

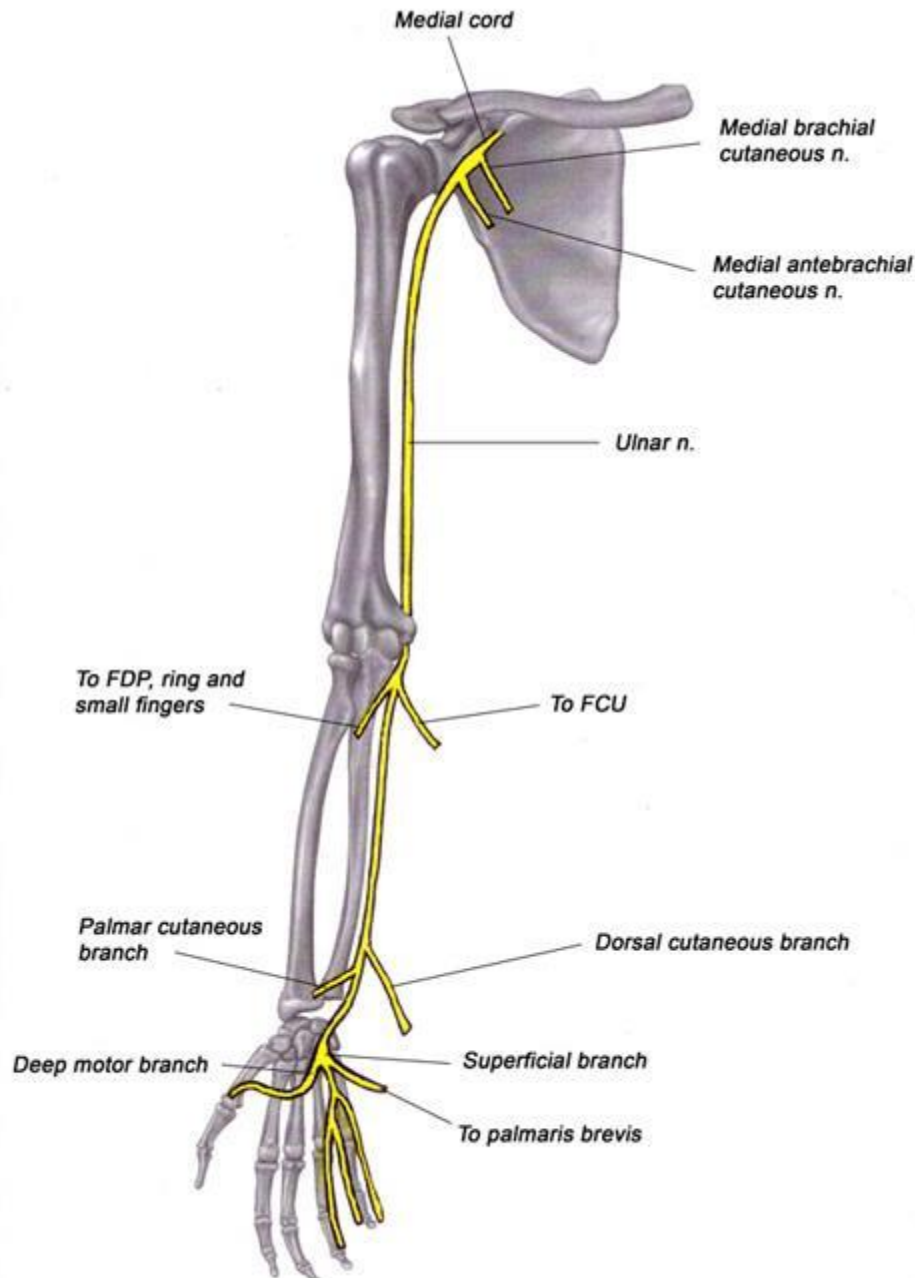
Cubital Tunnel Syndrome (Ulnar Nerve Entrapment)

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The cubital tunnel syndrome is a condition caused by pressure at the elbow on the ulnar nerve. The nerves are the structures carrying the messages between the brain, the spinal cord and the body parts. A nerve is unable to function properly once it is compressed. The ulnar nerve entrapment at the elbow is the second most common entrapment syndrome after the carpal Tunnel Syndrome.

The ulnar nerve carries the signals for sensation in our little finger and in one half of our ring finger. It allows the muscles of the hand to perform fine motions of the fingers. With such syndrome, individuals will demonstrate difficulty in handling objects and performing gripping motions. They may feel numbness, pain, and a tingly sensation that many may describe like when a funny bone is hit. The ulnar nerve is also responsible for the activities of some muscles of the forearm.

The ulnar nerve runs from the side of our neck down to our fingers. At the elbow, this nerve is most exposed for compression while passing through a groove formed by muscle, bone and ligament on the posteromedial aspect of the elbow. This passage is called the Cubital tunnel. Once the nerve become compressed, it will send faulty signals down to the forearm, hand and fingers. This nerve is responsible for providing the sensation over half of the ring finger and the little finger, muscles of the forearm (flexors) as well as muscles of the hand (interossei +Adductor Pollicis) receive an innervation from the ulnar nerve. These fine motions find their importance when one has to manipulate objects.



The cause of a Cubital Tunnel Syndrome is not always well known but several factors may appear to contribute especially, the repeated range of motions of the elbow. It looks like the Flexor Carpi Ulnaris (FCU) muscle can become irritated by such motion and apply pressure over the nerve. Other causes like acute or neglected fractures, bone spurs, swelling, soft tissue cysts, any other disease affecting the elbow can play a role in this pathology. Like rheumatoid arthritis etc.

Cubital Tunnel Syndrome, frequently causes numbness and tingling to the ring finger and little finger in a permanent way or presenting in transient or recurrent symptoms, more often with the elbow in a bending position especially when slipping. Additional symptoms of poor finger coordination and weak grip or pinch can be seen while the individual is holding on an instrument or playing the piano by example (adductor pollicis muscle). If left untreated, the situation may deteriorate and lead to permanent changes in loss of sensation and motion or even contracture flexion of the ring and little fingers. The condition can become chronic and permanent deformation as the “Christ Hand” position can be seen, as described in the French literature, mimicking the position of Christ’s fingers when absolving his disciples.

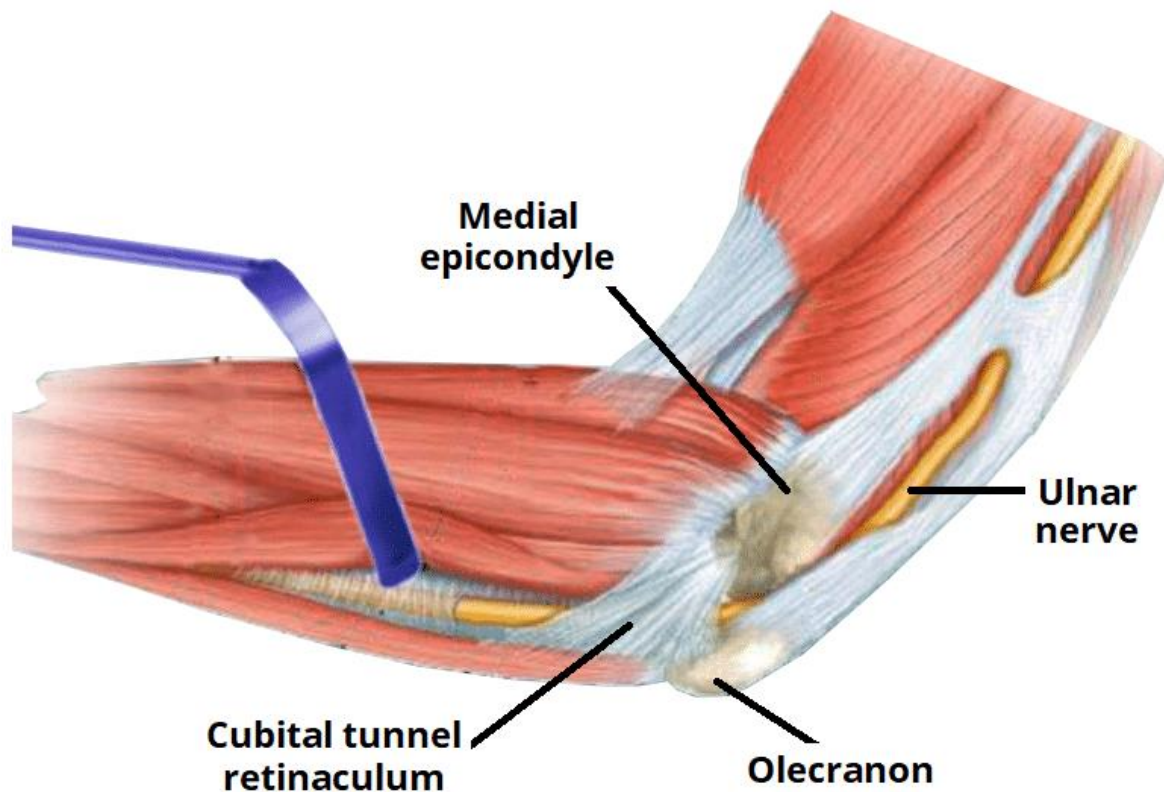
Why do we have an Ulnar Nerve entrapment at the elbow? It can happen when the elbow is exposed to prolonged stretching especially when the elbow is kept bent for long periods or simply when the nerve is subject to direct pressure while in contact with a solid surface like a metallic surface. The same can happen at the wrist level if one lean on the handlebars during a long bike ride. There is also a Guyon tunnel where a branch of the ulnar nerve passes at the wrist level. One will feel then the extremity “Going to sleep” or while bumping the elbow one may describe a sensation of “hitting a funny bone” because of an electrical shock or can describe simply a tingling sensation. In some people, the nerve does not lie properly in the cubital tunnel and can shift across the medial epicondyle and can sub-luxate while the elbow passes from a flexed to an extended position. Such repeated motions can cause irritation of the nerve. Fluid build-up or long-standing effusion at the elbow can exceptionally compress on the ulnar nerve.

To diagnose such pathology, one should perform an proper examination of the extremity and review the medical history of the patient. It is important to look for, clinically, where the compression may be, in evaluating the forearm, the elbow, the hand and the fingers for strength and range of motion.as well as sensation. Percussion over the nerve along its trajectory may reveal a tingling sensation which is the principle of a “Tinel’s sign” causing a discomfort at percussion.

Imaging studies like simple X-rays has been used in search of bony pathology.as well as MRI and CT scan to locate bone spurs which may compress the nerve. This allows us to evaluate the bone condition at the elbow because of the close contact of the nerve to the bone. MRI will provide details in the anatomy of the soft tissues at the elbow. MR Neurography is also an MRI with special techniques and sequences enhancing images of the nerve, used the same way a standard MRI is performed. These modalities present some of the non-invasive ways to evaluate the elbow. Ultrasound has been a useful tool used by others.....

Most clinicians will rely on an Electromyography (EMG) and a Nerve Conduction Study (NCS) to evaluate the function of the nerve and this will help in specifying the site of the compression. The Electromyography (EMG) will evaluate the ongoing muscle activity and

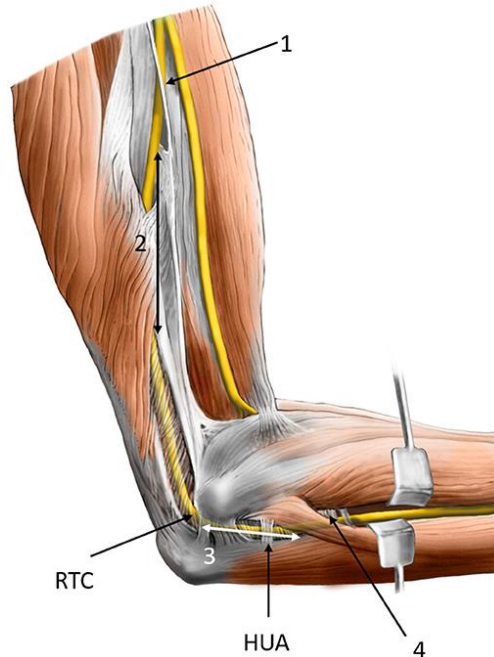
the response of the muscle when the nerve is stimulated, The Nerve Conduction Study (NCS) will measure the amount and the speed of conduction of an electrical impulse through the nerve while innervating a muscle. Often, a surgeon may be so sure of the diagnosis that it become unnecessary to perform such test. The same can be seen with carpal tunnel syndrome or other peripheral nerve compression. The pressure we are facing with defensive Medicine, obligate us to perform these tests prior to initiate any treatment especially when surgery is contemplated as the definitive method of treatment.



A view of the medial aspect of the elbow

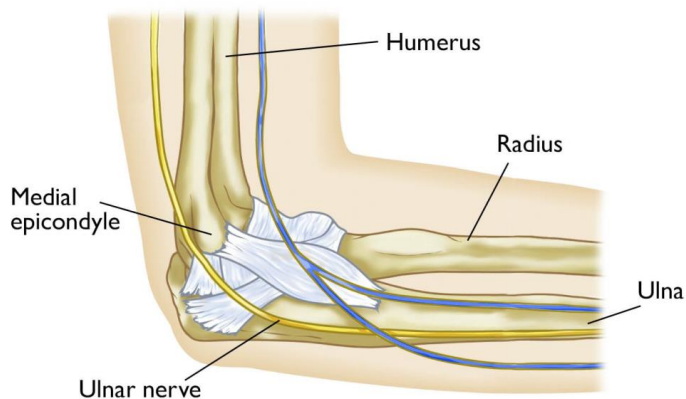
Most cases of Cubital Tunnel Syndrome respond to non-surgical treatments once taken in proper consideration. Treatment varies with restriction of activity, rest, and pain relief as well as anti-inflammatory medication. The importance in avoiding external pressure over the medial aspect of the elbow is paramount. Padded splints or braces can be beneficial especially while sleeping or driving. Avoid any prolonged pressure over the medial aspect of the elbow. Rarely, we will encourage warm compresses or even prescribe physical therapy

sessions with heat and ultrasound therapy. Repetitive motions should be avoided in order to ease the inflammatory process.



Sub-cutaneous view of the anatomy of the elbow (medial)

I use in a routine basis, on any of my patient with peripheral nerve entrapment or neuropathy, B6 (Pyridoxine) medication as I was taught in medical school on patient suffering from Tuberculosis taking "INH". medication and developing peripheral neuropathy. I have learned from my rotation at the Sanatorium of our country.



Deeper view of the anatomy of the medial aspect of the elbow

Some physicians prescribe occupational or physical therapy. The occupational or physical therapists focus their efforts on gentle exercises to help the Ulnar Nerve slide through the Cubital Tunnel. The exercises may help keeping the muscles of the forearm and hand healthy while preventing the joints from becoming stiff.

Surgery will finally be recommended only when all conservative options have been exhausted to release the extremity from extensive pressure over the ulnar nerve. This may prevent further muscle wasting. The surgical procedure is performed in the operating room as an outpatient procedure but rarely may require an overnight stay. A patient may choose to be sedated and benefit from a regional anesthesia like a “Bier Block” or a “Regional Block” which block the innervation to the involved extremity allowing the surgeon to perform the desired procedure. Patient can be also offered the choice of a general anesthesia. Most protocol will require the surgeon to obtain his/her own permit for the surgical treatment, obligating him/her to see the patient in the holding area and identify the area with his/her signature or place a mark over the area to be operated, in order to avoid any confusion in the operating room and specially to avoid a “wrong-site surgery”. This has been a common error in our surgical centers and outpatient operating rooms around the country.

There are various options in the armamentarium of the surgeon shooting at relieving the symptoms of a compressed ulnar nerve at the elbow. A skin incision, centered over the medial aspect of the elbow is used to approach the elbow (6 centimeters long). Then, the Ulnar nerve is located posteriorly at the entry of the cubital tunnel of the elbow. It becomes imperative to remove the “Roof” (retinaculum) above the cubital tunnel. This is called a simple decompression of the nerve and when the nerve is re-routed anteriorly, it is called “Subcutaneous transposition”. There are also different ways in performing the transposition itself: Subcutaneous or musculofascial anterior transposition or simply under the flexor muscle (submuscular). Other surgeons may not be satisfied with this technique and will chose to secure the nerve in order to avoid its return to it previous position, in the cubital tunnel.

A surgeon may take the risk in releasing the roof only and leave the nerve simply laying in the tunnel but the most common procedure remains the decompression of the nerve and

the re-routing in front of the elbow under the subcutaneous fatty tissue or to perform a musculotendinous flap to imbed it. This will secure the positioning anteriorly and stop the nerve from returning to its previous position. This sleeve is commonly performed to assure a stabilization of the nerve. Additional splinting of the extremity at 45 to 90 degrees is always recommended in the post-operative period. for 2-3 weeks. Occupational therapy is also recommended to re-gain strength and range of motion in the upper extremity. It may take months to recover fully. I generally supplement the patient with B6 vitamins. The nerve may need a longer period to re-generate (a millimeter a day). Unfortunately for individuals with severe nerve compression and muscle damage, a complete healing may never be obtained and permanent symptoms may be seen after transposition.

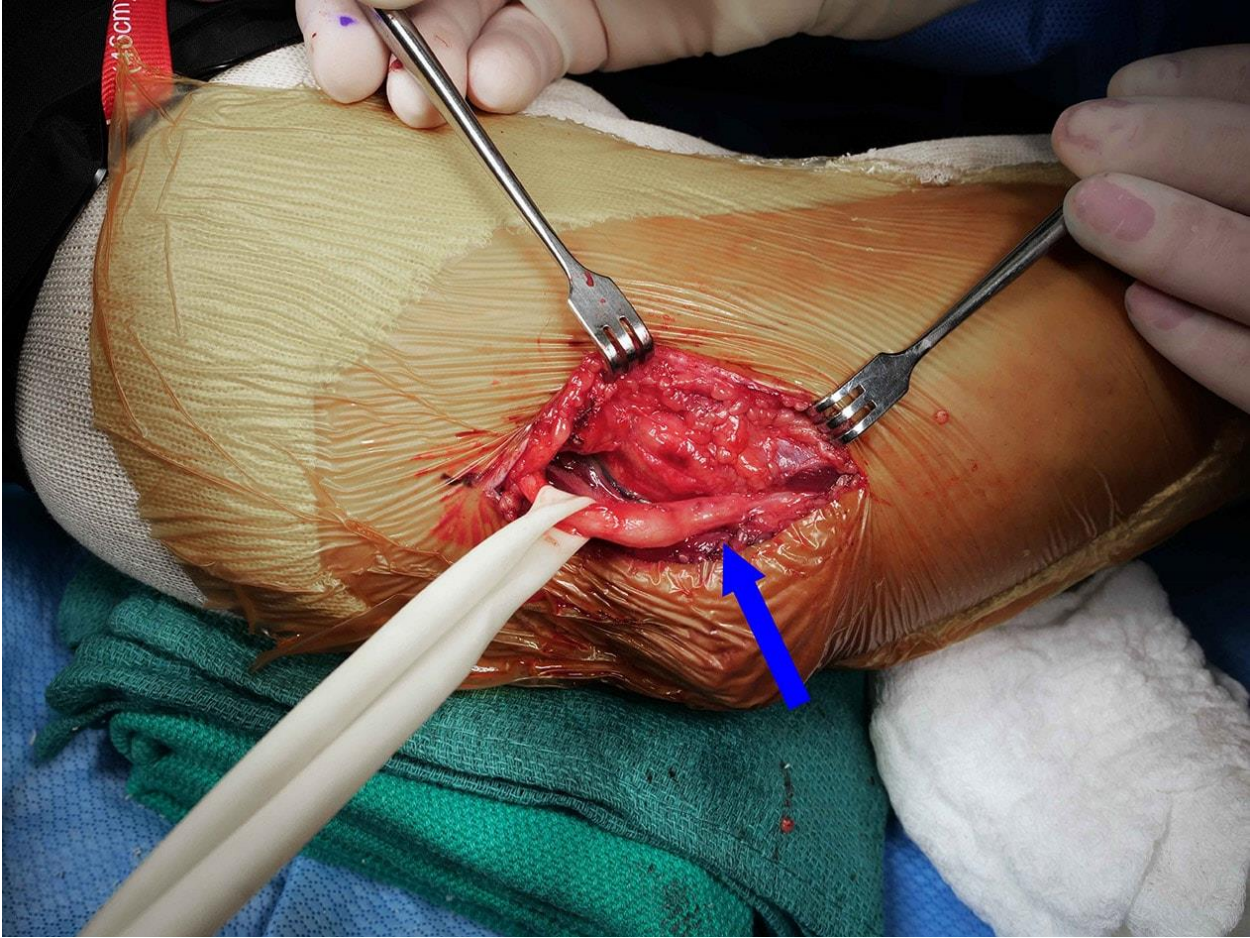
One has to remember that the Ulnar nerve branches off the brachial plexus system and travel down the arm to the hand. It transmits electrical signals to muscles of the forearm and hand and appears also to provide articular branches to the elbow joint itself. I always try to spare these branches when I discover them. This nerve provides the sensation to the 4th and 5th fingers (ring and little finger) of the hand, part of the palm and the ulnar aspect of the forearm. An entrapment of the nerve causes pain, numbness and tingling to the areas described/ In some cases, weakness and loss of muscle mass is noted as well as deformity in flexion of the ring and little finger is seen in late cases. Other signs of sensibility to cold can be seen.

In transposing the ulnar nerve, I have taken the habit to split the intermuscular fascia in the distal aspect of the arm because it appears that while transferring the nerve, a secondary area where the nerve is crossing the fascia may become a site of friction and irritation. Finally, another operation became popular among hand surgeons, during my residency, consisting in removing the medial epicondyle of the humerus itself, to avoid any friction on the nerve. Many are still hesitating to perform it because all the complications associated to it, but may be considered in patients with degenerative or rheumatoid arthritis.

Medial approach of the elbow to expose the Ulnar Nerve

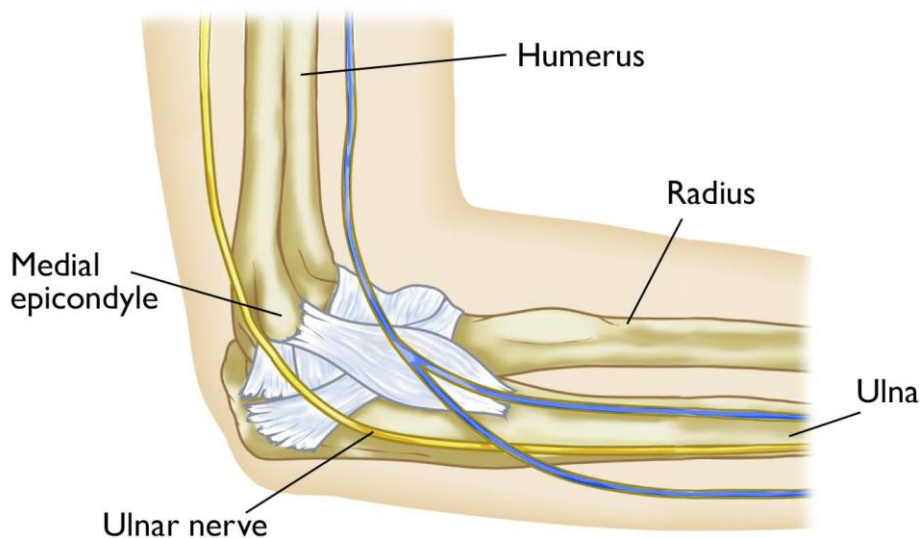


Ulnar Nerve removed from the cubital tunnel on a penrose drain retracting it.





At the elbow, the ulnar nerve travels through a tunnel of tissue (the cubital tunnel) just behind the medial epicondyle and provides some articular branches as well as branches to the flexor muscles. Some surgeons as we described may simply remove the medial epicondyle itself (medial epicondylectomy) avoiding all bony contact on the nerve.



Following anterior transposition, the results are generally good with similar results for any type of surgical treatment discussed above. The patient should always be told that the nerve will be more anteriorly and superficially situated under the soft tissue and a tingling sensation may be experienced whenever the anterior aspect of the elbow is stimulated. There may be some muscle wasting and the nerve may take time to recover and some symptoms may even persist after surgical treatment.

This page is dedicated to our medical students and resident learning on how to exam and treat patients suffering from an entrapment of the Ulnar nerve at the elbow.

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