

Management of Ulnar Nerve Injuries

Alice Woo, MD, Karim Bakri, MBBS, Steven L. Moran, MD

Injuries to the ulnar nerve result in both sensory and motor deficits within the hand. Functional outcomes following repair of this nerve have not performed as well as outcomes following repair of the median or radial nerves. Advances in imaging modalities may provide earlier means of identifying and diagnosing closed nerve injuries. Early neuroorrhaphy of acute nerve injuries provides the best outcome, but consideration should also be given to performing distal motor nerve transfers to preserve hand intrinsic motor function when injuries occur at or above the proximal forearm. This article attempts to summarize the most recent trends within ulnar nerve repair. (*J Hand Surg Am.* 2015;40(1):173–181. Copyright © 2015 by the American Society for Surgery of the Hand. All rights reserved.)

Key words Ulnar nerve, nerve repair, nerve injury, outcomes.



ULNAR NERVE INJURIES CAN result in paresthesia, dysesthesia, and muscle weakness in the affected hand. According to the Nationwide Inpatient Sample database from the Healthcare Cost and Utilization Project, ulnar nerve injury was the most frequent major upper extremity peripheral nerve injury resulting in hospital admission from 1993 to 2006 when compared with median, radial, and brachial plexus injuries.¹ The demographics of patients with ulnar nerve injuries are disproportionately male in the working age group (18–45 y) with a median income of \$36,000.¹ It is estimated that the health care cost associated with ulnar nerve injury is \$10,563 to \$42,000 per individual, with higher costs associated with injuries requiring concomitant tendon repair.^{1,2} An additional intangible cost to society may also be attributed to the loss of work productivity for the injured individual.²

For better outcomes, ulnar nerve injuries require early repair compared with other peripheral nerve injuries.¹ Unfortunately, repair of this nerve often results

in incomplete recovery with functional results that are inferior to those achieved following radial nerve and median nerve repair.^{3,4} This article attempts to summarize the most recent trends within the management of ulnar nerve repair.

ANATOMY

The ulnar nerve is the terminal branch of the medial cord of the brachial plexus. This cord contains nerve fibers from C7 to T1 nerve roots. It lies medial to the brachial artery in the upper arm and exits the posterior compartment of the arm as it descends down the humerus to enter the anterior compartment through the medial intermuscular septum. It continues anterior to the medial head of the triceps brachii muscle to enter the cubital tunnel posterior to the medial epicondyle, medial to the elbow joint capsule and the medial collateral ligament. After exiting the cubital tunnel, the ulnar nerve gives off 2 or 3 muscular branches to the flexor carpi ulnaris (FCU) muscle. The ulnar nerve passes beneath the humeral and ulnar heads of the FCU muscle to enter the volar aspect of the forearm, where it continues deep to the flexor pronator aponeurosis. In the forearm, the nerve passes anterior to the flexor digitorum profundus (FDP) muscle to supply motor branches to the ulnar half of FDP. The ulnar nerve travels the remaining length of the forearm between the FDP and the flexor digitorum superficialis (FDS) muscles (Fig. 1).

From the Division of Plastic and Reconstructive Surgery, Mayo Clinic, Rochester, MN.

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Corresponding author: Steven L. Moran, MD, Division of Plastic and Reconstructive Surgery, Mayo Medical School, Mayo Clinic, 200 First St., SW, Rochester, MN 55905; e-mail: moran.steven@mayo.edu.

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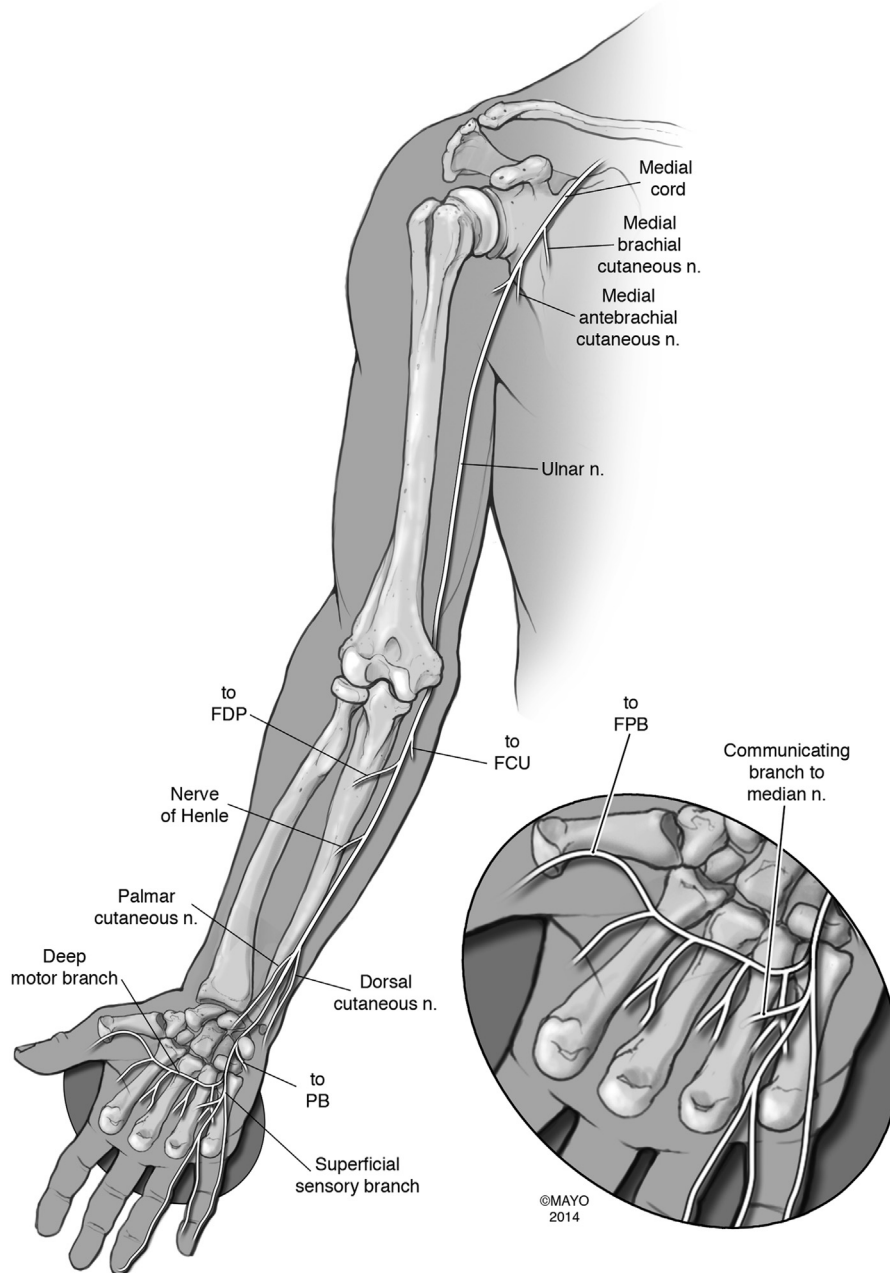


FIGURE 1: The ulnar nerve contains fibers from C7–T1. After traveling through the cubital tunnel, it supplies the FCU muscle and motor branches to the ulnar half of the FDP muscle. The ulnar nerve then travels the length of the forearm between the FDP and the FDS muscles; sympathetic innervation to the ulnar artery is supplied through the nerve of Henle. A palmar cutaneous branch may also exit the ulnar nerve within the distal forearm to supply sensation to the skin overlying the hypothenar area. PB, palmaris brevis; FPB, flexor pollicis brevis. Inset: The deep branch of the ulnar nerve innervates the interosseous muscles, adductor, and deep head of the flexor pollicis brevis muscle. (Copyright © Mayo Foundation 2014.)

The *dorsal cutaneous branch* of the ulnar nerve arises from the medial aspect of the ulnar nerve approximately 8 cm proximal to the pisiform bone. It provides dorsal branches to the small finger, the ulnar aspect of the ring finger, and the ulnar aspect of the carpus and hand. Palmarly at the level of the wrist, the ulnar nerve bifurcates into 2 main branches at the distal aspect of Guyon's canal; these branches are the

superficial sensory and *deep motor* (Fig. 2). The deep motor branch passes deep between the flexor and the abductor digiti minimi muscles and continues laterally between the superficial and the deep layers of the opponens digiti minimi. The deep motor branch then continues laterally through the deep palmar space to innervate the intrinsic and thumb adductor muscles.^{5–7} The superficial branch of the ulnar nerve gives off 2

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