

Ulnar Nerve Palsy Following Closed Radiocarpal Fracture-Dislocation

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Distal radius fractures are common injuries. Transient median nerve symptoms are often associated with these fractures and with other trauma about the distal forearm and radiocarpal joint. Ulnar nerve palsy, however, is seldom associated with this type of injury. Treatment varies from watchful waiting (with expectant recovery) to early versus delayed neurolysis to nerve grafting.¹⁻¹¹

We describe the case of a patient with immediate ulnar nerve palsy secondary to a closed high-energy radiocarpal fracture-dislocation. We detail our treatment and also review the literature.

CASE REPORT

A man in his mid-20s presented to our institution after a motor vehicle accident in which he sustained an isolated left wrist closed radiocarpal fracture-dislocation. Physical examination revealed significant deformity and swelling and a nearly complete ulnar nerve palsy. There was no vascular compromise associated with the injury. Median and radial nerve function was intact. Ulnar nerve motor function was absent, and sensory function demonstrated decreased light-touch sensation palmarly. Two-point discrimination was more than 8 mm in the ulnar distribution on the small and ring fingers. The ulnar nerve dorsal sensory branch was functionally normal. Radiographs showed a comminuted, intra-articular distal radius fracture with dislocation of the radiocarpal joint and an unstable distal radioulnar joint (Figure 1).

The fracture-dislocation was reduced and splinted in the emergency department on day of presentation. There was no resolution or worsening of the ulnar nerve palsy after closed reduction. There was no evidence of compartment syndrome based on patient's discomfort level or on serial

examination results. The patient was admitted for observation and elevation of the extremity pending surgery the next day.

In the operating room, the wrist was formally reduced and stabilized using an external fixator and percutaneous pins. The distal radioulnar joint was also stabilized with a pin from the ulna to the radius (Figure 2). The ulnar nerve was not explored at this initial surgery. The patient's fracture then healed, and all hardware was removed approximately 6 weeks after injury. Ring- and small-finger clawing and a positive Froment's sign were evident at 2-month follow-up. Electrodiagnostic testing at 3 months was recommended, but the patient was lost to follow-up until 6 months, at which point his studies revealed a severe, axonal-loss lesion of the left ulnar nerve distal to the branch to the palmaris brevis, electrophysiologically consistent with a complete lesion.

The patient underwent ulnar nerve exploration 8 months after injury (Figure 3). The nerve was grossly in continuity, though severely stretched and deviated to the palmar radial side of the wrist, where it adhered to the healed fracture callus. After the nerve was freed from the adhesions, intraoperative electrodiagnostic studies showed no conduction across the damaged segment, approximately 4.5 cm proximal to the wrist. This segment was then resected, and grouped fascicular nerve grafting was performed using autogenous sural nerve. Histologic evaluation of the resected nerve segment revealed both perifascicular and intrafascicular fibrosis and degenerative changes.

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Figure 1. Anteroposterior (A) and lateral (B) x-rays of injury.



Figure 2. Anteroposterior (A) and lateral (B) x-rays after closed reduction, percutaneous pinning, and external fixator placement.

At the most recent clinic follow-up, approximately 1 year 4 months after nerve grafting, the patient demonstrated no change in sensation or motor function. He continued to have ring- and small-finger clawing and a positive Froment's sign.

DISCUSSION

This case demonstrates a unique ulnar nerve injury after a closed distal radius fracture-dislocation. The ulnar nerve was electrophysiologically disrupted without being frankly severed. The literature includes a variety of small series and case reports of median and ulnar nerve injuries.¹⁻¹¹

In 1966, Zoega¹¹ described 3 patients who developed ulnar nerve palsy after a Colles fracture; 2 of these patients underwent surgery to treat contusion of the nerve. In 1977, Rychak and Kalenak⁷ described injury to the median and ulnar nerves in a 24-year-old construction worker who fell 5 meters and sustained a comminuted, intra-articular distal radius fracture with ulnar styloid fracture. The patient required release of the carpal tunnel and the canal of Guyon 3 weeks after injury. Nerve conduction studies at time of surgery indicated severe impairment of both nerves. The patient returned to work 6 months after injury. Nerve conduction studies were normal at 11-month follow-up.

In 1978, Poppi and colleagues⁶ described the case of a 42-year-old bricklayer who presented 3 months after an open fracture dislocation of the distal radius involving a dense ulnar palsy. Electrodiagnostic studies demonstrated fibrillation potentials and sharp waves consistent with severe ulnar nerve embarrassment. At time of surgery, the ulnar nerve was found encircled in scar tissue, and neurolysis and release of the volar carpal ligament were performed. The authors commented that, despite the interval between trauma and neurolysis, nerve function recovery

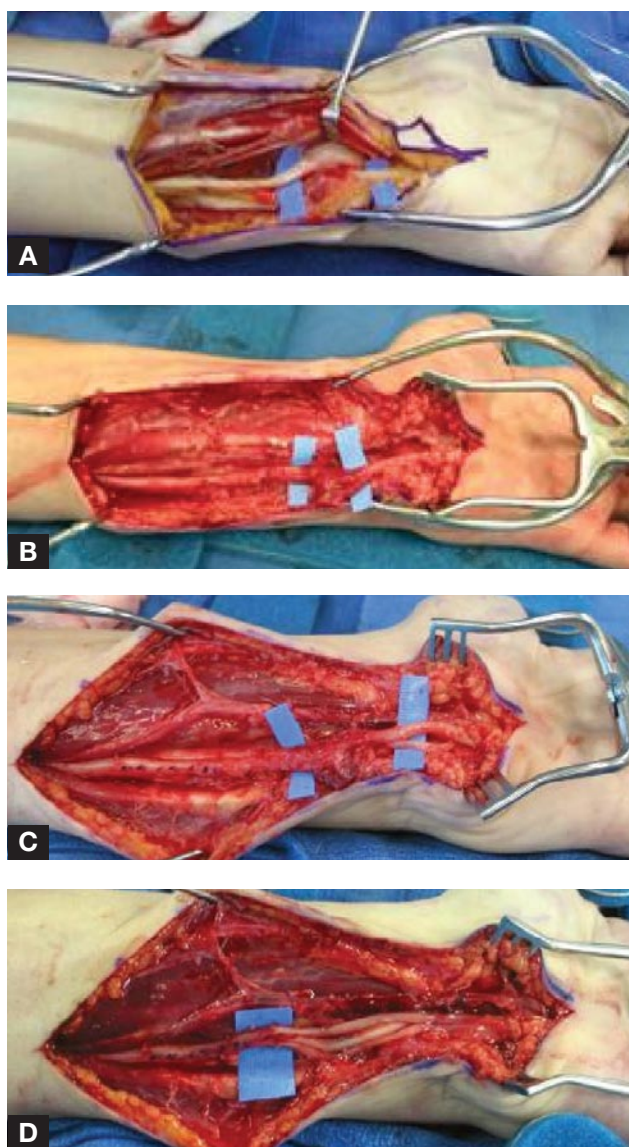


Figure 3. Intraoperative photographs of (A) ulnar nerve severely stretched and deviated to the palmar radial side of the wrist, where it adhered to the healed fracture callus, (B) ulnar nerve freed from surrounding tissues, (C) damaged section of ulnar nerve marked after intraoperative electrodiagnostics, and (D) grouped fascicular sural nerve graft in place.

was excellent and rapid (2 months), though mild atrophy of the interossei persisted.

Other cases have been reported. Vance and Gelberman¹⁰ in 1978 reiterated the need for prompt and accurate fracture reduction and early surgical decompression, when necessary, for acute ulnar neuropathy with fractures at the wrist. In 1982, Bourrel and Ferro¹ suggested a therapeutic approach for lesions of the median or ulnar nerve associated with closed fractures of the lower end of the radius. Their treatment algorithm for immediate lesions included appropriate, gentle reduction and immobilization, avoiding the position of extreme flexion and ulnar deviation. They advocated neurolysis at 3 to 6 months in cases of deterioration or no improvement in symptoms. In 1991, Clarke and

Spencer² reported 3 cases of progressive ulnar nerve palsy after fractures of the distal radius. Two of these cases underwent surgical exploration 3 months after injury, and the third at 2 months. In all 3 cases, there was dense scarring around the nerve, and 3 months after surgical decompression ulnar nerve function was almost completely returned.

Pazart and colleagues⁵ in 1999 reported the case of a severed ulnar nerve in a patient they first saw 6 months after a distal radius fracture. The patient had clinical and electrodiagnostic evidence of severe ulnar nerve palsy. The authors hypothesized that the nerve was relatively tethered by the canal of Guyon and was severed where it stretched over the sharp edge of the proximal radius fracture.

This hypothesis raised 2 questions: What should be done in the emergency situation? Are there any predictable signs of a severed nerve? Their conclusions are similar to other authors'. Some investigators have indicated that, in acute palsy, immediate fracture reduction that avoids ulnar deviation and palmar flexion leads to complete recovery in 4 to 5 months.^{1,11} Others have reported that lack of symptom improvement within 36 hours of reduction is an indication for surgical exploration.¹⁰ In the case of secondary lesions with no significant improvement observed within 6 months, or with deterioration noted, nerve release must be performed.¹ Regarding predictable signs of a severed nerve, Pazart and colleagues⁵ wrote that the only predictable radiologic element of a severed nerve is the extent of radial displacement, which should raise the suspicion of an ulnar nerve lesion.

CONCLUSIONS

Permanent nerve injuries after closed distal radius fractures, or fracture-dislocations, are extremely rare. Often, these palsies can be observed for return of function. When nerve function does not improve after accurate fracture

reduction and adequate recovery time, early nerve exploration and neurolysis should be considered. Delay in aggressive treatment may limit how much nerve function returns and may adversely affect the final outcome.

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The authors are employees of the US government. The opinions and assertions contained herein are their private views and are not to be construed as official or as reflecting the views of the US Army or the US Department of Defense.

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