

**EXTENSOR  
COMPARTMENT OF THE  
FOREARM**

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# Introduction

- The forearm is the part of the upper limb between the arm and the hand
  - From the elbow to the wrist
- Its extensor compartment is the posterior aspect of the forearm

# Introduction

- There are 12 muscles in this compartment
- 7 are superficial; 5 are deep
- These muscles are involved in:
  - movement of the wrist joint
  - extension of the fingers and thumb
  - Supination
  - Flexion of the elbow joint

# Introduction

- 3 arise from the lateral part of the humerus and run along the radial side
  - Brachioradialis
  - Extensor carpi radialis longus
  - Extensor carpi radialis brevis

# Introduction

- 3 arise from the lateral part of the humerus and pass along the posterior surface
  - Extensor digitorum
  - Extensor digiti minimi
  - Extensor carpi ulnaris

# Introduction

- 3 emerge in the lower part of the forearm and go to the thumb
  - ❑ Abductor pollicis longus
  - ❑ Extensor pollicis longus
  - ❑ Extensor pollicis brevis

# Introduction

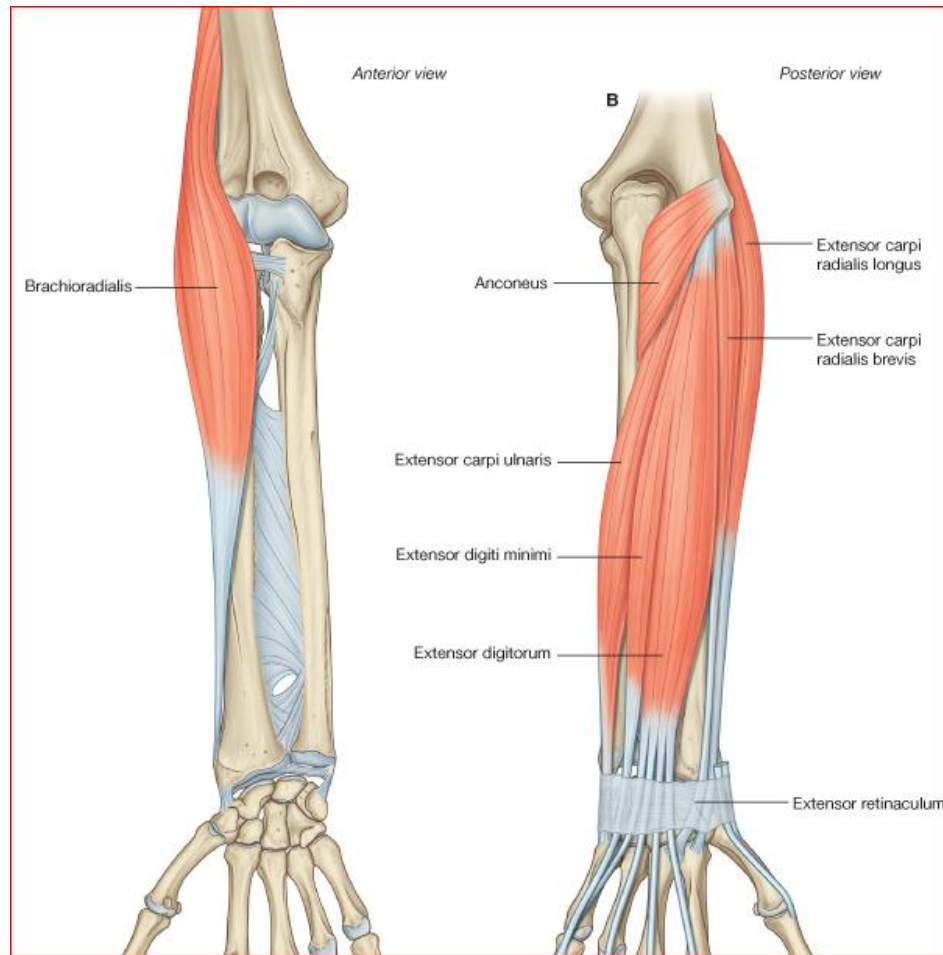
- 2 are located in the upper part of the forearm
  - Anconeus, which lies superficial
  - Supinator, which lies deep
- 1 runs deeply to reach the back of the hand
  - Extensor indicis

# Superficial muscles of the extensor compartment of the forearm

- The 7 muscles of the superficial layer
  - ❑ Brachioradialis
  - ❑ Extensor carpi radialis longus
  - ❑ Extensor carpi radialis brevis
  - ❑ Extensor digitorum
  - ❑ Extensor digiti minimi
  - ❑ Extensor carpi ulnaris
  - ❑ Anconeus



# Superficial muscles of the extensor compartment of the forearm



# Superficial muscles of the extensor compartment of the forearm

- **Brachioradialis**
- Arise from the upper  $\frac{2}{3}$  of the lateral supracondylar ridge and inserted into the base of the radial styloid
- Nerve supply is by radial nerve (C5, C6)
- It flexes the elbow

# Superficial muscles of the extensor compartment of the forearm

- **Extensor carpi radialis longus**
- Arises from the distal part of the supracondylar ridge and the lateral epicondyle of the humerus
- Inserts on the dorsal surface of the base of 2<sup>nd</sup> metacarpal
- It is deep to the brachioradialis muscle
- Extends and abducts the wrist
- Innervated by radial nerve C6, 7

# Superficial muscles of the extensor compartment of the forearm

- The following **4 muscles have a common extensor origin**, which is attached to the smooth area on the front of the lateral epicondyle
- Extensor carpi radialis brevis
- Extensor digitorum
- Extensor digiti minimi
- Extensor carpi ulnaris

# Superficial muscles of the extensor compartment of the forearm

- **Extensor carpi radialis brevis** is inserted in the base of the 3<sup>rd</sup> metacarpal
- Nerve supply by posterior interosseous nerve C7, 8
- It is a wrist extensor
- Extensors carpi radialis longus and brevis and ulnaris assist in making fist

# Superficial muscles of the extensor compartment of the forearm

- **Extensor digitorum** has 4 tendons which insert into the base of the dorsal surfaces of the middle and distal phalanges
- It is a major extensor of the four fingers
- Innervated by posterior interosseous nerve C7, 8
- It is an extensor of the wrist, metacarpophalangeal and interphalangeal joints

# Superficial muscles of the extensor compartment of the forearm

- **Extensor digiti minimi** inserts into the dorsal digital expansion of the little finger
- Innervated by posterior interosseous nerve C7, 8
- It is an accessory extensor of the little finger and wrist joint

# Superficial muscles of the extensor compartment of the forearm

- **Extensor carpi ulnaris**
- Inserts into the medial side of the base of the 5<sup>th</sup> metacarpal
- It extends and adducts the wrist
- Also acts as a synergist in finger flexion
- Innervated by the posterior interosseous nerve C7, 8



# Superficial muscles of the extensor compartment of the forearm

- **Anconeus**
- Arises from the posterior surface of lateral epicondyle
- It has a broad insertion into the posterolateral surface of the olecranon and related posterior surface of the ulna
- Innervated by radial nerve C7, 8
- Produces posteriolateral movement of the ulna during pronation

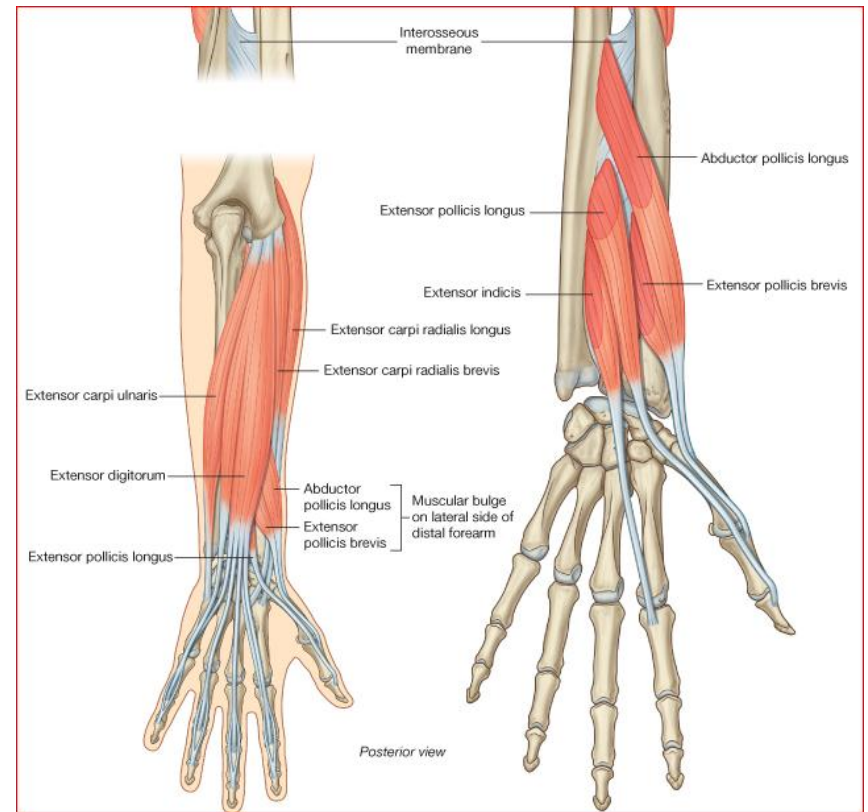
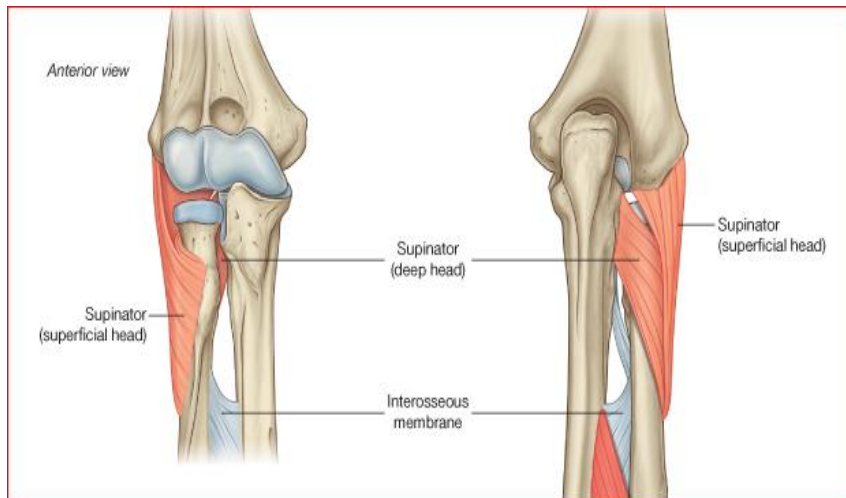
# Deep muscles of the extensor compartment of the forearm

- The 5 muscles of the deep layer
  - ❑ Supinator
  - ❑ Abductor pollicis longus
  - ❑ Extensor pollicis brevis
  - ❑ Extensor pollicis longus
  - ❑ Extensor indicis

# Deep muscles of the extensor compartment of the forearm

- All deep layer muscles, except supinator, arise from the posterior surfaces of the radius, ulna, and interosseous membrane and pass into the thumb and fingers
- Abductor pollicis longus, extensor pollicis brevis, and extensor pollicis longus emerge between the extensor digitorum and the extensor carpi radialis brevis tendons and pass into the thumb

# Deep muscles of the extensor compartment of the forearm



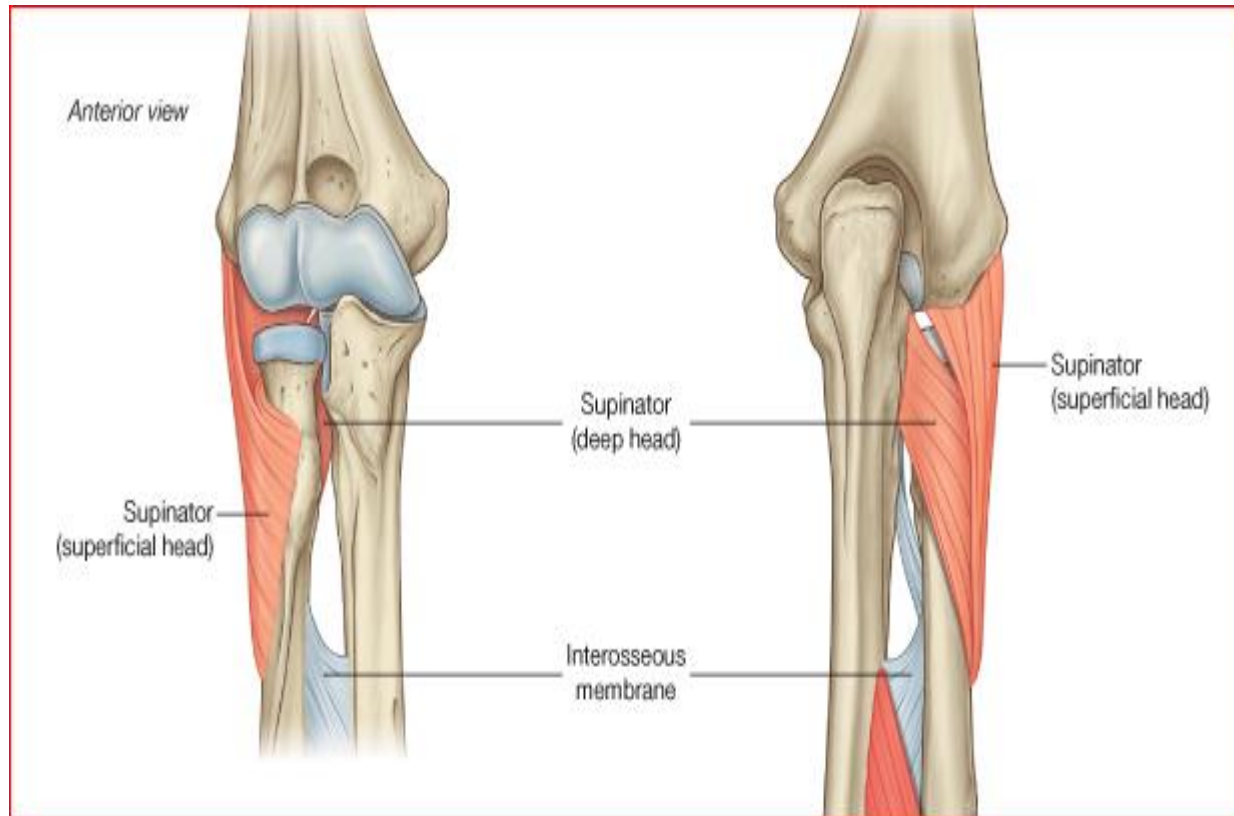
# Deep muscles of the extensor compartment of the forearm

- **Supinator**
- Has two heads of origin, which insert together on the proximal aspect of the radius
- The superficial (humeral) head arise from the lateral epicondyle and the related anular ligament and the radial collateral ligament of the elbow joint

# Deep muscles of the extensor compartment of the forearm

- The deep (ulnar) head arise from the supinator crest on the posterolateral surface of the ulna
- It inserts to the lateral surface of the radius, between the anterior and posterior oblique lines
- Innervated by posterior intersseous nerve C6,7
- Supinates the forearm and hand

# Deep muscles of the extensor compartment of the forearm



# Deep muscles of the extensor compartment of the forearm

- **Abductor pollicis longus**
- Arises from the proximal posterior surfaces of the radius, ulna and interosseous membrane
- The tendons divide into 2 and inserts into the base of 1<sup>st</sup> metacarpal and trapezium
- Extends the thumb at carpometacarpal joint, abduction and flexion of the wrist
- Nerve: Posterior interosseous nerve C7,8



# Deep muscles of the extensor compartment of the forearm

- **Extensor pollicis brevis**
- Arises from the posterior surface of the radius and interosseous membrane
- Together with abductor pollicis longus it forms a bulge on the posterolateral surface of the distal forearm
- Inserts on the base of the proximal phalanx

# Deep muscles of the extensor compartment of the forearm

- Innervated by posterior interosseous nerve C7,8
- Extends the carpometacarpal and metacarpophalangeal joints of the thumb
- Prevents flexion of the metacarpophalangeal joint when terminal phalanx is flexed by flexor pollicis longus
- As seen in pinching the thumb and index finger pads together e.g threading a needle

# Deep muscles of the extensor compartment of the forearm

- **Extensor pollicis longus**
- arises from the posterior surface of the ulna and adjacent interosseous membrane
- Inserts into the base of the distal phalanx of the thumb
- Held away from the other two deep muscles of the thumb by passing medially around the dorsal tubercle on the distal end of the radius (Lister's tubercle)

# Deep muscles of the extensor compartment of the forearm

- It is innervated by posterior interosseous nerve C7,8
- Extends the terminal phalanx of the thumb
- Also extends and abducts the wrist
- Injury leads to Hammer thumb

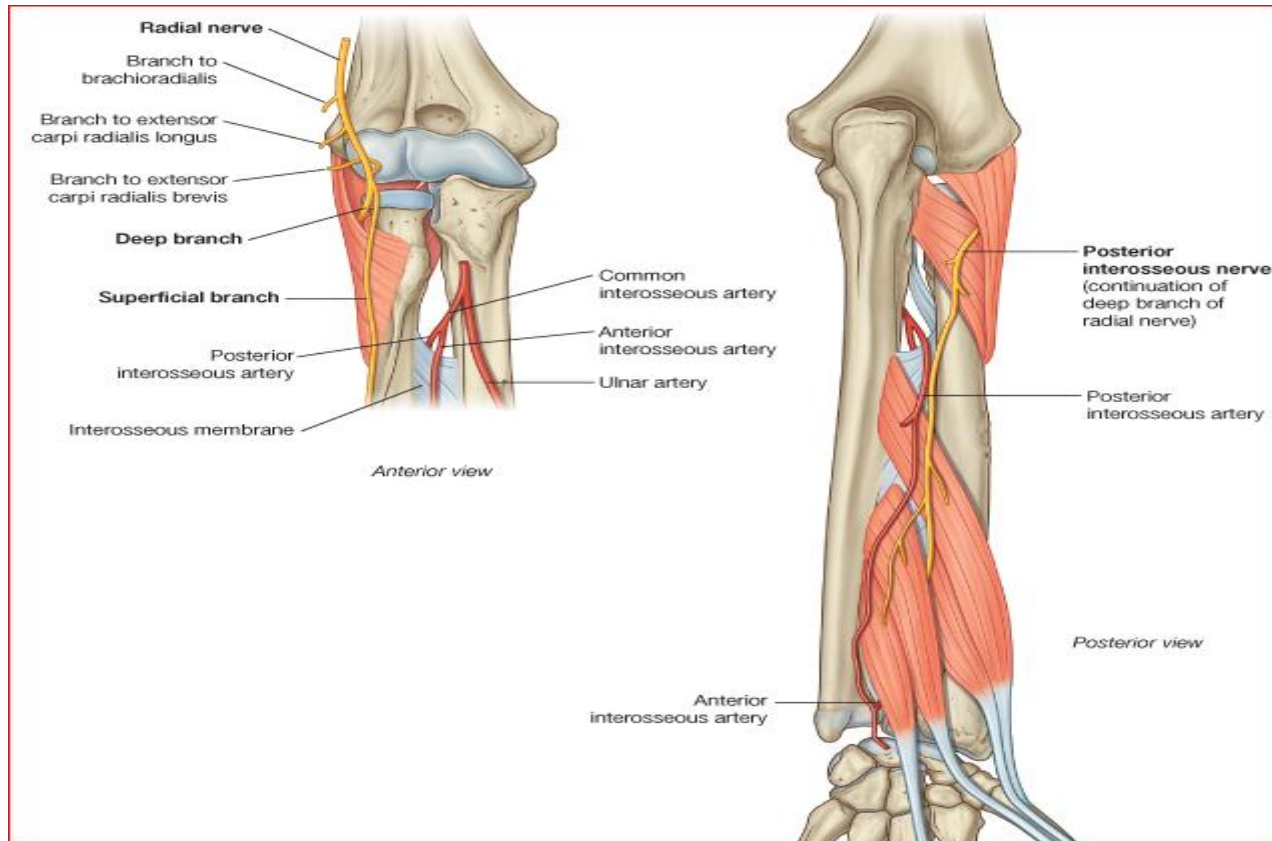
# Deep muscles of the extensor compartment of the forearm

- **Extensor indicis**
- Arises from the posterior surface of the ulna and adjacent interosseous membrane, distal to extensor pollicis longus
- Inserts into the extensor hood of the index finger with the tendon of extensor digitorum
- Nerve: posterior interosseous nerve C7,8
- Extends the index finger (as in pointing)

# Nerve supply of the extensor compartment of the forearm

- The nerve is the **radial nerve** and the posterior interosseous nerve
  - The **posterior interosseous nerve** ends as a small nodule at the wrist
- ☐ It supplies the muscles which arise from the common extensor origin and the deep muscles of the extensor compartment

# Nerve and blood supply of the extensor compartment of the forearm



# Blood supply of the extensor compartment of the forearm

- Posterior interosseous artery supplies this compartment
- The anterior interosseous artery supplements the blood supply
- The veins accompany the arteries, usually by dual venae comitantes which anastomose freely with each other



# Summary- Superficial group

Muscle	Origin	Insertion	Innervation	Function
Brachioradialis	Proximal part of lateral supraepicondylar ridge of humerus and adjacent intermuscular septum	Lateral surface of distal end of radius	Radial nerve [C5,C6] before division into superficial and deep branches	Accessory flexor of elbow joint when forearm is mid-pronated
Extensor carpi radialis longus	Distal part of lateral supraepicondylar ridge of humerus and adjacent intermuscular septum	Dorsal surface of base of metacarpal II	Radial nerve [C6,C7] before division into superficial and deep branches	Extends and abducts the wrist
Extensor carpi radialis brevis	Lateral epicondyle of humerus and adjacent intermuscular septum	Dorsal surface of base of metacarpals II and III	Deep branch of radial nerve [C7,C8] before penetrating supinator muscle	Extends and abducts the wrist
Extensor digitorum	Lateral epicondyle of humerus and adjacent intermuscular septum and deep fascia	Four tendons, which insert via 'extensor hoods' into the dorsal aspects of the bases of the middle and distal phalanges of the index, middle, ring, and little fingers	Posterior interosseous nerve [C7,C8]	Extends the index, middle, ring, and little fingers; can also extend the wrist
Extensor digiti minimi	Lateral epicondyle of humerus and adjacent intermuscular septum together with extensor digitorum	Dorsal hood of the little finger	Posterior interosseous nerve [C7,C8]	Extends the little finger
Extensor carpi ulnaris	Lateral epicondyle of humerus and posterior border of ulna	Tubercle on the base of the medial side of metacarpal V	Posterior interosseous nerve [C7,C8]	Extends and adducts the wrist
Anconeus	Lateral epicondyle of humerus	Olecranon and proximal posterior surface of ulna	Radial nerve [C6 to C8] (via branch to medial head of triceps brachii)	Abduction of the ulna in pronation; accessory extensor of the elbow joint

# Summary-deep group

Muscle	Origin	Insertion	Innervation	Function
Supinator	Superficial part-lateral epicondyle of humerus, radial collateral and anular ligaments; deep part-supinator crest of the ulna	Lateral surface of radius superior to the anterior oblique line	Posterior interosseous nerve [C6,C7]	Supination
Abductor pollicis longus	Posterior surfaces of ulna and radius (distal to the attachments of supinator and anconeus), and intervening interosseous membrane	Lateral side of base of metacarpal I	Posterior interosseous nerve [C7,C8]	Abducts carpometacarpal joint of thumb; accessory extensor of the thumb
Extensor pollicis brevis	Posterior surface of radius (distal to abductor pollicis longus) and the adjacent interosseous membrane	Dorsal surface of base of proximal phalanx of the thumb	Posterior interosseous nerve [C7,C8]	Extends metacarpophalangeal joint of the thumb; can also extend the carpometacarpal joint of the thumb
Extensor pollicis longus	Posterior surface of ulna (distal to the abductor pollicis longus) and the adjacent interosseous membrane	Dorsal surface of base of distal phalanx of thumb	Posterior interosseous nerve [C7,C8]	Extends interphalangeal joint of the thumb; can also extend carpometacarpal and metacarpophalangeal joints of the thumb
Extensor indicis	Posterior surface of ulna (distal to extensor pollicis longus) and adjacent interosseous membrane	Extensor hood of index finger	Posterior interosseous nerve [C7,C8]	Extends index finger

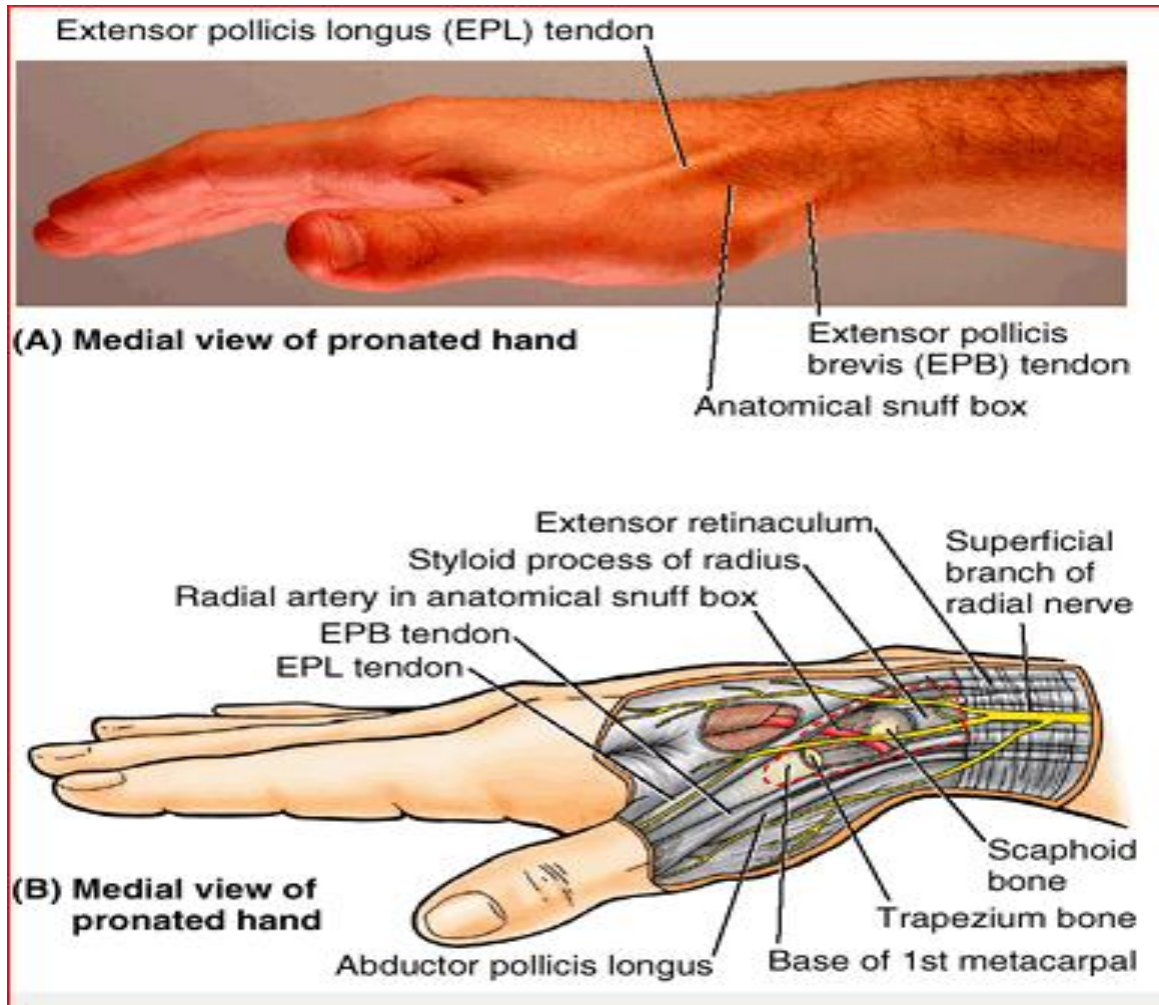
# Anatomical snuff box

- A concavity that appears on the radial side of the wrist when the thumb is fully extended and the extensor tendons are drawn up
- Radial border formed by extensor pollicis brevis and abductor pollicis longus
- Ulnar border is formed by extensor pollicis longus
- The cephalic vein begins at the roof of this box

# Anatomical snuff box

- The cutaneous branches of the radial nerve are felt above as they cross the tendons
- The radial artery lies on the floor
- Bony points on the floor include:
  - Radial styloid
  - Scaphoid
  - Trapezium
  - Base of thumb metacarpal

# Anatomical snuff box



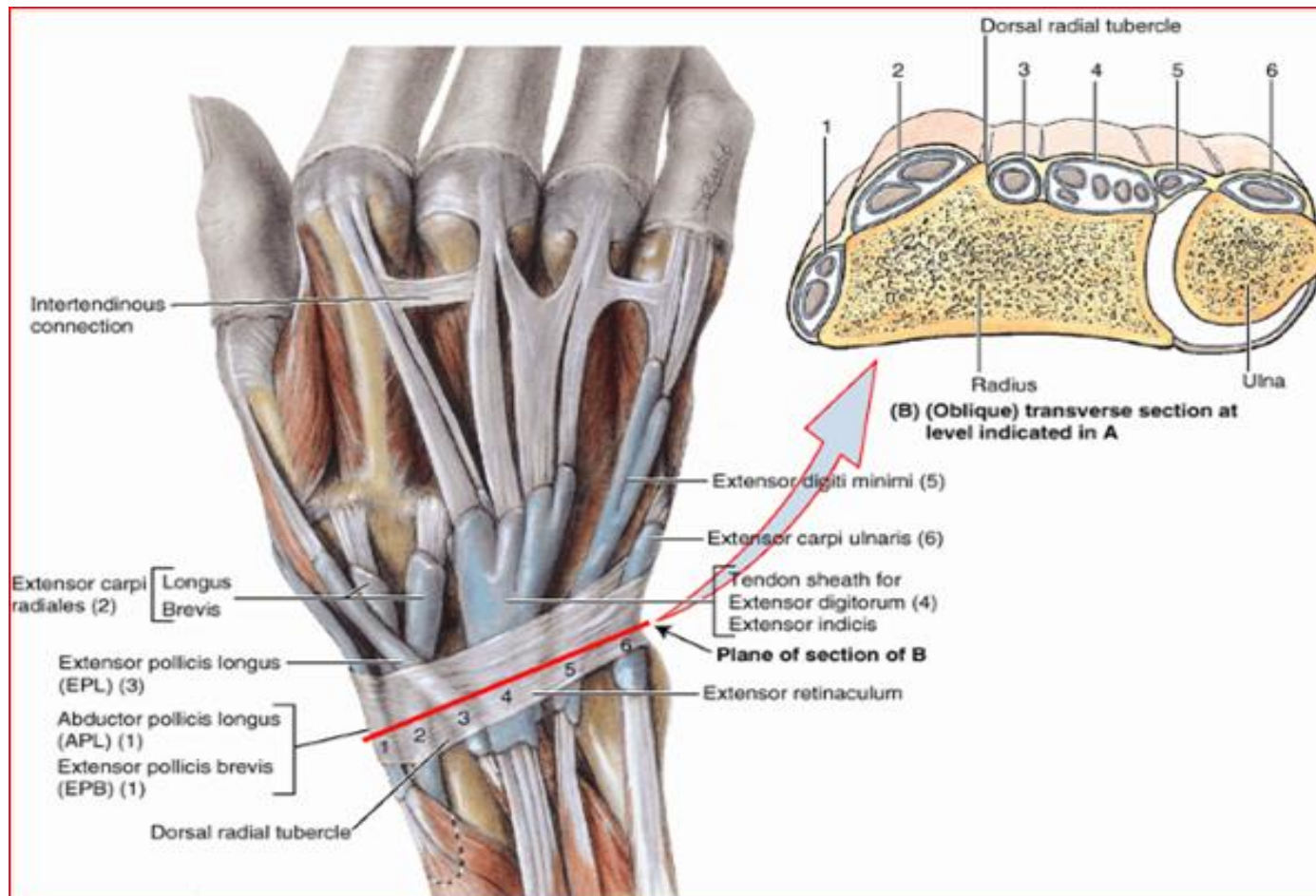
# Extensor retinaculum

- A band-like thickening in the deep fascia of the forearm, lying obliquely across the extensor surface of the wrist
- About 2.5cm wide
- *Attachment*
  - ❑ Proximal: Anteriolateral border of the radius, above the styloid process
  - ❑ Distal: Pisiform and triquetral bones

# Extensor retinaculum

- Fibrous septa pass to the bones of the forearm from its undersurface
- These septa divide the tunnel into **6 compartments**
- Most lateral (on lateral surface of radius): Houses the tendons of abductor pollicis longus and extensor pollicis brevis
- Between dorsal tubercle and most lateral: radial extensors of the wrist-longus and brevis

# Extensor retinaculum



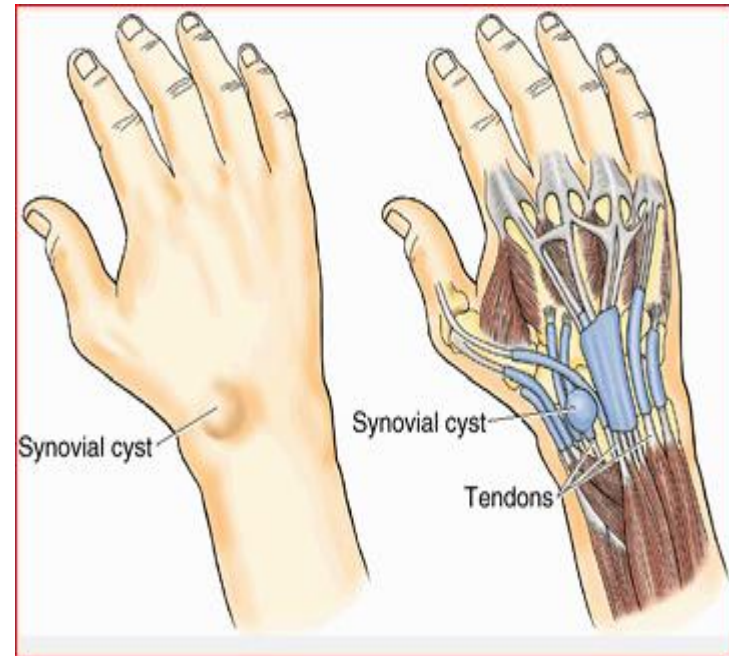
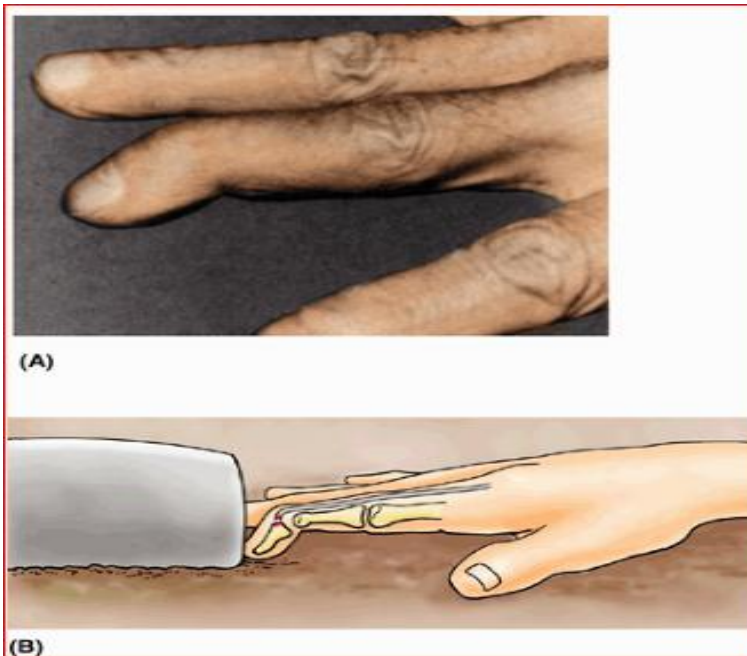


# Extensor retinaculum

- Ulnar side of radial tubercle: extensor pollicis longus
- Between ulnar border of radius and above groove: tendons of extensor digitorum and extensor indicis
- Over radioulnar joint: extensor digiti minimi
- Base of ulnar styloid: extensor carpi ulnaris

# Clinical correlates

- Elbow tendinitis or Lateral epicondylitis
- Mallet or Baseball finger
- Ganglion



# Acknowledgement

- This presentation was prepared with materials from:
  - ❑ Last's Anatomy. 12<sup>th</sup> edition
  - ❑ Gray's Anatomy for students
  - ❑ Clinically oriented anatomy

**Thank you for listening**