

## Ulnar Tunnel Syndrome Due to Ulnar Artery Aneurysm: A Case Report

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### Abstract

**Aims:** To report of a case with non-traumatic distal ulnar artery aneurism leading to ulnar nerve neuropathy at level of wrist in the ulnar tunnel. Ulnar nerve impingement has been mostly reported to be a result of posttraumatic false aneurysms, thrombosis, or anomalies distal ulnar artery in ulnar tunnel (Guyon's canal).

**Methods:** A 33 year-old woman with sever continuous pain which was gradual in onset over the last 9 months associated with intermittent burning sensation and continuous numbness on the ulnar side of her left hand was presented to causality unit. EMG examination showed an ulnar neuropathy in the ulnar tunnel and an ipsilateral carpal tunnel syndrome.

**Results:** An operation was performed and exploration of the right ulnar nerve in the ulnar tunnel at the wrist showed that an ulnar artery aneurysm had pulsatile pressure like effect on the ulnar nerve. Ulnar nerve decompression by ulnar artery ligation was performed after ensuring of distal circulation, the carpal ligament was excised at the same session. After the operation, pain was improved completely in the first day postoperatively but numbness lasted for about 6 months post operatively.

**Conclusion:** Peripheral nerve neuropathies are results of a variety of causes most of which are post traumatic, non-traumatic peripheral artery aneurism are very unlikely seen to be a leading cause to the neuropathy.

Although the exact etiology is unknown but mostly it might be the pulsatile pressure like affect that predispose to the upcoming neuropathy which explains the disappearance of the pain first day postoperatively after the ligation of the aneurysm was performed.

### Introduction

Ulnar Tunnel Syndrome (UTS) is a term used to describe a condition which occurs at the level of wrist joint as a result of ulnar nerve entrapment. The term "ulnar tunnel syndrome" was coined by DuPont in 1965 to describe the condition of 4 patients with acquired ulnar neuritis [1]. Other synonym of the ulnar tunnel is Guyon's canal which is one potential but not exclusive site of ulnar nerve compression at the wrist. The eponym comes from Guyon's description in 1861 of a space at the base of the little finger (hypothenar) at which bifurcation of the ulnar nerve occurs and that is liable to compression from surrounding structures [2].

Numerous factors may precipitate the onset of UTS, including space-occupying lesions, vascular lesions, and repetitive trauma. The zone or the area of compression of the ulnar nerve contribute the patient presentation and therefore may be purely motor, purely sensory, or a mixture of both. The role of conservative treatment is found to be beneficial and found to be useful in selected cases such changing or modification of the life style or job, but whenever there will be entrapment or sings of neuropathy surgical release is indicated.

### Case Report

A female patient aged 33 years presented to the causality unit with a history of 9 months sever continuous pain gradual in onset associated with intermittent burning sensation and continuous numbness along the base of right little finger and the ring and little digits of her right hand. Taking many pain relief medication even trials of local steroidal injection had done without getting any benefits.

On examination, there was an obvious atrophy of the hypothenar eminence muscle mass with especially seen atrophy of adductor pollicis muscle, weak abduction of the little and ring fingers noticed. Sensation to touch and pinprick was decreased in the curse distribution of the ulnar of the right hand (Figure 1a and 1b).

Right ulnar nerve conduction velocity study did not show any ulnar nerve regional delay across the elbow. Right ulnar nerve united muscle

action potential revealed significantly decreased amplitude (normal 15 to 50 mV). In addition to these ulnar nerve findings, there was also a minimal carpal tunnel finding on the same side.

During operation and identification of the right ulnar nerve in the Guyon's canal at the wrist showed an ulnar artery aneurysm compressing the ulnar nerve. After a tourniquet application aneurysm of artery was ligated and the tourniquet deflated to assess the circulation of the right hand. Ulnar artery was dissected from underlying nerve and decompression after ulnar artery ligation was performed.

After the operation, intermittent the annoying severe pain

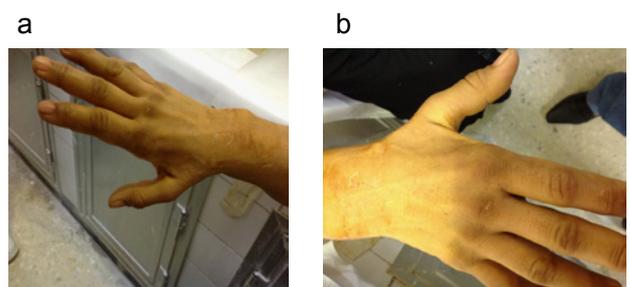


Figure 1: Examination of Atrophy of adductor pollicis muscle.

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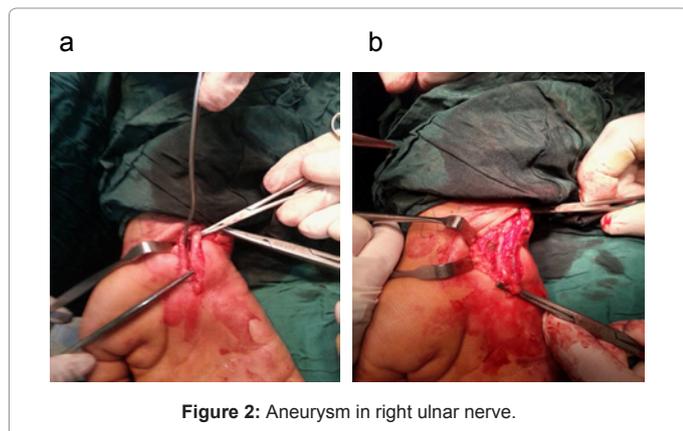


Figure 2: Aneurysm in right ulnar nerve.

disappeared first day postoperatively and burning sensation were improved completely in a few days, but numbness and weakness were continued. On 6-month follow-up, numbness was not present, and hypoesthesia on ulnar side of right hand and weakness of the fourth and fifth digits abduction were not present on neurological examination. On EMG examination after 6 months, a significant improvement was observed (Figure 2a and 2b).

## Discussion

The distal ulnar tunnel is clinically important because of that it may become the site of ulnar nerve impingement. Although most of cases the exact etiology is unknown, ulnar entrapment can result from compression of the nerve by osteoarthritic changes, tumours of the surrounding soft tissues, synovial cysts, bursal enlargement, abnormality in muscles, ganglions, calcinosis, and unusual fibrous band. It may also be due to arterial pathologies. In comparison to the cranial nerves, which are known be compressed by arterial pathologies such as aneurysm or elongated, tortuous, and dilated arteries, peripheral nerve compression syndromes may be rarely due to arterial pathologies. Among these peripheral nerves only the ulnar nerve has been identified to be entrapped by ulnar artery aneurysm or thrombosis [3,4].

Reports demonstrated that a lot of cases of impingement of the ulnar nerve as a result of false posttraumatic ulnar artery aneurysms at the wrist and hand. Also thrombosis of the ulnar artery has been reported as a leading pathology to the entrapment as the artery leaves the Guyon's canal, or arterial anatomy abnormality. Occasionally, compression by true ulnar artery aneurysms has been reported. However, the only case with ulnar nerve compression caused by tortuous ulnar artery has been reported by Segal et al. in literature [5]. In our case, it was also determined ulnar nerve impingement by an ulnar artery aneurysm in the ulnar tunnel as that case.

Segal et al. have reported in their case that, paresthesia, tingling and burning had been the prominent symptoms, and they have stated with immediate resolution of these symptoms by simply diverting aside the pulsatile pressure that might have initiated abnormal activation of sensory nerve fibers as the cases with pulsatile vascular compression of cranial nerves. In our case, the prominent symptoms were an intermittent burning pain as the one of Segal et al. and numbness in addition [5].

Burning pain was completely resolved in a few hours after the operation. Therefore, it was stated that this symptom may be due to pulsatile compression by the ulnar artery aneurysm. On the other hand, numbness and hypoesthesia on ulnar side of the hand and mild

weakness of the fourth and fifth digits were improved. On 6-month follow-up, EMG findings were improved significantly.

The specific internal topography of the ulnar nerve in relation to the structures comprising the distal ulnar tunnel into three zones. Each zone consists of both a specific portion of the ulnar nerve and the structures surrounding it. Zone I is that portion of the tunnel proximal to the bifurcation of the nerve. In Zone I, the nerve has both motor and sensory fibers. Cross sections of the nerve in this zone showed two distinct groups of fascicles. The palmar-radial fibers became the superficial branch, while the dorsal-ulnar fibers became the deep motor branch. Zone II covers the deep motor branch of the nerve, and Zone III encloses the superficial branch.

Gross and Gelberman have reported in a review that, most of the ulnar nerve entrapment cases in Zone I had combined motor and sensory deficits. Ulnar artery is located lateral side of the nerve through the Zone I of the canal. Therefore, it is expected that nerve compression due to arterial pathology must cause principally sensorial symptoms and signs as in the case of Segal et al. However, unlike that case, there were both sensorial and motor deficits, and also permanent deficits in our case whose compression was in Zone 1. Therefore, it may be stated that pulsatile compression of the nerve due to arterial loop in Zone I may affect both lateral-sensorial and medial-motor fascicles, and may also cause to permanent sensorial and motor deficits, if it is long-lasting sufficiently.

Compression of the ulnar nerve at Guyon's canal can be caused not only by tumor-like structures, a fibrotic arch, a ganglion, lipoma, aneurysm or thrombosis but also by anomalous hypothenar muscles which are reviewed here. The abductor digiti minimi is the most variable hypothenar muscle. It can possess one to three muscle bellies. Additional heads can arise from the flexor retinaculum, the palmaris longus tendon, the pronator quadratus tendon or the deep fascia of the palmar side of the forearm. In addition, at the flexor digiti minimi accessory heads with origin from the flexor retinaculum, the antebrachial fascia or the long flexor muscles of the forearm can be detected. By contrast, the opponens digiti minimi mostly lacks variations and is sometimes missing; this is due to its hidden location. However, in few cases an additional head can arise from the lower arm aponeurosis. Furthermore, additional (fourth) hypothenar muscles might be expressed. These muscles are characterized by origins in the forearm and insertions on the head of the 5<sup>th</sup> metacarpal bone or on the 5<sup>th</sup> proximal phalanx. It must be noted that accessory hypothenar muscles might look like connective tissue at first glance. Often their origin extends to the antebrachial fascia. This can be explained by the phylogenetic fact that all intrinsic muscles of the hand are derived from muscle masses that originated in the forearm. In the opinion of several authors, ulnar nerve compression mostly is evoked by hypertrophied variant hypothenar muscles due to overuse as for example in carpenters. In some rare cases, an aberrant hypothenar muscle can also evoke median nerve compression.

The first common habit that will almost always end in injury to the ulnar nerve and compression of the ulnar tunnel is if you rest your elbow on an armrest or on a table, workbench or desk. Think about all the furniture you use throughout your day. Armrests on your office chair might seem very comfortable, but using them puts pressure on the ulnar tunnel or on the path of the ulnar nerve as it travels through the forearm. Resting your elbow on a tabletop or desk will also compress the ulnar nerve, right at the tunnel itself. Pressure on the ulnar nerve at the same time you are using your hands to type, assemble objects, eat dinner or use your hand actively in any other way will accelerate

the development of ulnar tunnel symptoms and adhesions. The safest option is to rest your arms in your lap when you are not using your hands, avoiding armrests and desktops altogether. While working, it is essential that you allow your arms to float over your work surface rather than leaning on your elbows.

Another common mistake people make that can promote Ulnar Tunnel Syndrome is when the arms are held away from and forward of the body. Often, the placement of desktop accessories can force this posture so it is very important to take a new look at the placement of your computer keyboard, mouse, and other equipment on your work surface.

Hairdressers are forced to hold their arms up and away from their bodies while cutting and styling hair. Any job that requires that objects be held or carried forward and away from the body, like movers, truck drivers, etc. can also experience similar stress to their ulnar nerves [6,7].

### Learning Points

The approach to the diagnosis and treatment of UTS has changed little during the past several decades. UTS is less common than either CTS or cubital tunnel syndrome, and in a high proportion of cases, the cause can be localized to a compressive space-occupying lesion or repetitive trauma. The anatomy of the ulnar tunnel is complex, but numerous anatomic studies have described the tunnel in significant detail. Because organic lesions are often implicated in the cause, surgical exploration and decompression of the ulnar tunnel is a

common treatment modality. Reported surgical results have yielded good results, although at this time, case series and comparative studies are uncommon, perhaps as a result of both the infrequency and heterogeneity of the causes.

### Consent

Consent was clearly informed and written by the patient to authorize the publication of this case report with the accompanying figures. A transcript of this consent is accessible to reevaluation.

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