

Facts to Remember – Chapter: Forearm and Hand

General Overview

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- The **forearm** extends from the **elbow joint to the wrist** and contains **20 muscles** divided into **anterior (flexor-pronator)** and **posterior (extensor-supinator)** compartments.
- The **interosseous membrane** binds radius and ulna and transmits forces from hand ? forearm ? arm.
- **All flexors of forearm = median nerve** supply (except flexor carpi ulnaris and medial ½ of FDP = ulnar nerve).
- **All extensors = radial nerve or its posterior interosseous branch.**

Muscles

- **Superficial flexors** share a **common origin** from the *medial epicondyle* (common flexor tendon).
- **Superficial extensors** share a **common origin** from the *lateral epicondyle* (common extensor tendon).

- **Brachioradialis** – only **flexor** in **extensor compartment**.
 - **Pronator teres & pronator quadratus** ? main pronators; **supinator & biceps** ? main supinators.
 - **Flexor digitorum profundus** flexes **DIP joints**; **flexor digitorum superficialis** ? **PIP joints**.
 - **Lumbricals & interossei** ? flex MCP & extend IP joints (“writing position”).
 - **Thenar muscles** ? control **thumb opposition and precision grip**.
 - **Hypothenar muscles** ? control movement of little finger.
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Tendons and Retinacula

- **Flexor retinaculum** forms the **roof of carpal tunnel**, transmitting **median nerve + 9 tendons** (4 FDS + 4 FDP + 1 FPL).
 - **Extensor retinaculum** prevents “bow-stringing” of extensor tendons; contains **6 compartments** with synovial sheaths.
 - **Palmar aponeurosis** provides protective covering for underlying structures and continues into fibrous digital sheaths.
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Nerves

- **Median nerve**: main nerve of anterior forearm and lateral palm.

- Injury ? *Ape-hand deformity, hand of benediction.*
 - **Ulnar nerve:** chief nerve of hand (supplies most intrinsic).
 - Injury at wrist ? *Claw hand.*
 - **Radial nerve:** entirely motor in forearm and sensory on dorsum of hand.
 - Injury ? *Wrist drop.*
 - **Posterior interosseous nerve:** deep branch of radial; supplies all deep extensors.
 - **Anterior interosseous nerve:** branch of median; supplies FPL, lateral FDP, and pronator quadratus.
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Arteries

- **Brachial artery** ? divides into **radial and ulnar** arteries in cubital fossa.
 - **Radial artery:** mainly forms **deep palmar arch.**
 - **Ulnar artery:** mainly forms **superficial palmar arch.**
 - **Common interosseous artery** (from ulnar) ? divides into anterior and posterior interosseous arteries.
 - **Arterial arches** ensure collateral flow between radial and ulnar arteries.
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Venous and Lymphatic Drainage

- **Superficial veins:** cephalic (lateral) and basilic (medial) ? connected by median cubital vein.
 - **Deep veins:** venae comitantes accompany arteries.
 - **Lymphatics:**
 - Palmar ? follow deep veins ? axillary nodes.
 - Dorsal ? follow superficial veins ? cubital then axillary nodes.
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Important Anatomical Relations

- **Radial artery pulse:** lateral to flexor carpi radialis tendon.
 - **Ulnar artery pulse:** lateral to pisiform bone.
 - **Median nerve at wrist:** lies beneath flexor retinaculum ? compressed in carpal tunnel.
 - **Ulnar nerve & artery:** pass superficial to retinaculum through Guyon's canal.
 - **Radial nerve & artery:** cross the anatomical snuffbox.
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Fascial Spaces & Synovial Sheaths

- **Thenar space** ? lateral palm (thumb, index).

- **Mid-palmar space** ? medial palm (middle & ring fingers).
 - **Pulp space** ? fingertips (site of whitlow).
 - **Parona's space** ? forearm; communicates with thenar & mid-palmar spaces.
 - **Ulnar bursa** ? sheath for FDS & FDP.
 - **Radial bursa** ? sheath for FPL.
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Clinical Points

- **Tennis elbow:** inflammation of common extensor origin.
- **Golfer's elbow:** inflammation of common flexor origin.
- **Carpal tunnel syndrome:** compression of median nerve beneath flexor retinaculum.
- **Guyon's canal syndrome:** compression of ulnar nerve superficial to retinaculum.
- **De Quervain's disease:** tenosynovitis of APL & EPB (first dorsal compartment).
- **Mallet finger:** rupture of extensor tendon at DIP joint.
- **Dupuytren's contracture:** fibrosis of palmar aponeurosis ? flexion of fingers.
- **Claw hand:** ulnar nerve lesion.
- **Ape hand:** median nerve lesion in thenar region.
- **Wrist drop:** radial nerve palsy.

- **Hand of Benediction:** median nerve lesion at elbow.

Palmar Arches

- **Superficial palmar arch:** mainly ulnar; level = distal border of thumb.
- **Deep palmar arch:** mainly radial; level = proximal border of thumb.
- **Allen's test** checks collateral flow between them.

Quick Summary Table

CATEGORY	KEY FACT
Nerve of anterior forearm	Median
Nerve of hand	Ulnar
Nerve of posterior forearm	Radial
Main artery of hand	Ulnar (superficial arch)
Wrist pulse	Radial artery
Main supinator	Biceps + Supinator
Main pronator	Pronator teres + Pronator quadratus
Thumb extensors	EPL, EPB, APL

CATEGORY	KEY FACT
Thumb flexors	FPL, FPB
Finger abductors/adductors	Dorsal/Palmar interossei