

# Ulnar nerve entrapment: Cubital Tunnel

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## Description

Cubital Tunnel Syndrome is an entrapment neuropathy that affects the ulnar nerve across the elbow. It can occur following progressive impingement on the nerve by structures in this region, by repetitive low-grade trauma, or by a single, severe injury. An ulnar neuropathy that appears in a delayed fashion following an elbow injury is called Tardy Ulnar Palsy.

## Anatomy

The ulnar nerve arises from the medial cord of the brachial plexus in the proximal arm. It passes beneath a portion of the triceps, the Arcade of Struthers, and the medial intermuscular septum proximal to the elbow. At the level of the elbow, it passes through the ulnar groove, and may be compressed by ligamentous attachments between the olecranon and medial epicondyle. Distal to this point, the nerve enters the Cubital Tunnel, a structure formed by the two heads of the flexor carpi ulnaris and its overlying fascia. These structures represent the five potential points of entrapment, from proximal to distal:

1. Arcade of Struthers
2. Medial Intermuscular Septum
3. Transverse Ligament
4. Fascia of the Flexor Carpi Ulnaris
5. Heads of the Flexor Carpi Ulnaris

Other points of compression, such as osteophytes, ganglion cysts, and tumors, may contribute to the neuropathy as well.

## Clinical Presentation

Patients often present with elbow pain and paresthesias in the 5th and splitting the 4th digits of the hand and ulnar palm. This may progress to numbness in an ulnar nerve distribution. Clumsiness with fine motor tasks such as buttoning shirts or writing may follow. Overt weakness and atrophy of hand intrinsics may follow as the neuropathy progresses.

## Diagnosis

A careful history may reveal a single traumatic injury to the elbow or perhaps episodic minor trauma. Resting the elbow on a hard surface such as a desk or a wheelchair armrest is a typical story. A history of orthopedic deformity is also helpful. Patient complaints of paresthesias and numbness in the appropriate distribution also can clue in the examiner. In general, on physical examination, an ulnar neuropathy will cause sensory loss that splits the 4th digit, whereas a C8 radiculopathy will tend to exclude the 4th digit altogether. Weakness in an ulnar nerve distribution is also helpful. A Tinel's sign may be present along the course of the ulnar nerve at the elbow. In more severe cases, atrophy of the hand intrinsic and the hypothenar eminence can occur. Nerve conduction studies may reveal slowing across the elbow. Inching studies, in which short segments of nerve are tested, may be helpful in identifying the exact point of entrapment along the course of the nerve. Electromyography may reveal denervational changes in the ulnar-innervated muscles in severe cases.

## Treatment

Similar to other nerve entrapments, a trial of nonoperative therapy is customarily attempted first. Avoidance of aggravating factors, such as resting the elbow on hard surfaces, may be helpful. Elbow splints may be prescribed, but patients are often non-compliant with these devices. In some cases, the trial of nonoperative therapy may be kept fairly short if the neuropathy is severe, and patients already have notable weakness, atrophy, and denervational changes on electrodiagnostic studies.

Once the decision is made to pursue operative treatment, a variety of options are available. Prospective, randomized clinical studies have shown that some of these options have essentially the same results. For example, ulnar nerve decompression yielded similar results to both submuscular transposition and subcutaneous transposition.

The following lists some available options with their corresponding advantages and disadvantages:

- Simple Decompression utilizes a small incision, under a local anesthetic, and does not require postoperative immobilization. Unfortunately, it leaves the nerve in a superficial location where it remains susceptible to repetitive injury. Also, decompression alone may not adequately address orthopedic abnormalities, if present.
- Subcutaneous Transposition utilizes a long incision, and moves the nerve to a more relaxed course across the elbow. Like for simple decompression, the nerve remains susceptible to repetitive injury in the subcutaneous location.
- Submuscular Transposition also utilizes a long incision, and moves the nerve to a more protected location beneath the pronator teres muscle. General anesthesia or a regional block is typically required. In contrast to the above techniques, postoperative arm immobilization for 2-3 weeks is required to enable adequate muscle healing.

## **Outcome**

Generally, better outcomes occur in patients with milder symptoms, regardless of treatment approach. As symptoms and signs become more severe, nonoperative as well as the surgical therapies becomes less effective. The surgical techniques described above have roughly the same likelihood of successful outcome.