneous branch of the ulnar nerve (DCBUN), without motor symptoms. The DCBUN supplies sensation to the dorso-ulnar aspect of the hand, the dorsum of the fifth finger, and the dorso-ulnar aspect of the fourth finger. It arises from the medial aspect of the main ulnar trunk about 5 cm proximal to the tip of the ulnar styloid (range 3–10 cm) [7, 8]. More distally, it becomes subcutaneous about 1.6 cm proximal to the tip of ulnar styloid [8].

The clinical presentation of the two cases, which included high tension of the skin over the ulnar styloid and quick resolution after fracture reduction, lead to the hypothesis that the sensory loss is the result of traction or compressive neuropraxia of the DCBUN in the subcutaneous tissue around the ulnar styloid.

Ulnar nerve palsy after distal radius fracture is associated with young age, a high-energy mechanism of injury, and a severe injury pattern consisting of wide displacement, comminution, an associated distal ulna fracture, and an open wound [3]. Both of the cases we encountered presented with a similar history and physical examination.

In conclusion, a pure sensory neuropraxia of the ulnar nerve, and specifically of the DCBUN, following distal radius fracture has not yet been described in the orthopedic literature. These two cases highlight this phenomenon, which might be common but overlooked, and describe the clinical presentation leading to it—high-energy trauma in a young patient, presenting with a dorso-radial displaced distal

radius fracture accompanied by high tension of the skin over the ulnar styloid.

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## Compliance with ethical standards

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