MEDICAL EDUCATION RESOURCE

Nerves of the Hand

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Overview

The **hand** is richly supplied by three major nerves:

1. **Ulnar nerve** – chief nerve of the hand (supplies most intrinsic muscles).
2. **Median nerve** – supplies the thumb, index, and middle fingers (precision grip).
3. **Radial nerve** – purely **sensory** in the hand (to dorsum of thumb region).

1. Ulnar Nerve

Root Value

- **C8 – T1** (branch of medial cord of brachial plexus).

Course in Hand

1. Enters palm **superficial to the flexor retinaculum** through the **ulnar (Guyon's) canal**, **lateral to the pisiform bone** and **medial to the ulnar artery**.

2. At the level of pisiform ? divides into:
    - **Superficial terminal branch** (mainly sensory).
    - **Deep terminal branch** (mainly motor).

Branches

A. Superficial Branch

- **Muscular branch** ? *Palmaris brevis*.
- **Digital branches** ?
    - Common palmar digital nerve ? divides into **proper digital nerves** for:
        - Medial 1½ fingers (little + half of ring finger).
    - Supply skin of palmar and dorsal aspects of these fingers.

B. Deep Branch

- Passes between abductor and flexor digiti minimi ? accompanies **deep branch of ulnar artery**.
- Supplies:
    - All **hypothenar muscles** (3).
    - **3rd & 4th lumbricals.**

- **All interossei (palmar and dorsal).**
- **Adductor pollicis.**
- **Deep head of flexor pollicis brevis.**

Area of Sensory Supply

- **Palmar surface:** medial 1½ fingers and adjoining palm.
- **Dorsal surface:** medial 1½ fingers up to distal interphalangeal joints.

Clinical Anatomy of Ulnar Nerve

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1. Sites of Injury

- **At elbow (cubital tunnel).**
- **At wrist (Guyon's canal).**

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2. Ulnar Nerve Injury at Elbow

Causes: Fracture or dislocation near medial epicondyle.
Effects:

- Paralysis of flexor carpi ulnaris & medial half of FDP.
- Loss of finger adduction & abduction (interossei).

- **Claw hand deformity:** hyperextension at MCP & flexion at IP joints of ring and little fingers.
- Sensory loss in medial 1½ fingers.

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3. Ulnar Nerve Injury at Wrist (Guyon's Canal Syndrome)

Causes: Compression in ulnar canal by ganglion or occupational trauma.
Effects:

- Intrinsic hand muscle weakness (except lateral two lumbricals & thenar muscles).
- Sensory loss limited to palmar side (dorsum spared).
- Flattening of hypothenar eminence.

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4. Clinical Tests

- **Froment's Sign:** Patient grips paper between thumb and index; flexion of thumb IP joint = adductor pollicis paralysis.
- **Card Test:** Paper between fingers slips easily ? interossei weakness.

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2. Median Nerve

Root Value

- **C5 – T1** (from lateral and medial cords of brachial plexus).

Course in Hand

1. Enters hand **deep to the flexor retinaculum** through the **carpal tunnel**.
2. Lies beneath palmar aponeurosis and divides into:
    - **Recurrent (thenar) branch** ? motor.
    - **Digital branches** ? sensory and lumbrical branches.

Branches

A. Muscular Branch (Recurrent Thenar Branch)

- Curves upward to supply:
    - Abductor pollicis brevis.
    - Opponens pollicis.
    - Superficial head of flexor pollicis brevis.

B. Digital Branches

- Emerge beneath palmar aponeurosis.
- Supply:
    - **Lateral two lumbricals.**

- **Palmar skin** of lateral 3½ fingers.
- **Dorsal nail beds** of same fingers (via distal branches).

Area of Sensory Supply

- **Palmar:** Lateral 3½ digits (thumb ? radial half of ring finger).
- **Dorsal:** Terminal phalanges of same digits.
- **Palm:** Lateral two-thirds via palmar cutaneous branch.

Clinical Anatomy of Median Nerve

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1. Carpal Tunnel Syndrome

Cause: Compression beneath flexor retinaculum (commonest site).
Features:

- Tingling & numbness in thumb, index, middle, and half of ring finger.
- Weakness or wasting of thenar muscles.
- Loss of thumb opposition (flat thenar = *ape-hand deformity*).
- Sensory sparing of thenar skin (palmar cutaneous branch lies superficial).

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2. Median Nerve Injury at Elbow (Supracondylar Fracture)

Effects:

- Loss of pronation (pronator teres & quadratus).
- Wrist flexion weak and deviated to ulnar side.
- Loss of flexion of thumb & index (FPL + lateral FDP).
- **Hand of Benediction:** seen when patient tries to make a fist ? index & middle fingers remain extended.

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3. Anterior Interosseous Nerve Lesion

Effect: Loss of flexion at thumb IP & index DIP ? *“Pinch sign” (unable to make OK gesture).*

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4. Clinical Tests

- **Opposition Test:** Ask patient to touch thumb to little finger ? fails in median nerve palsy.
- **Thumb abduction test:** Raise thumb perpendicular to palm ? weak in carpal tunnel syndrome.
- **Benediction test:** Attempt to make fist ? failure of index & middle finger flexion.