MEDICAL EDUCATION RESOURCE

Posterior Interosseous Nerve (Deep Branch of Radial Nerve)

Posterior Interosseous Nerve (Deep Branch of Radial Nerve)

Root Value

- **C7, C8** (continuation of the deep branch of the radial nerve).

Course

1. Arises in the **cubital fossa** as the **deep branch** of radial nerve.
2. Pierces the **supinator muscle** (between its superficial and deep layers).
3. Enters the **posterior compartment** of forearm as the **posterior interosseous nerve**.
4. Descends on the **interosseous membrane**, lying between the superficial and deep extensor groups.
5. Terminates as a **gangliform enlargement** on the dorsal wrist joint, giving **articular branches** to the wrist and intercarpal joints.

Branches and Distribution

Before entering supinator:

- Nerve to *extensor carpi radialis brevis*.
- Nerve to *supinator*.

Within and below supinator:

- Muscular branches to:
  - Extensor digitorum
  - Extensor digiti minimi
  - Extensor carpi ulnaris
  - Abductor pollicis longus
  - Extensor pollicis longus
  - Extensor pollicis brevis
  - Extensor indicis

Articular branches:

- To wrist and intercarpal joints.

Relations

- Lies deep to **extensor digitorum** and **extensor carpi radialis brevis**.

- Accompanied by the **posterior interosseous artery** (branch of common interosseous artery).

Clinical Anatomy

- **Posterior Interosseous Nerve Palsy:**
  - Results from compression in the supinator (arcade of Frohse).
  - Produces **inability to extend fingers** (wrist extension preserved via ECRL).
  - Common in rheumatoid arthritis or after radial head fracture.
- **Testing:** Ask patient to extend middle finger; weakness indicates radial nerve lesion at this level.

? Dissection of Posterior Interosseous Nerve

Steps

1. Place limb prone; reflect superficial extensors (*ECRL, ECRB, ED, EDM, ECU*).
2. Identify **deep branch of radial nerve** as it enters *supinator*.
3. Follow it beneath supinator to posterior forearm ? becomes **posterior interosseous nerve**.
4. Observe muscular branches to deep extensors and terminal articular twigs near wrist.
5. Note accompanying **posterior interosseous artery** throughout its course.

? Posterior Interosseous Artery

Origin

- From **common interosseous artery**, a branch of **ulnar artery** in the forearm.

Course

1. Arises in the upper forearm, passes **posteriorly above the interosseous membrane**.
2. Appears between *supinator* and *abductor pollicis longus*.
3. Descends with the **posterior interosseous nerve**, between the superficial and deep extensor groups.
4. Ends near the wrist by anastomosing with the **anterior interosseous artery** and **dorsal carpal network**.

Branches

- **Recurrent branch** ? joins *middle collateral artery* (from profunda brachii) in the elbow anastomosis.
- **Muscular branches** ? to extensor muscles.
- **Terminal branches** ? join anterior interosseous artery and carpal arches.

Clinical Anatomy

- Contributes to **collateral circulation** around the elbow and wrist.
- Injury is rare due to deep position, but important for maintaining **dorsal hand perfusion** after radial or ulnar occlusion.

? Arches of the Hand

Overview

The hand contains **two main arterial arches** that ensure rich anastomosis between the radial and ulnar arteries:

1. **Superficial palmar arch**
2. **Deep palmar arch**

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1. Superficial Palmar Arch

Formation

- Mainly by **ulnar artery**, completed laterally by the **superficial palmar branch of radial artery**.

Location

- Deep to palmar aponeurosis, superficial to flexor tendons.

Branches

- **Three common palmar digital arteries** ? each divides into **two proper digital arteries** for adjacent fingers.
- **One proper digital artery** ? supplies medial side of little finger.

Level

- Lies in line with the distal border of fully extended thumb (lower than deep arch).

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2. Deep Palmar Arch

Formation

- Mainly by **radial artery**, completed medially by the **deep branch of ulnar artery**.

Location

- Deep to long flexor tendons, on bases of metacarpal bones and interossei.

Branches

- **Palmar metacarpal arteries** ? join common palmar digital arteries of superficial arch.
- **Perforating branches** ? connect to dorsal metacarpal arteries.
- **Recurrent branches** ? to wrist and carpal area.

Level

- Approximately at the level of the **proximal border of extended thumb**.

Clinical Anatomy of Palmar Arches

- **Allen's Test:**
  - Used to check patency of both ulnar and radial arteries before radial artery cannulation or graft harvesting.
- **Incomplete arches (in ~20–30%)** ? risk of ischemia if one artery is occluded.
- **Severe palmar injuries:** may involve both arches ? profuse bleeding requiring compression of both arteries at wrist.
- **Surgical Note:**
  - Deep arch injury ? bleeding controlled by compressing radial artery in anatomical snuffbox.
  - Superficial arch injury ? compress ulnar artery proximal to pisiform.