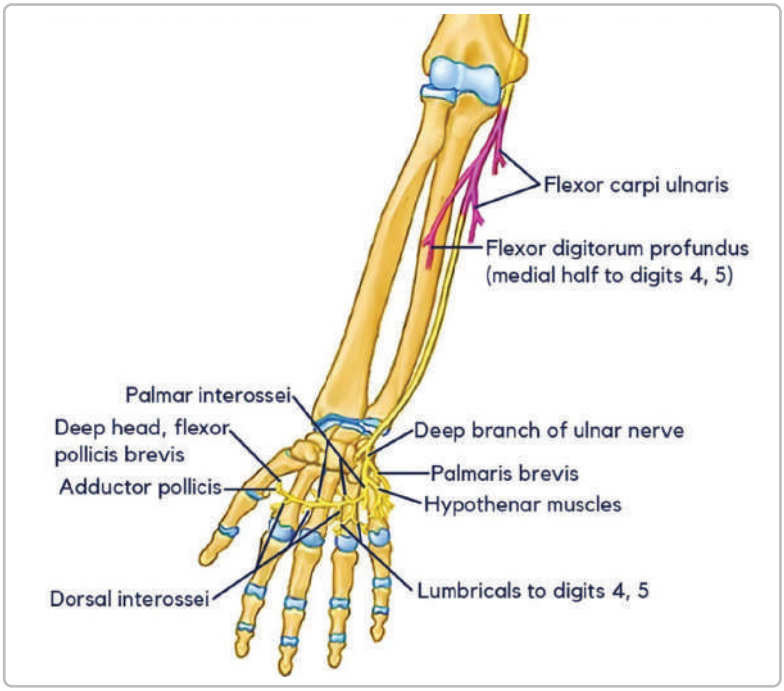
General Information

00:00:10

- The ulnar nerve is a large nerve.
- It runs with the bone on the medial side of the forearm.
- It originates from the brachial plexus.
- Specifically, it is formed by the lower root value of the brachial plexus, which is C8 and T1, forming the lower trunk.
- The lower trunk of the brachial plexus gives an anterior division that continues as part of the middle cord.
- Therefore, the ulnar nerve has root values of C8 and T1, although it can sometimes have C7.
- Because it primarily has C8 and T1 root values, it primarily works for the hand muscles, as the root value of hand muscles is C8 and especially T1, while C8 also innervates the entire forearm muscles.



Sensory Supply

00:03:50

- The ulnar nerve supplies the skin on the medial one and a half fingers (the little finger and the ulnar half of the ring finger). This includes both the anterior and posterior aspects. The sensory branch passes behind the medial epicondyle.

Pathways and Vulnerable Points

00:04:15

- The ulnar nerve passes behind the medial epicondyle of the humerus.
- It is not a content of the cubital fossa (the space in front of the elbow joint) because it passes behind the medial epicondyle.
- If there is a fracture of the medial epicondyle, the ulnar nerve can be damaged.
- In the wrist, the ulnar nerve passes superficial to the flexor retinaculum (also known as the transverse carpal ligament). The median nerve passes deep to the flexor retinaculum.
- The ulnar nerve passes through **Guyon's canal** (also known as the ulnar canal). This canal is formed by the pisiform bone and the hook of the hamate, with the palmar carpal ligament forming the roof
- Compression of the ulnar nerve in **Guyon's canal** can occur due to prolonged pressure, such as from leaning on bicycle handlebars.

Muscles Supplied

00:04:35

- In the forearm, the ulnar nerve supplies only one and a half muscles.
  - **Flexor carpi ulnaris**: This muscle flexes the carpus from the ulnar side and also contributes to ulnar deviation.
  - **Medial half of flexor digitorum profundus (FDP):** This portion flexes digits four (ring finger) and five (little finger), especially at the distal interphalangeal (DIP) joint.
- The ulnar nerve supplies most of the 20 muscles in the hand.
  - **Hypothenar muscles:** All the muscles of the little finger are supplied by the ulnar nerve, as there is no other nerve in that area. These muscles are involved in the movement of the little finger.
  - **Palmaris brevis:** This is a subcutaneous muscle in the palm supplied by the ulnar nerve.
  - **Deep muscles of the hand (via its deep branch):**
    - **Four palmar interossei:** These muscles adduct the fingers (bring them towards the middle finger, which acts as the axis).

- **Four dorsal interossei**: These muscles abduct the fingers (spread them away from the middle finger).
- **Adductor pollicis**: This is a deep muscle of the thumb and is not a thenar muscle. The thenar muscles (abductor pollicis brevis, flexor pollicis brevis superficial head, and opponens pollicis) are supplied by the median nerve.
- **Deep head of flexor pollicis brevis**: The superficial head of this muscle is supplied by the median nerve, making flexor pollicis brevis a hybrid muscle with dual innervation.

– **Two Lumbricals (for digits 4 and 5):** These lumbricals arise from the tendons of the FDP that are supplied by the ulnar nerve. Lumbricals typically perform MCP joint flexion and IP joint extension.

Hybrid Muscles

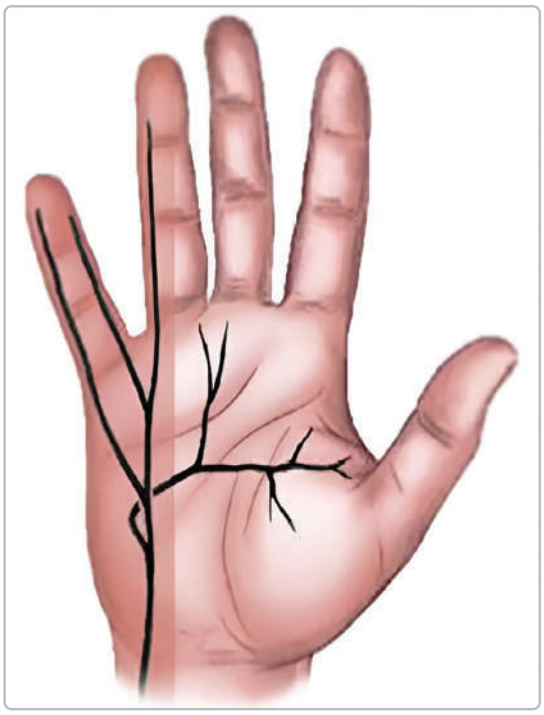
00:08:45

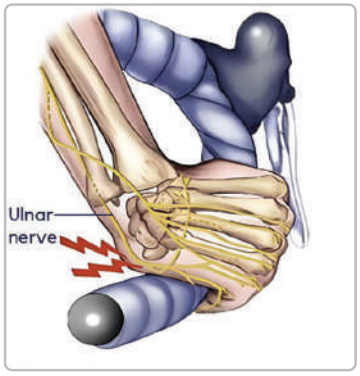
- **Flexor digitorum profundus (FDP):** The medial half (for digits 4 and 5) is supplied by the ulnar nerve, while the lateral half (for digits 2 and 3) is supplied by the anterior interosseous nerve (a branch of the median nerve).
- **Flexor pollicis brevis:** The deep head is supplied by the ulnar nerve, and the superficial head is supplied by the median nerve, making it a hybrid muscle.

Consequences of Ulnar Nerve Lesions

00:09:10

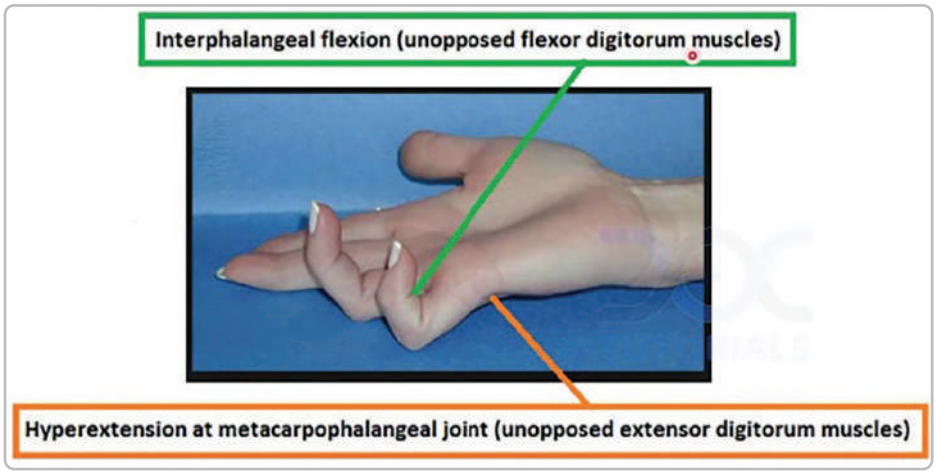
- Damage to the ulnar nerve can compromise the flexor carpi ulnaris and the medial half of the FDP in the forearm, as well as most of the hand muscles.
- Compression in Guyon's canal can lead to sensory loss in the medial one and a half fingers (anterior and posterior).
- It can also lead to weakness or paralysis of the intrinsic hand muscles supplied by the ulnar nerve.





Ulnar Claw Hand

00:12:20



- This deformity results from the imbalance of muscle action when the ulnar nerve is damaged.
  – **MCP joint hyperextension:** This occurs in the ring and little fingers due to the unopposed action of the extensor digitorum muscles in the forearm.

- **PIP and DIP joint flexion:** This occurs in the ring and little fingers due to the unopposed action of the flexor digitorum profundus muscle (specifically the medial half supplied by the ulnar nerve) and the flexor digitorum superficialis.
- The index and middle fingers are often less affected because the lateral half of the FDP (which flexes these fingers at the DIP joint) and their lumbricals are supplied by the median nerve.
- In a **"total claw hand,"** where both the median and ulnar nerves are affected, the deformity might look different.

- When the ulnar nerve is damaged at the level of Guyon's canal, the palmar and dorsal interossei will not function properly, leading to difficulty in adducting and abducting the fingers at the metacarpophalangeal joints.