# Upper Extremity Entrapment Neuropathies

Essay

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# List of Abbreviations

| Abbreviation | Refer to |
|---|---|
| ***AIN*** | *Anterior Interosseous Nerve* |
| ***aTOS*** | *Arterial Thoracic Outlet Syndrome* |
| ***C T*** | *Computed Tomography* |
| ***CSF*** | *Cerebrospinal Fluid* |
| ***CTS*** | *Carpal Tunnel Syndrome* |
| ***CuTS*** | *Cubital Tunnel Syndrome* |
| ***CXR*** | *Chest X-Ray* |
| ***EAST*** | *Elevated Arm Stress Test* |
| ***EMG*** | Electromyography |
| ***LAC*** | *Lateral Antebrachial Cutaneous Nerve* |
| ***LMNL*** | *Lower Motor Neuron Lesion* |
| ***MAC*** | *Medial Antebrachial Cutaneous Nerve* |
| ***MNCS*** | *Motor Nerve Conduction Study* |
| ***MRI*** | *Magnetic Resonance Image* |
| ***MRN*** | *Magnetic Resonance Neurography* |
| ***NCS*** | *Nerve Conduction Study* |
| ***NSAIDs*** | *NonSteroidal Anti-Inflammatory Drugs* |
| ***nTOS*** | *Neurogenic Thoracic Outlet Syndrome* |
| ***PIN*** | *Posterior Interosseous Nerve* |
| ***RTS*** | *Radial Tunnel Syndrome* |
| ***SNAP*** | *Sensory Nerve Action Potential* |
| ***SNCS*** | *Sensory Nerve Conduction Study* |
| ***SSEPs*** | *Somatosensory Evoked Potentials* |
| ***TMJ*** | *Temporomandibular Joint* |
| ***TOCS*** | *Thoracic Outlet Compression Syndrome* |
| ***TOS*** | *Thoracic Outlet Syndrome* |
| ***UMNL*** | Upper motor neuron lesion |
| ***UNE*** | *Ulnar Nerve Entrapment* |
| ***vTOS*** | *Venous Thoracic Outlet Syndrome* |

# Introduction

The entrapment neuropathies are important and widespread clinical problems, they are caused by mechanical dynamic compression of a short segment of a single nerve at a specific site, as it passes through a fibro-osseous tunnel or an opening in fibrous or muscular tissue, ischemia occurs and mechanical disruption of the nerve follows **(Bland, 2005).**

The median nerve entrapment at the wrist called carpal tunnel syndrome (CTS), which is the most common entrapment neuropathy, the median nerve passes through the carpal tunnel canal, which is a fibro-osseous passageway in the anterior aspect of the wrist, that is formed by the transverse carpal ligament (flexor retinaculum) superiorly with the carpal bones inferiorly **( Jillapalli and Shefner, 2005).**

The ulnar nerve entrapment at the elbow called cubital tunnel syndrome(CuTS), which is the second most common entrapment neuropathy after carpal tunnel syndrome (CTS), the ulnar nerve passes through the cubital tunnel, which is the aponeurosis between the two heads of the flexor carpi ulnaris muscle at the elbow **(Palmer and Hughes, 2010).**

The radial nerve compression at the elbow can lead to either radial tunnel syndrome(RTS) or posterior interosseous nerve syndrome , people with radial tunnel syndrome have a burning sensation along the lateral aspect of the forearm, whereas patients with posterior interosseous nerve syndrome present with weakness of the extensor muscles of the forearm **(Tsai and Steinberg, 2008).**

Thoracic outlet syndrome (TOS) denotes compression of the subclavian vessels and nerve trunks of the brachial plexus in the region of the thoracic inlet , resulting in injury or irritation of neurovascular structures as they course through three narrow passageways from the base of the neck into the arm via the axilla **(Lukanich and Grondin et al., 2001).**

Less common entrapment neuropathies of the upper extremity as pronator syndrome and anterior interosseous nerve syndrome which are entrapment neuropathies of the median nerve in the forearm. Guyon's canal syndrome which is entrapment neuropathy of the ulnar nerve at the wrist. Suprascapular nerve may get entrapped under the transverse scapular ligament. Quadrilateral space syndrome which entrapment neuropathy of the axillary nerve within the quadrilateral space at the back of the shoulder. Long thoracic

neuropathy which result from stretch from repetitive activities**(Spinner and Amadio, 2003).**

Nerve conduction studies (NCS) and electromyography (EMG) are a standard part of the evaluation for entrapment neuropathies, they are useful to support the clinical diagnosis of entrapment neuropathies, to assess severity and to rule out other abnormalities **(Jablecki and Andary et al., 2002).**

Conservative therapy is generally considered to be a reasonable first option for mild to moderate entrapment neuropathies with successful outcomes **(McClure, 2003).**

Surgical decompression is effective treatment for entrapment neuropathies; it can be performed as an open procedure or endoscopically **(Capasso and Manzoli et al., 2009).**

# Aim of our work is to:

- Review the literature of the up-to-date about etiology and pathophysiological mechanism of upper extremity entrapment neuropathies.
- Outline the physical and electrophysiological assessment modalities of upper extremity entrapment neuropathies.
- Outline the different modalities involved in management of upper extremity entrapment neuropathies including efficacy, complications and outcome.

***The Brachial Plexus:***

The brachial plexus is a triangular shaped structure that extends from the spinal cord to the axilla. Its average extraforaminal length is 15.3 cm. It is composed of connective and neural tissue in a 2:1 ratio, and contains several elements: five roots, three trunks, six divisions, three cords and several terminal nerves ***(Ferrante, 2004).*** (Fig. 1)

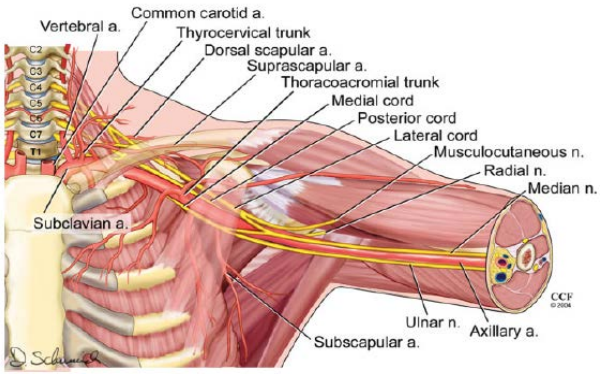


***Fig.1: The Relationship between The Brachial Plexus And The Neighboring Structures (Netter, 1995).***

It originates in the posterior triangle of the neck and travels distally into the upper extremity. The brachial plexus extends from the lateral border of the scalene anterior muscle to the caudal (inferior) border of the pectoralis minor muscle where each of the three cords