Cubital Tunnel Syndrome

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KEYWORDS

• Ulnar nerve • Cubital tunnel • Peripheral nerve • Compression syndrome • Nerve transposition • Medial epicondylectomy

KEY POINTS

- Compression of the ulnar nerve at the elbow, or cubital tunnel syndrome, is the second most common peripheral nerve compression syndrome in the upper extremity.
- Surgical intervention is indicated when nonoperative treatment, including activity modification, does not relieve the symptoms.
- There is currently no consensus on the best surgical treatment of cubital tunnel syndrome.

INTRODUCTION

In 1878, Panas[1] provided the first description of ulnar neuropathy across the elbow in a patient who had sustained an elbow fracture as a child and developed a tardy ulnar nerve palsy. With subsequent descriptions throughout the early 1900s, investigators focused on specific origins of these symptoms related to trauma and osteoarthritis, often referring to the constellation of symptoms as a "friction neuritis" or "traumatic neuritis."[2]

It was not until 1949 that Magee and Phalen[3] described the first case of a spontaneous presentation of ulnar nerve symptoms across the elbow. They suggested the cubital tunnel as the origin of the symptoms.[3,4] Osborne[4] (1957) described a fibrous band bridging the 2 heads of the flexor carpi ulnaris (FCU) as a site of compression and was the first to recommend a release of the cubital tunnel and anterior transposition of the nerve.[5] One year later, Feindel and Stratford[5] compared this compressive neuropathy with carpal tunnel syndrome as "an area of focal constriction" and recommended simple decompression to relieve the symptoms.

Since the 1950s, the diagnosis of cubital tunnel syndrome has increased in prevalence to become the second most common compressive neuropathy in the upper extremity after carpal tunnel syndrome.[6,7] The purpose of this article is to review the relevant anatomy of ulnar neuropathy across the elbow, the proposed causes, and to review the relevant diagnostic maneuvers and treatment options to provide the reader with a logical approach to treating this common entity.

ANATOMY

An understanding of the anatomic course of the ulnar nerve is critical to understanding cubital tunnel syndrome and its differential diagnoses.

The Course of the Ulnar Nerve

The ulnar nerve proper travels the following course:

- Originates in the axilla from the medial cord of the brachial plexus, with contributions from the C8-T1 nerve roots

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- Travels posterior to the medial intermuscular septum, anterior to the medial head of the triceps
- Through the cubital tunnel (defined later)
- Dives into the forearm between the 2 heads of the FCU
- Travels between the FCU and flexor digitorum profundus into the forearm
- Travels through Guyon canal at the wrist
  - Terminates in the hand as motor and sensory branches
    - Sensory: ulnar digital nerve to the ring finger, radial and ulnar digital nerves to the small finger
    - Motor: deep motor branch to the intrinsic muscles of the hand

Significant branches of the ulnar nerve during the dissection around the cubital tunnel include the following:

- The first branch off the ulnar nerve in most patients is a sensory branch to the elbow joint. It can be sacrificed without significant consequence.
- The next branch is a motor branch to the FCU.
  - Often times this branch is a tether to anterior transposition of the nerve and must be freed via neurolysis to a more proximal level to complete the transposition.

Sites of Compression of the Ulnar Nerve (Proximal to Distal)

Nerve fibers contributing to the ulnar nerve begin in the neck and travel all the way down to the fingertips of the ring and small fingers, sending branches out along the way (**Fig. 1**). Entrapment of these nerve fibers at any point along this path can cause symptoms. For the purpose of this article, only compression along the ulnar nerve from the brachium through the area of the cubital tunnel is discussed. The common sites of compression include the following:

- Arcade of Struthers (a fibrous band running from the medial head of the triceps to the medial intermuscular septum) located approximately 8 cm proximal to medial epicondyle
  - Arcade of Struthers present in 70% of patients[8]
  - Implicated primarily as a site of compression in the *transposed* nerve
- Medial intermuscular septum: also implicated primarily as a site of compression in the *transposed* nerve
- Medial epicondyle of the humerus
- Arcuate ligament of Osborne/cubital tunnel proper
  - Osborne ligament: the thickened fascia between ulnar and humeral heads of the flexor carpi ulnaris that creates the roof of the cubital tunnel
  - The floor of the cubital tunnel is formed by the medial collateral ligament of the elbow
- Anconeus epitrochlearis: anomalous muscle present in 1% to 30% of people that overlies the nerve and runs from its origin on the medial epicondyle to the olecranon (**Fig. 2**)[9]
- Fibrous bands within the FCU
- Aponeurosis at the proximal edge of the flexor digitorum sublimis

Extrinsic Blood Supply of the Ulnar Nerve

The extrinsic blood supply has been discussed as a potential concern in ulnar neuropathy (**Fig. 3**).

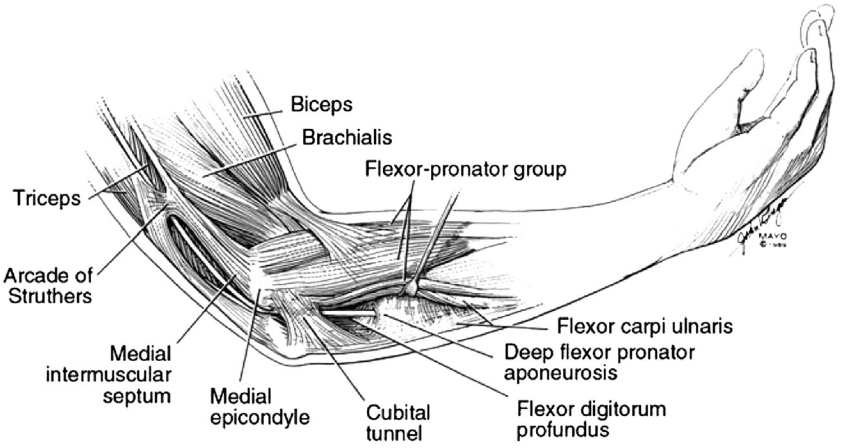

Fig. 1. Site of compression of the ulnar nerve at the elbow (By permission of Mayo Foundation for Medical Education and Research. All rights reserved.).