

## Upper Limb Nerve Injuries

Lesions of the Median, Ulnar and Radial Nerves

Lesions of the Median Nerve

Median nerve lesions occur at two sites,

1. In the forearm (Pronator Syndrome)  
and
2. At the wrist. (Carpal Tunnel Syndrome)

Pronator Syndrome

This is an uncommon entrapment neuropathy of the median nerve

Sites

The nerve may be involved at any of these sites.

1. As it passes alongside the fibrous band connecting the biceps tendon to the forearm fascia,
2. As it passes down between the two heads of pronator teres
3. As it passes through a fibrous arch formed by flexor digitorum superficialis.

Symptoms and Signs

Motor

There is weakness of all the muscles innervated by the median nerve, including abductor pollicis brevis and the long finger flexors.

Sensory

There is also sensory impairment on the palm of the hand (sparing in the carpal tunnel syndrome because the palmar cutaneous branch of the median nerve arises above the carpal tunnel and lies superficial to it.)

Anterior interosseous nerve palsy

The anterior interosseous nerve usually arises from the median nerve proximal to the site of compression in the pronator syndrome; it may be affected with the median nerve or by itself.

Causes

1. Due to external pressure (a form of Saturday night palsy),
2. Sometimes by tight grip in association with pronation without obvious cause.
3. May be a manifestation of neuralgic amyotrophy and tends to resolve spontaneously over several months.

Motor:

An anterior interosseous nerve palsy causes weakness of pinch grip due to involvement of flexor

pollicis longus and flexor digitorum profundus to the index finger.

Please note that

Innervation of flexor digitorum profundus to the middle finger is rather variable,(also by Ulnar Nerve) therefore this muscle may or may not be weak.

The branches to these three muscles (FDP,FPL,PQ) may arise separately from the median nerve, so that isolated weakness of the terminal phalanx to the thumb or index finger may occur. The pronator quadratus is also involved but is not clinically significant.

## Carpal Tunnel Syndrome

This is the most common entrapment mononeuropathy caused by the compression of the median nerve as it passes through the fibro-osseous tunnel beneath the flexor retinaculum.

### Causes

The carpal tunnel may be narrowed by

1. Arthritic changes in the wrist joint, particularly rheumatoid arthritis;
2. Soft tissue thickening as may occur in myxoedema and acromegaly;
3. Edema and obesity including pregnancy.

### Pathology

Normally the nerve slides smoothly in and out of the carpal tunnel with flexion and extension of the wrist; when the nerve is compressed there is an additional damage to the nerve with flexion and extension.

The dominant hand is usually affected first, probably because this hand is used more frequently and more vigorously.

### Motor

There is wasting and weakness of abductor pollicis brevis

### Sensory

Impairment of sensation in the

1. Thumb,
2. Index Finger,
3. Middle Finger and
4. Median side of the Ring finger,

(the palmar branch of the median nerve is spared since it does not pass through the carpal tunnel.)

Lesions of the Ulnar Nerve

Ulnar nerve lesions occur at four sites,

1. Behind the medial epicondyle,
2. In the cubital tunnel,
3. At the wrist and
4. In the hand.

At the Elbow

The ulnar nerve is in a vulnerable position as it lies

between the median epicondyle and the olecranon:

it lies on bone covered only by a thin layer of skin.

It is easily damaged if

the ulnar groove is shallow and

the nerve may become more prominent than the medial epicondyle or the olecranon when the elbow is fully flexed.

Sometimes the nerve may override the medial epicondyle in full flexion.

Loss of the ulnar groove may be associated with arthritis of the elbow joint, often due to an old fracture, in which case there may be incomplete extension of the elbow with a wide carrying angle.

The nerve is easily palpable and is often thickened.

Motor

There is usually weakness of flexor digitorum profundus to the ring and little fingers, and if these muscles are involved the lesion must be at the elbow.

Sensory

Sensation Impaired in

Palmar Aspect

Medial palmar skin,

Medial side of the little finger,

Adjoining sides of little and ring fingers

Dorsum

Medial side of the little finger,

Adjacent sides of the little and ring,

Adjoining sides of the ring and middle finger

Cubital Tunnel Syndrome

This is an entrapment neuropathy of the ulnar nerve in the tunnel formed by the tendinous arch connecting the two heads of flexor carpi ulnaris at their humeral and ulnar attachments. The clinical features are precisely the same as a lesion in the ulnar groove and again, involvement of flexor digitorum profundus to the ring and little fingers is variable.

Lesions at these two sites cannot be reliably distinguished neurophysiologically, but in the cubital tunnel syndrome the elbow joint is usually normal: elbow movements are full with a normal carrying angle; the ulnar nerve feels normal in the ulnar groove; it does not sublux; nor does it become superficial on elbow flexion.

At the Wrist

## Site

The ulnar nerve may be compressed in Guyon's canal by a ganglion.

## Motor

All the small hand muscles innervated by the ulnar nerve are involved.

Preservation of flexor digitorum profundus to the ring and little fingers

The dorsal cutaneous branch and the palmar branch of the ulnar nerve are both spared since the lesion is distal to their origin from the main trunk of the ulnar nerve in midforearm.

## In the Hand

The deep motor branch of the ulnar nerve may be compressed against the pisiform and hamate bones when the hand is used as a mallet, or if a vibrating tool or motorcycle handlebar is held in such a way that the hypothenar eminence is off the edge of the handle. The sensory branches are always spared and involvement of the hypothenar muscles is variable depending on the level at which branches to these muscles arise.

## Lesions of Radial Nerve

### At Axilla

Loss of Elbow Extension

Loss of Sensation in the lateral and posterior Part of Arm

Loss of Wrist Extension - Wrist Drop

Loss of Thumb Extension - Thumb drop

Loss of Finger Extension - Finger drop

Loss of Sensation in the first dorsal web space

### At the Spiral Groove

Loss of Wrist Extension - Wrist Drop

Loss of Thumb Extension - Thumb drop

Loss of Finger Extension - Finger drop

Loss of Sensation in the first dorsal web space

### After Spiral Groove Before Piercing the Supinator and before the origin of sensory branch

Diminished Wrist Extension - Wrist Deviates radially when extended

Loss of Thumb Extension - Thumb drop

Loss of Finger Extension - Finger drop

Loss of Sensation in the first dorsal web space

### After Piercing the Supinator (Posterior Interosseus Nerve)

Loss of Thumb Extension - Thumb drop

Loss of Finger Extension - Finger drop

## Superficial Branch

It lies superficially and relatively unprotected overlying the lateral aspect of the radius, where it is easily compressed by tight bracelets, watch straps and handcuffs, Called as Cheralgia Paraesthetica (compare with Meralgia Paraesthetica)

Loss of Sensation in the first dorsal web space

If the lesion is proximal in this nerve, sensation may be impaired over a variable area of skin over the lateral side of the dorsum of the hand.

***Compiled by Dr. Bruno***