MEDICAL EDUCATION RESOURCE

Muscles of the Back of the Forearm

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Overview

- All extensor muscles of the forearm lie in the **posterior compartment**.
- They are divided into two layers:
    1. **Superficial group**
    2. **Deep group**
- **Nerve supply:** Entirely by **radial nerve** or its **posterior interosseous branch**.
- **Main actions:** Extension of wrist and fingers, supination of forearm, abduction of thumb.

I. Superficial Muscles

? **Mnemonic (from lateral ? medial):**
“BRAE — BRE — DI — MI — UL”
(Brachioradialis, Extensor Carpi Radialis Longus, Extensor Carpi Radialis Brevis, Extensor Digitorum, Extensor Digiti Minimi, Extensor Carpi Ulnaris)

1. Brachioradialis

- **Origin:** Upper two-thirds of lateral supracondylar ridge of humerus.

- **Insertion:** Lateral side of distal radius (styloid process).
- **Nerve Supply:** Radial nerve (C5–C6).
- **Action:** Flexes elbow (best in mid-prone position).
- **Clinical Note:** Though in extensor group, it acts as **flexor** of forearm.

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2. Extensor Carpi Radialis Longus (ECRL)

- **Origin:** Lower part of lateral supracondylar ridge.
- **Insertion:** Base of 2nd metacarpal bone.
- **Nerve Supply:** Radial nerve (C6–C7).
- **Action:** Extends and abducts wrist.

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3. Extensor Carpi Radialis Brevis (ECRB)

- **Origin:** Common extensor origin (lateral epicondyle).
- **Insertion:** Base of 3rd metacarpal.
- **Nerve Supply:** Posterior interosseous nerve.
- **Action:** Extends wrist, helps in abduction.

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4. Extensor Digitorum

- **Origin:** Common extensor origin (lateral epicondyle).

- **Insertion:** Dorsal digital expansion of medial four fingers.
- **Nerve Supply:** Posterior interosseous nerve.
- **Action:** Extends fingers at MCP, PIP, and DIP joints.

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5. Extensor Digiti Minimi

- **Origin:** Common extensor origin.
- **Insertion:** Dorsal digital expansion of little finger.
- **Nerve Supply:** Posterior interosseous nerve.
- **Action:** Extends little finger.

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6. Extensor Carpi Ulnaris

- **Origin:** Lateral epicondyle and posterior border of ulna.
- **Insertion:** Base of 5th metacarpal.
- **Nerve Supply:** Posterior interosseous nerve.
- **Action:** Extends and adducts wrist.

> **Clinical Note (Superficial Extensors)**

- **Lateral Epicondylitis (Tennis Elbow):**

- Inflammation of common extensor origin ? pain on resisted wrist extension and grip.

- **Posterior interosseous nerve entrapment:**
  - Causes weakness in finger extension without wrist drop.

II. Deep Muscles

? **Mnemonic (from lateral ? medial):**
“Sup – AB – EPB – EPL – EI”
(Supinator, Abductor Pollicis Longus, Extensor Pollicis Brevis, Extensor Pollicis Longus, Extensor Indicis)

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1. Supinator

- **Origin:** Lateral epicondyle, radial collateral ligament, annular ligament, and supinator crest of ulna.
- **Insertion:** Upper third of radius (lateral and anterior surfaces).
- **Nerve Supply:** Deep branch of radial nerve (before it becomes posterior interosseous).
- **Action:** Supinates forearm (especially when extended).

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2. Abductor Pollicis Longus (APL)

- **Origin:** Posterior surfaces of radius, ulna, and interosseous membrane.
- **Insertion:** Base of 1st metacarpal.
- **Nerve Supply:** Posterior interosseous nerve.

- **Action:** Abducts and extends thumb at CMC joint.

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3. Extensor Pollicis Brevis (EPB)

- **Origin:** Posterior surface of radius and interosseous membrane.
- **Insertion:** Base of proximal phalanx of thumb.
- **Nerve Supply:** Posterior interosseous nerve.
- **Action:** Extends thumb at MCP joint.

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4. Extensor Pollicis Longus (EPL)

- **Origin:** Posterior surface of ulna and interosseous membrane.
- **Insertion:** Base of distal phalanx of thumb.
- **Nerve Supply:** Posterior interosseous nerve.
- **Action:** Extends thumb at IP, MCP, and CMC joints.

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5. Extensor Indicis (EI)

- **Origin:** Posterior surface of ulna and interosseous membrane.
- **Insertion:** Dorsal digital expansion of index finger (joins extensor digitorum tendon).
- **Nerve Supply:** Posterior interosseous nerve.
- **Action:** Extends index finger independently.

Clinical Note (Deep Extensors)

- **De Quervain’s Tenosynovitis:**
  - Involves 1st dorsal compartment tendons (APL & EPB).
  - Pain on lateral wrist and during thumb abduction.
- **Intersection Syndrome:**
  - Friction between APL/EPB and ECRL/ECRB ? pain 4–6 cm above wrist.
- **Posterior Interosseous Nerve Palsy:**
  - Loss of extension of digits but **wrist extension preserved**.

? Dorsal Digital (Extensor) Expansion

Definition

- A **triangular aponeurosis** on the dorsum of fingers formed by **extensor digitorum**, **lumbricals**, and **interossei** tendons.

Structure

- **Base (proximal):** Over MCP joint, receives tendon of *extensor digitorum*.

- **Sides:** Joined by *lumbricals* and *interossei*.
- **Apex (distal):** Divides into **three slips**:
  - **Central slip** ? inserted into base of *middle phalanx*.
  - **Two lateral slips** ? unite and attach to *base of distal phalanx*.

Functions

- Coordinates extension of MCP, PIP, and DIP joints.
- Maintains balance between **extensors and flexors** during finger movements.

Clinical Anatomy

- **Mallet Finger (Baseball Finger):**
  - Avulsion of extensor tendon from distal phalanx ? finger tip droops.
- **Boutonnière Deformity:**
  - Rupture of central slip ? flexed PIP and hyperextended DIP joint.

? Dissection of Muscles of Back of Forearm

Steps

1. Place limb prone and make longitudinal incision along posterior forearm.

2. Reflect superficial fascia ? identify **cutaneous veins** and **nerves** (posterior cutaneous nerve of forearm).

3. Expose **superficial extensor muscles (BRAE BRE DI MI UL)** from lateral to medial.

4. Reflect these to reveal **deep muscles (Sup, APL, EPB, EPL, EI)**.

5. Identify **posterior interosseous nerve** entering deep between supinator and APL.

6. Note **extensor retinaculum compartments** and **tendon sheaths** near wrist.

7. Trace extensor tendons to **dorsal digital expansions** over MCP joints.