

Anatomy of elbow, wrist, and hand

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최준환

• Index

❖ Elbow

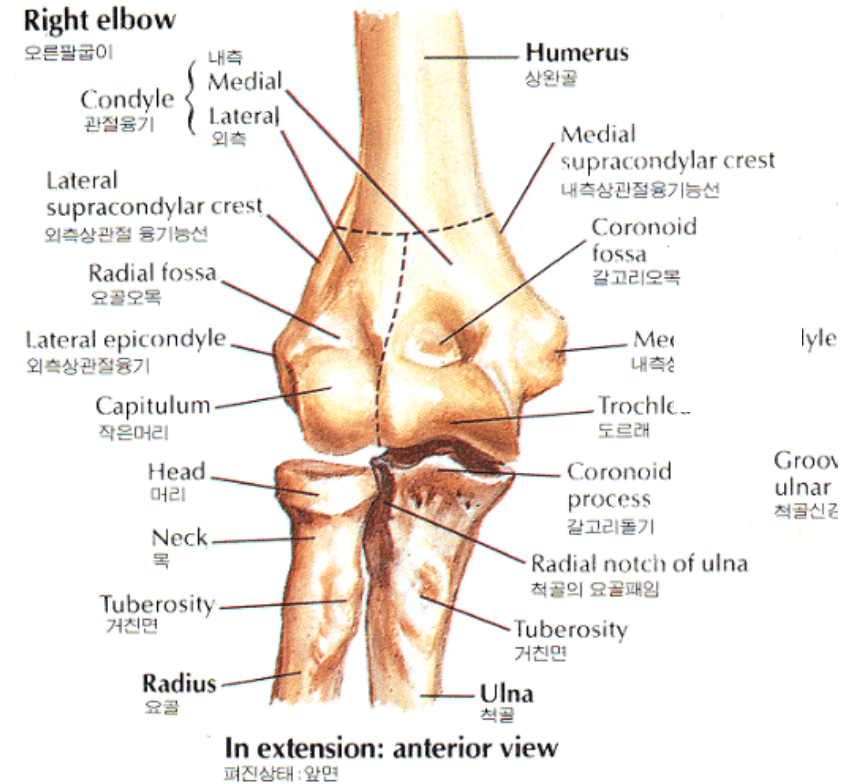
❖ Wrist

❖ Hand & fingers

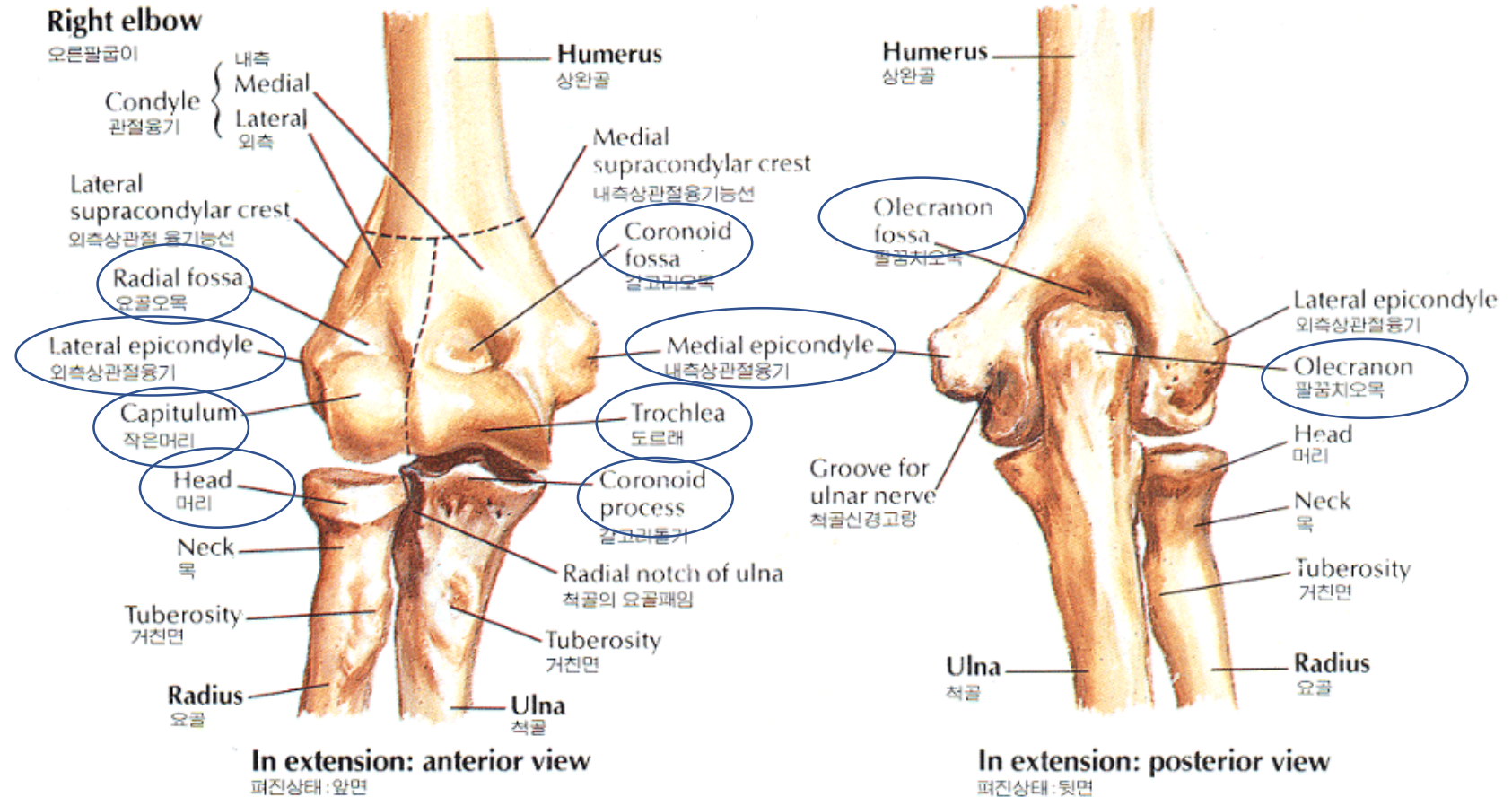
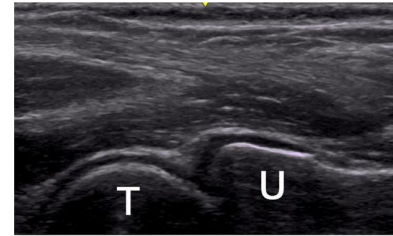
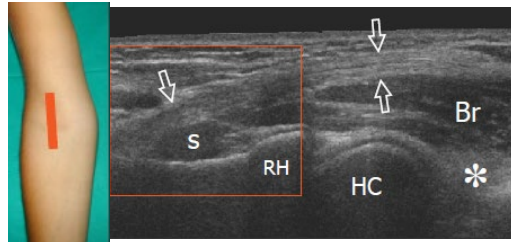
Elbow

Humerus – Radius – ulna 로 구성된 synovial joint

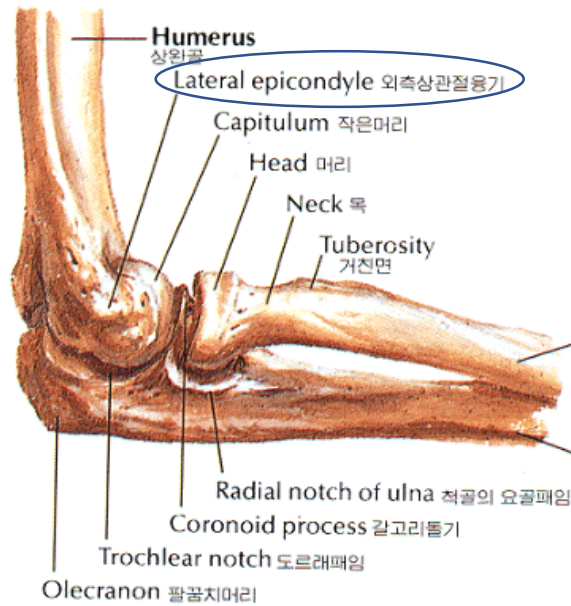
1. Humeroulnar joint : trochlea ~ ulnar trochlea notch
2. Humeroradial joint : capitulum ~ radial head
3. Proximal radioulnar joint : radial head ~ ulnar radial notch



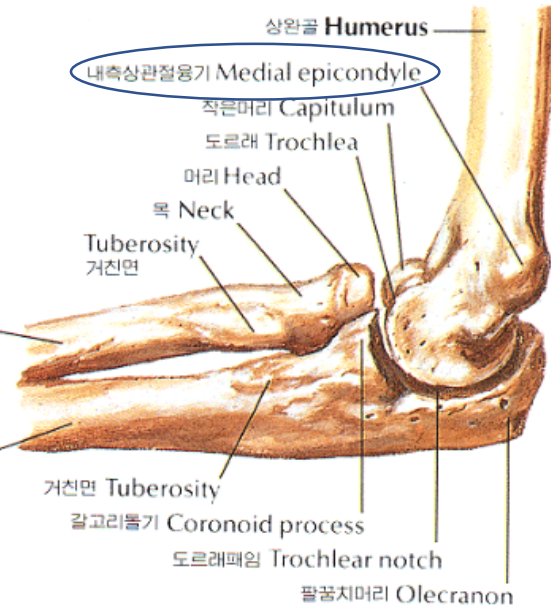
Bone



Bone



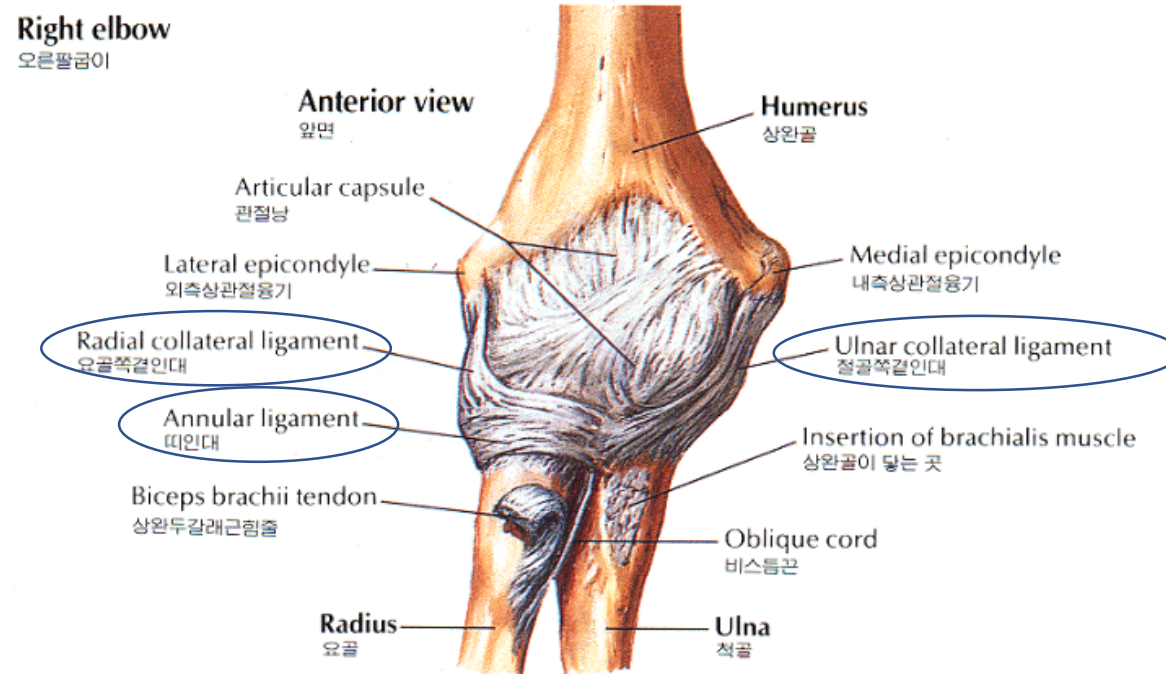
In 90° flexion: lateral view
90° 굽힌상태 : 외측면



In 90° flexion: medial view
90° 굽힌상태 : 내측면

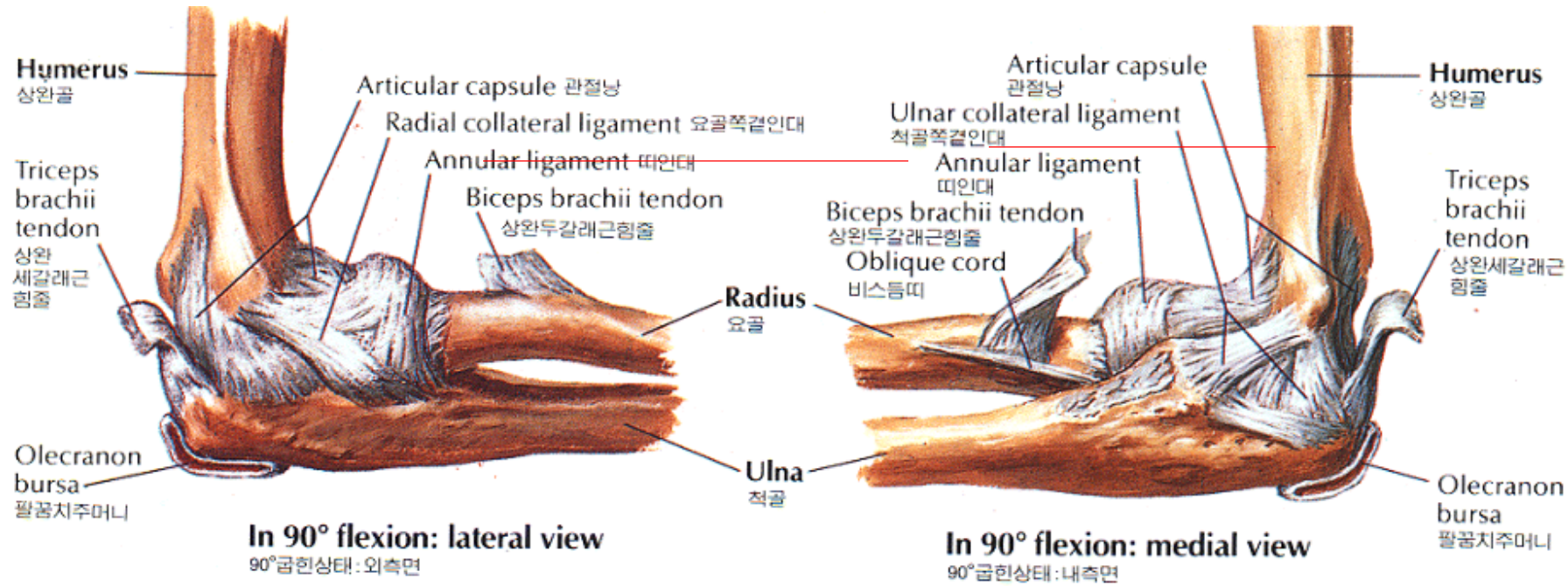


Ligament (anterior)



- **Ulnar & radial collateral ligament** : stabilize the valgus & varus stress to elbow joint
- **Annular ligament** : stabilizes the radial head within the radial notch of the ulna as it rotates during supination and pronation of the forearm.

Ligament (lateral, medial)



- Radial collateral ligament: lateral epicondyle ~ annular ligament
- Ulnar collateral ligament: **anterior bundle** (medial epicondyle ~ coronoid process)
posterior bundle (medial epicondyle ~ olecranon)
transverse bundle (coronoid process ~ olecranon)

Muscles

Anterior

- **Elbow flexors:**

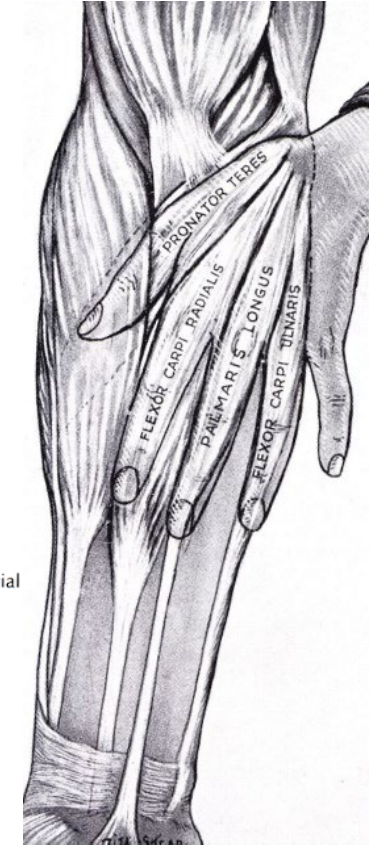
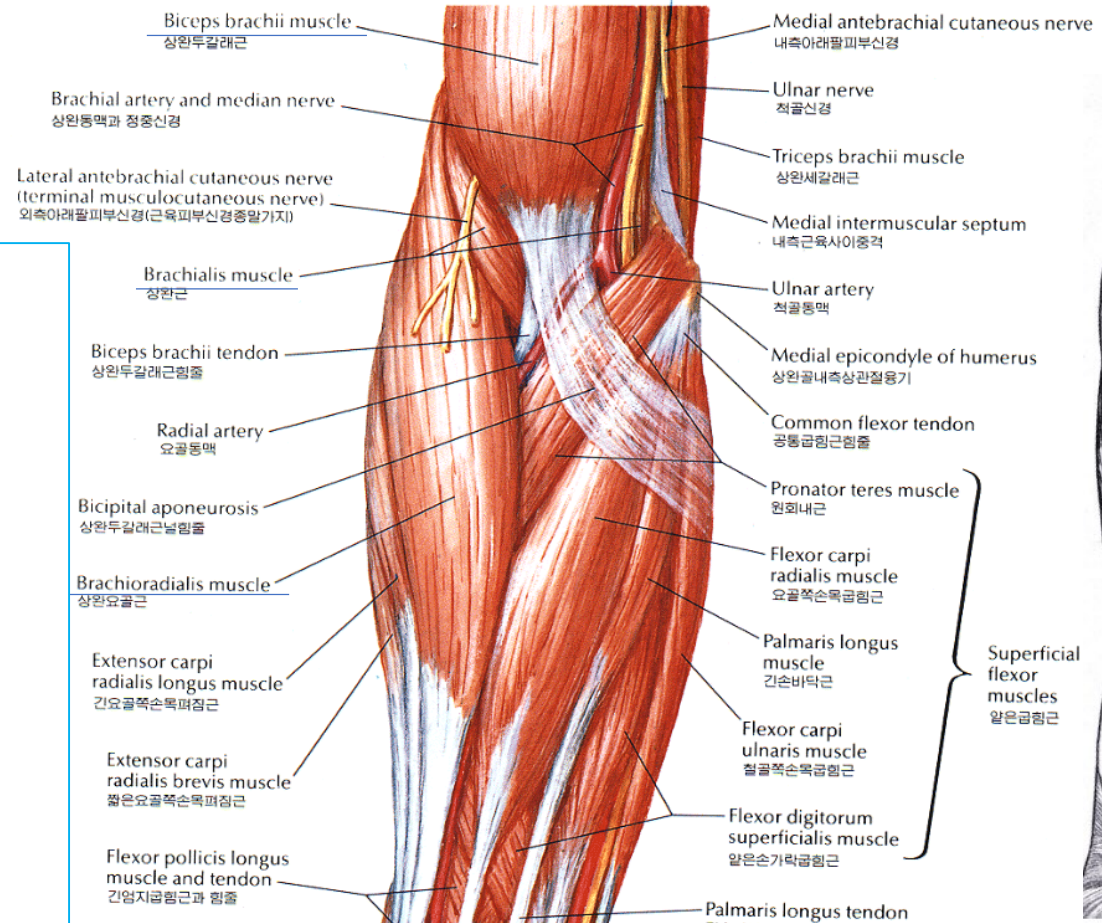
- ✓ biceps,
- ✓ brachialis,
- ✓ brachioradialis

Medial

- Pronator teres

- **Common flexor muscles:**

- ✓ flexor carpi radialis (FCR)
- ✓ palmaris longus (PL)
- ✓ flexor carpi ulnaris (FCU)
- ✓ flexor digitorum superficialis (FDS)



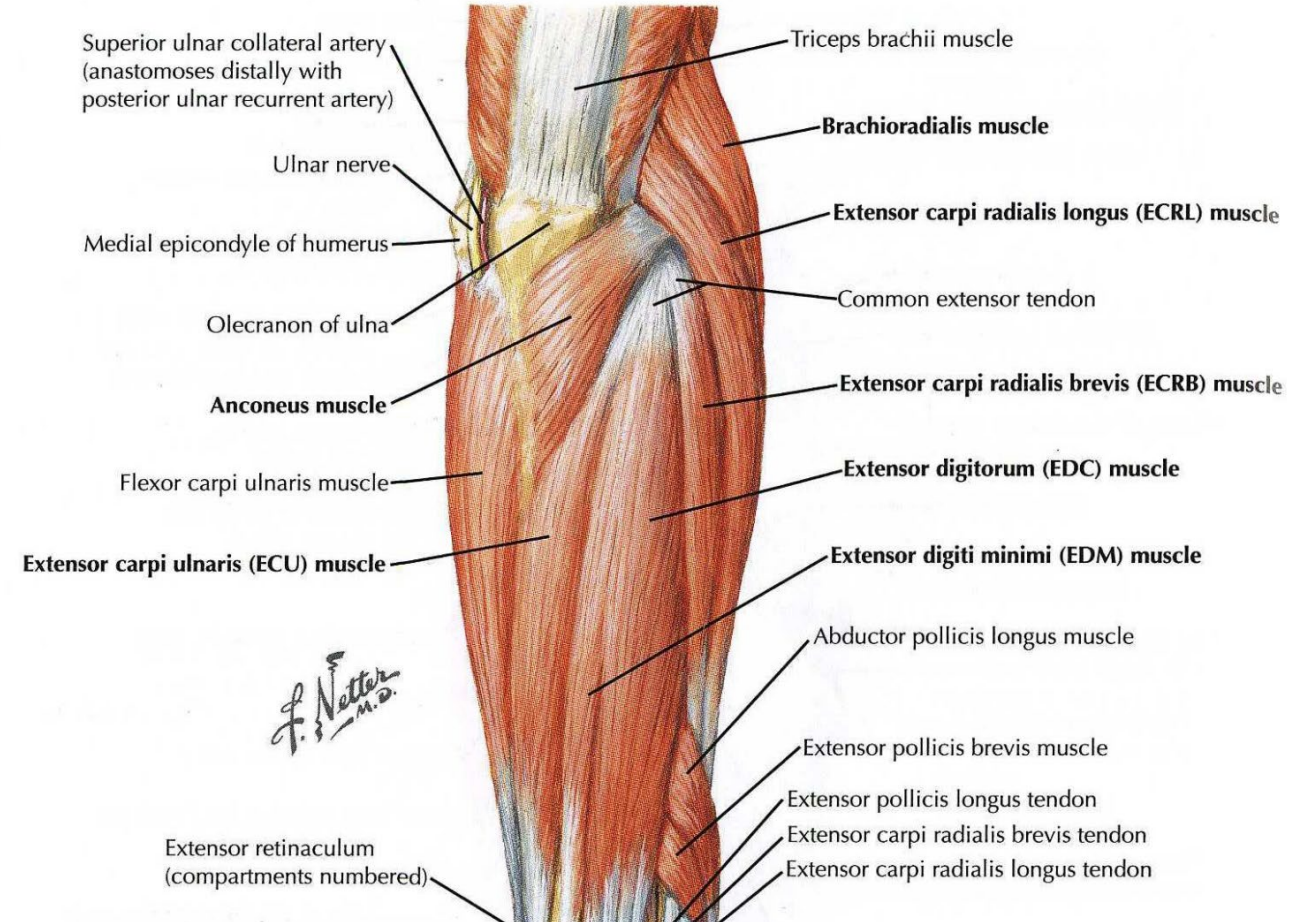
Muscles

Lateral

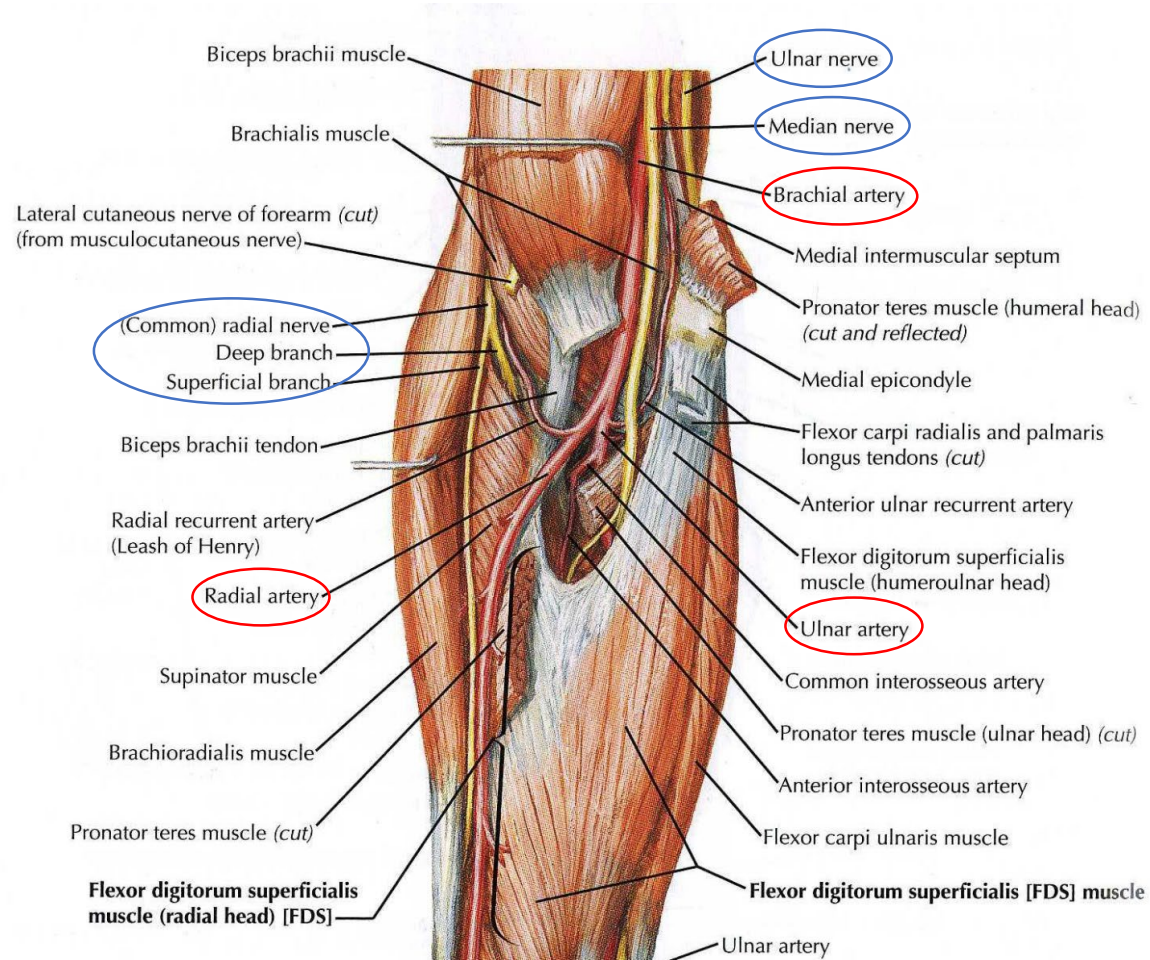
- BR, ECRL
- **Common extensor muscles:**
 - ✓ Extensor carpi radialis brevis (ECRB)
 - ✓ Extensor digitorum (EDC)
 - ✓ Extensor digiti minimi (EDM)
 - ✓ Extensor carpi ulnaris (ECU)

Posterior

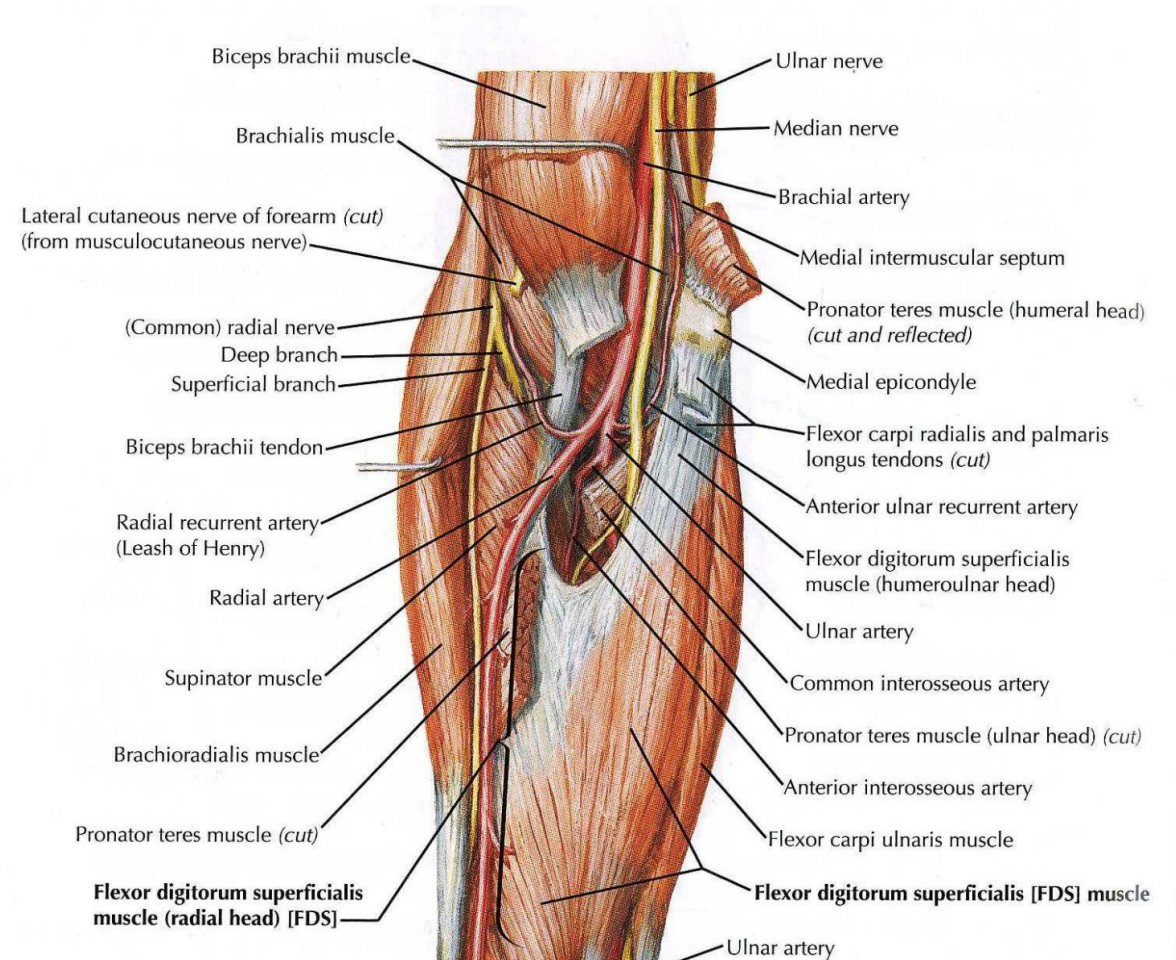
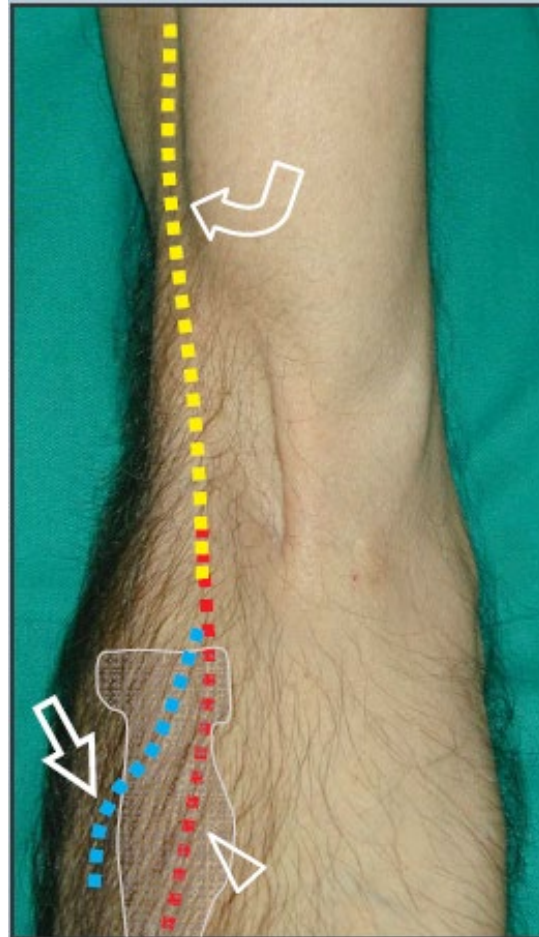
- Triceps tendon



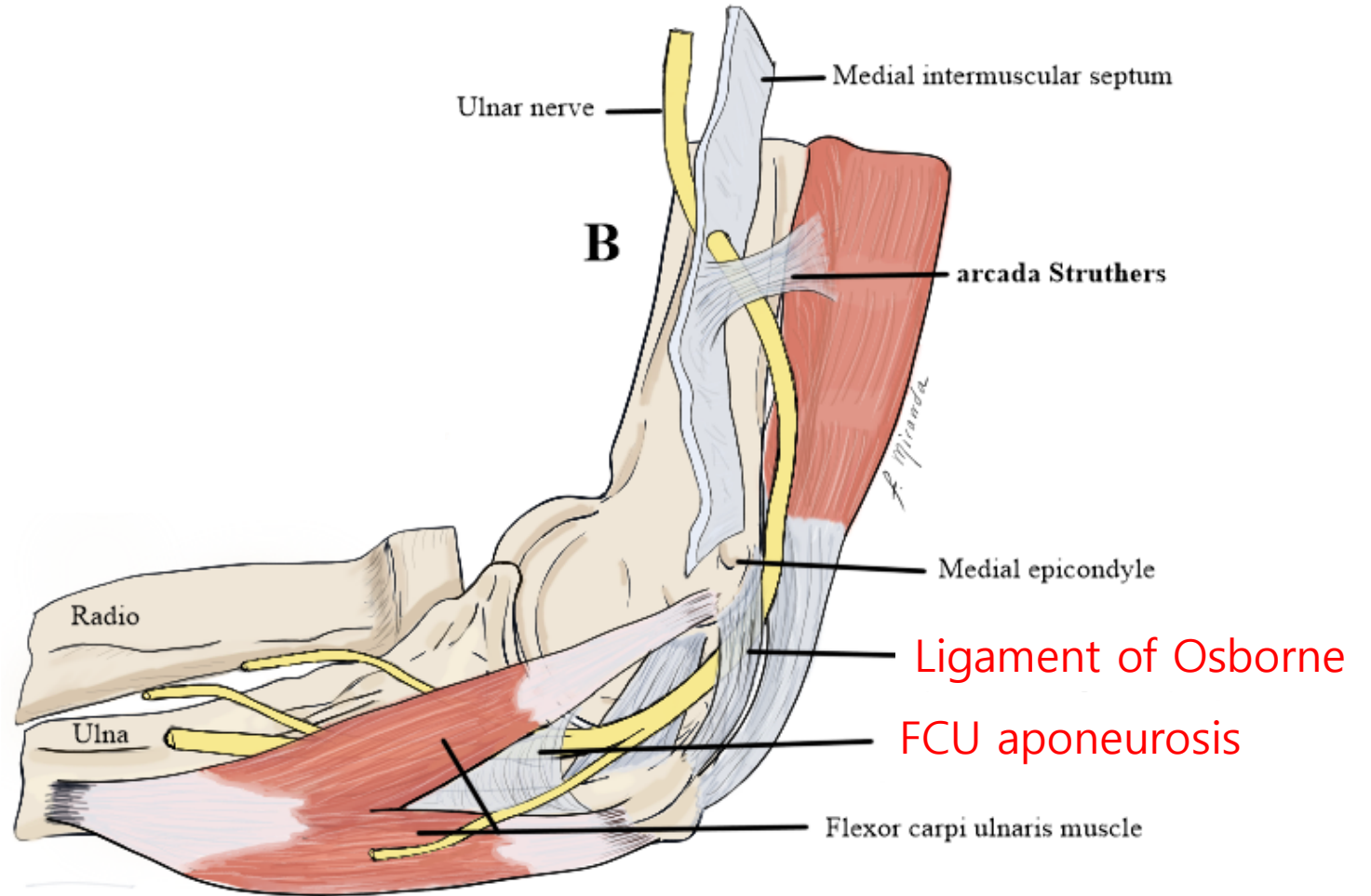
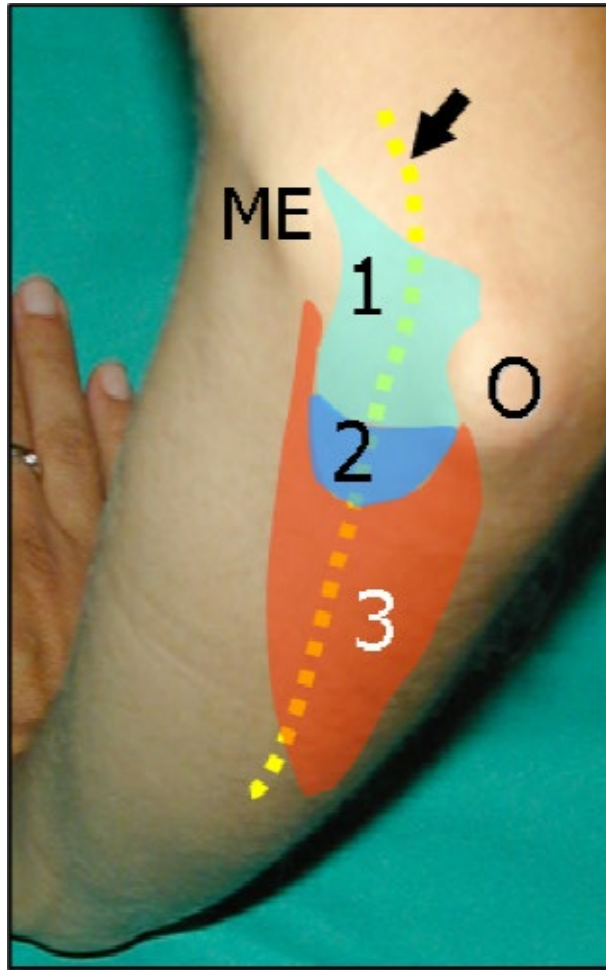
Arteries and nerves

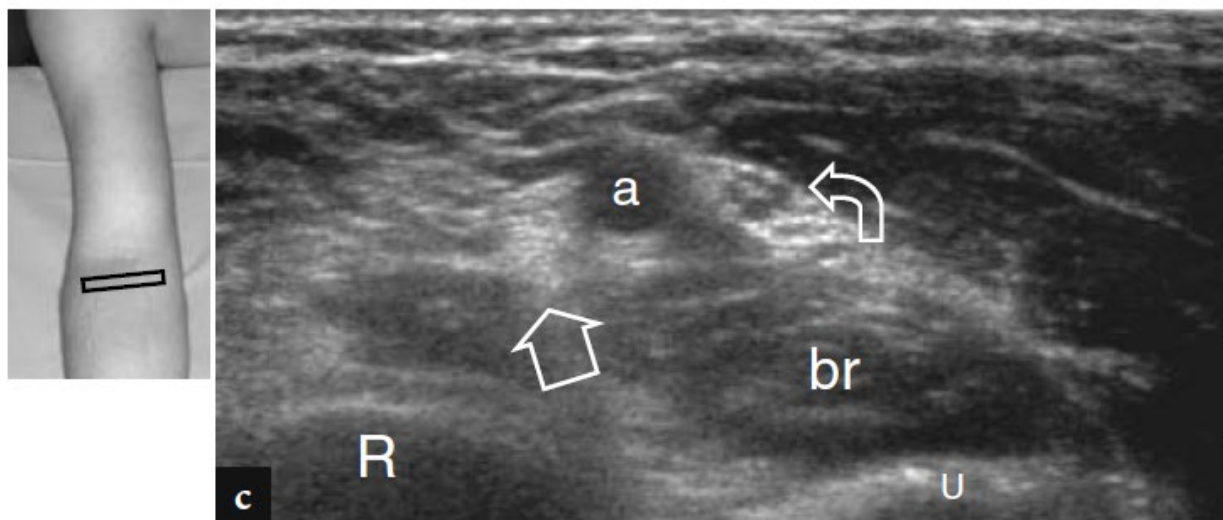
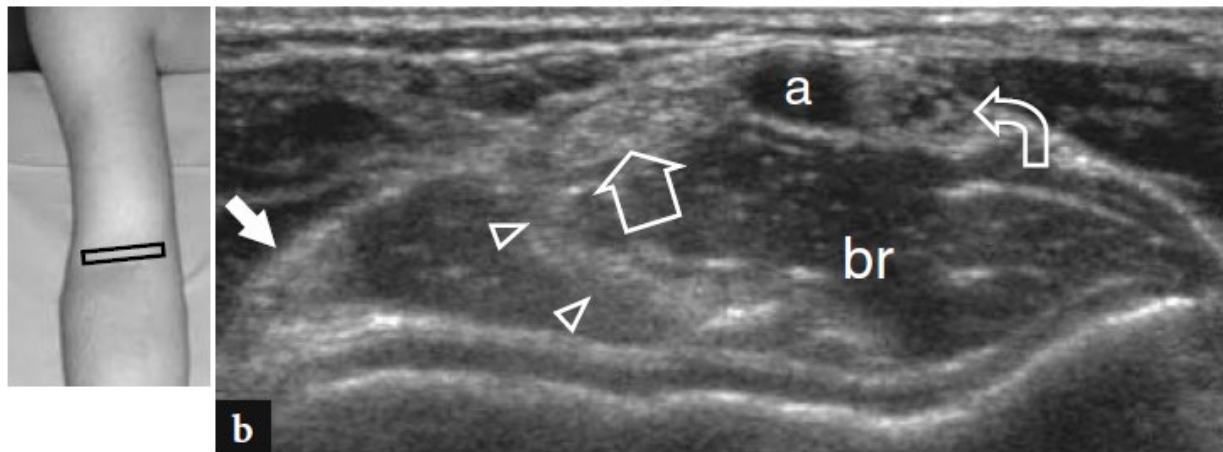
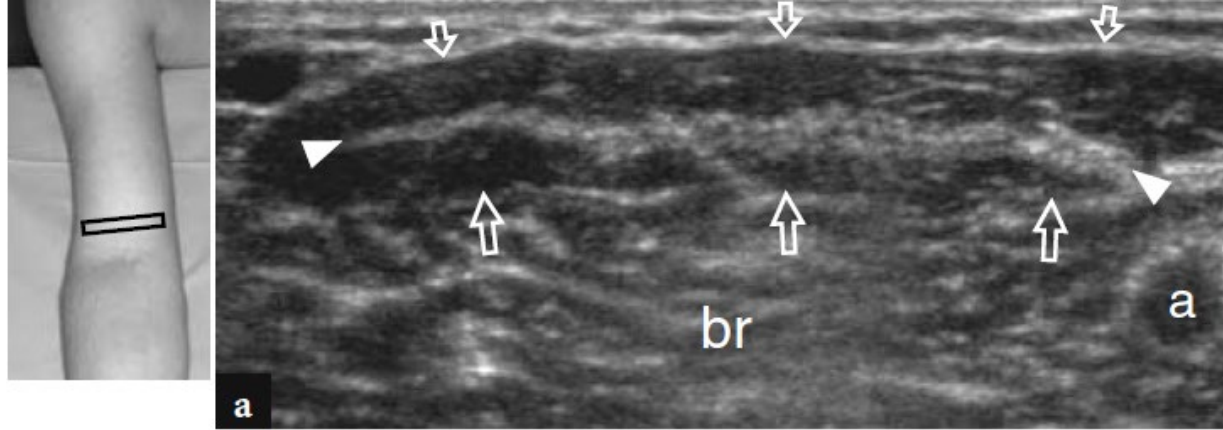
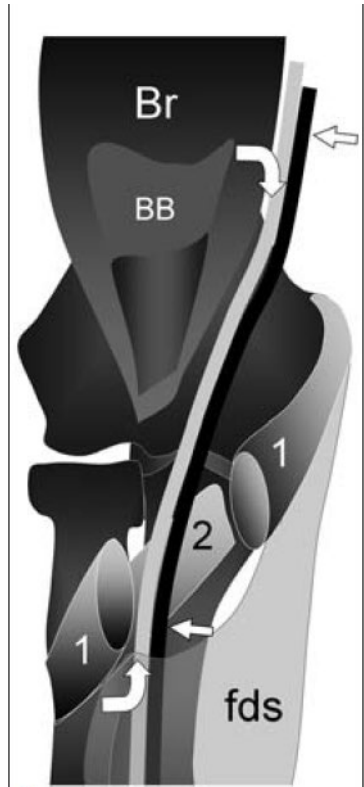


Radial nerve



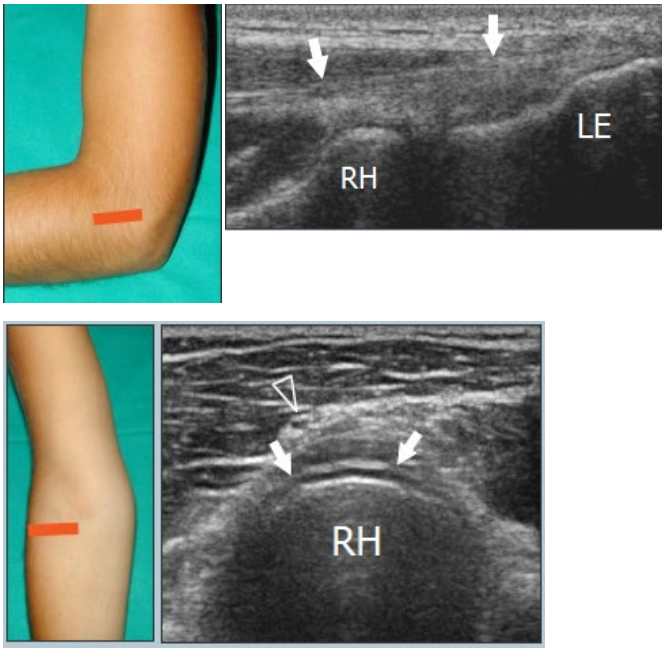
Ulnar nerve (cubital tunnel)





Anterior

- Capitulum, trochlea
- Radial head, ulnar
- Elbow flexors:
 - ✓ Biceps
 - ✓ Brachialis
 - ✓ Brachioradialis
- Brachial artery
- Median nerve
- Radial nerve



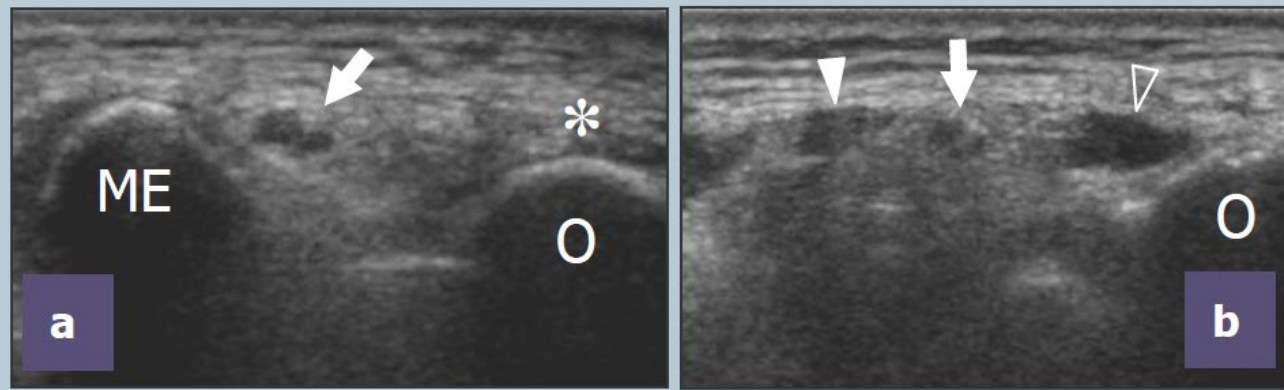
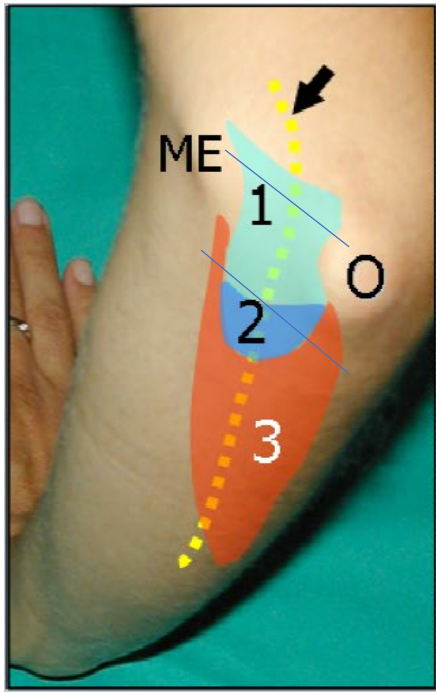
Lateral

- Radial head, lateral epicondyle
- Annular ligament
- Common extensor tendon
- Posterior interosseous nerve



Medial

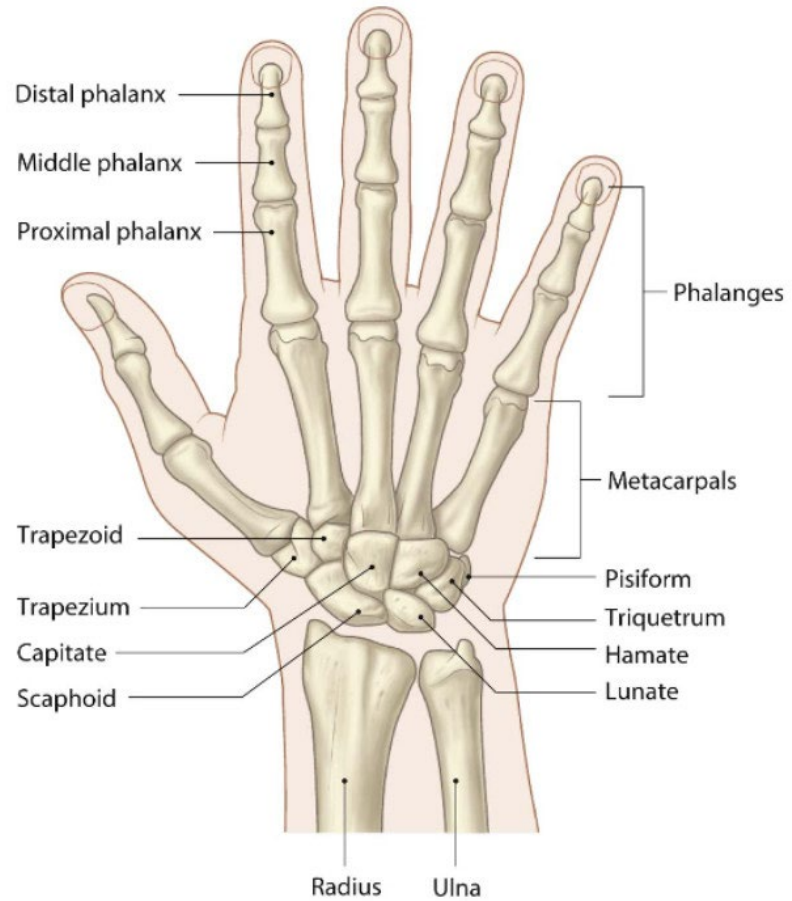
- Ulna, medial epicondyle
- Anterior bundle of medial collateral ligament
- Common flexor tendon



Posterior

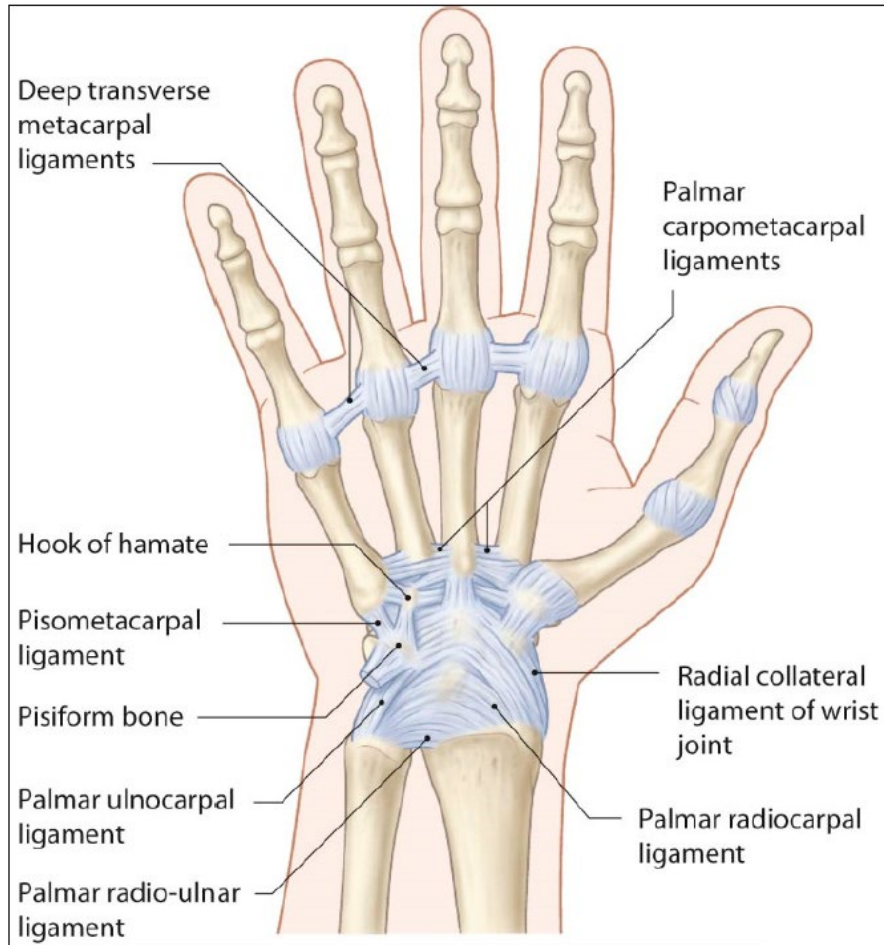
- Medial epicondyle, olecranon of ulna
- Triceps
- Ulnar nerve
- Ligament of Osborne, humeral head and ulnar head of FCU (aponeurosis)

Wrist – bone



- Proximal : scaphoid, lunate, triquetrum, pisiform
- Distal : trapezium, trapezoid, capitate, hamate

Wrist joints

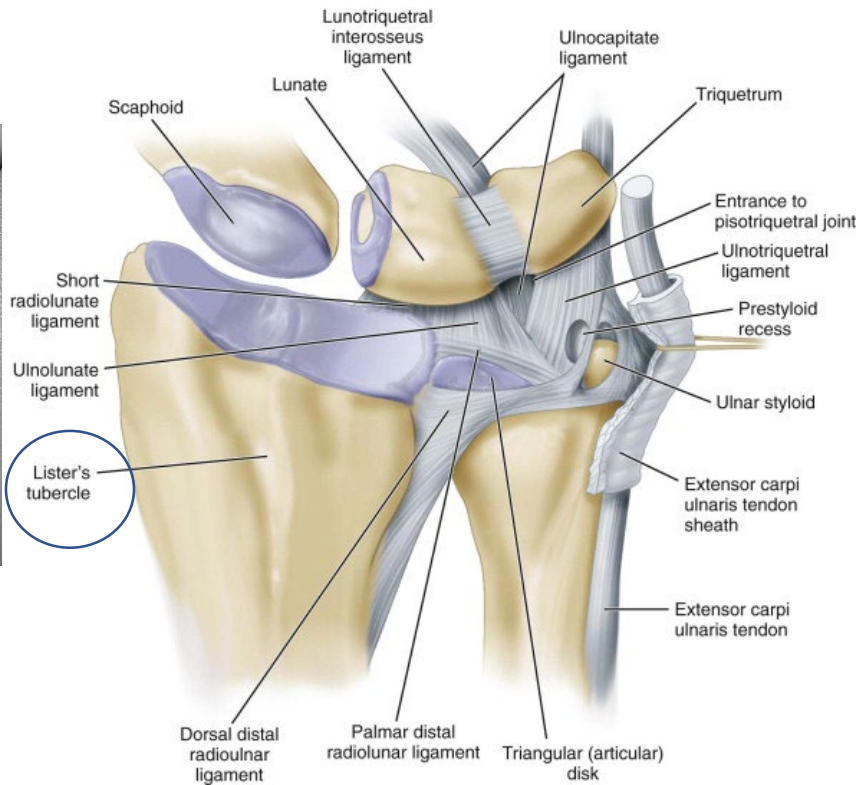
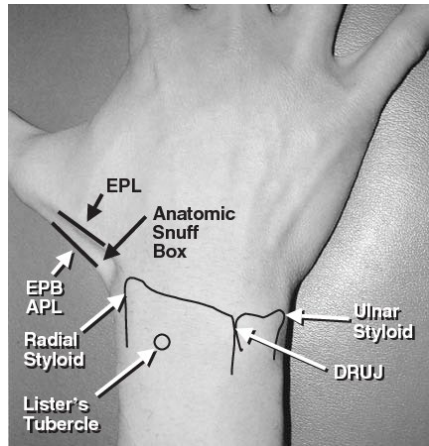


- Distal radio-ulnar, radiocarpal, mid carpal 의 3개의 joint 로 구성, 각각의 관절간의 연결은 없음.
- Distal ulna 는 carpal bone 과 관절을 형성하지 않고 완충작용을 하는 triangular fibrocartilage complex (TFCC)

Dorsal wrist

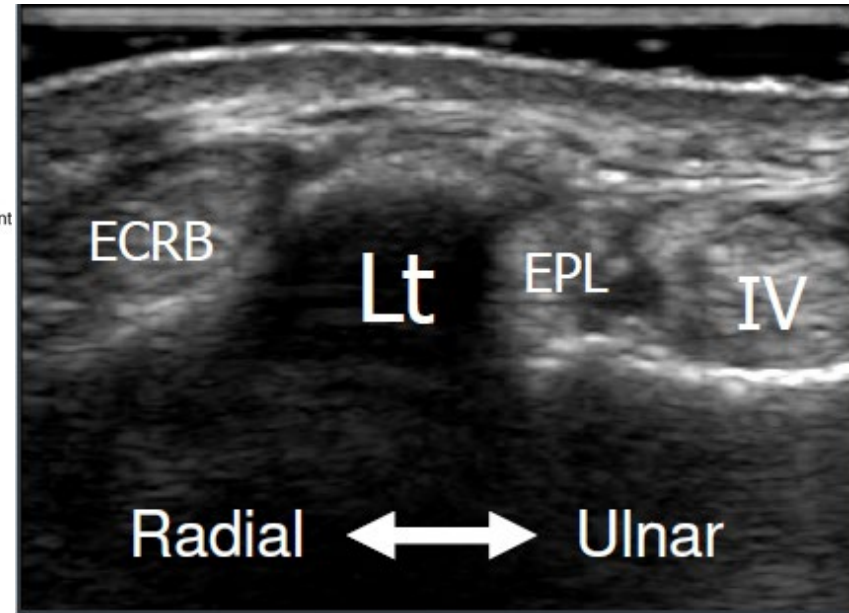
- 6 compartments (extensor tendons)

- Landmark : Lister's tubercle



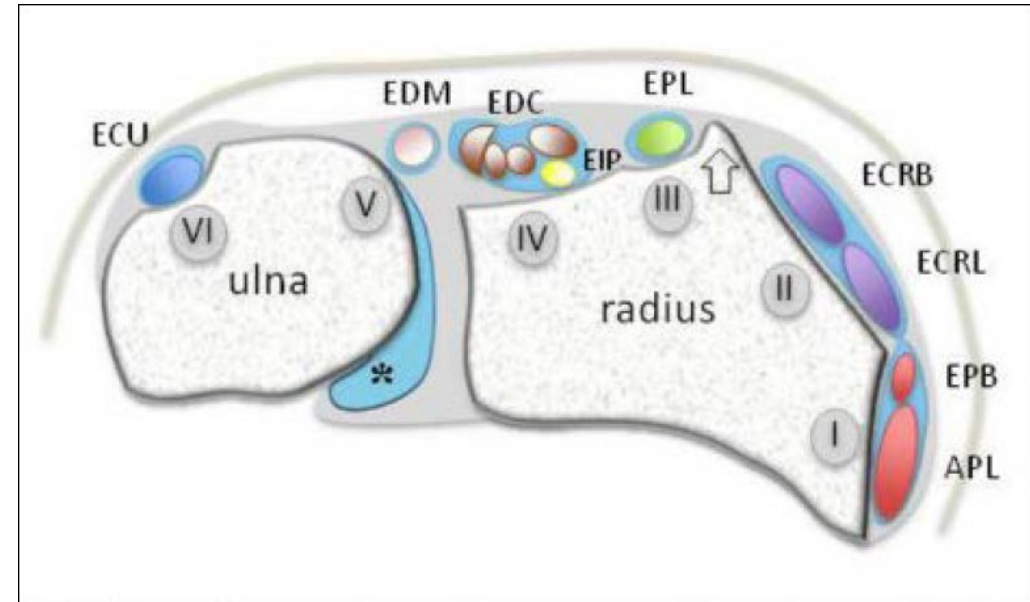
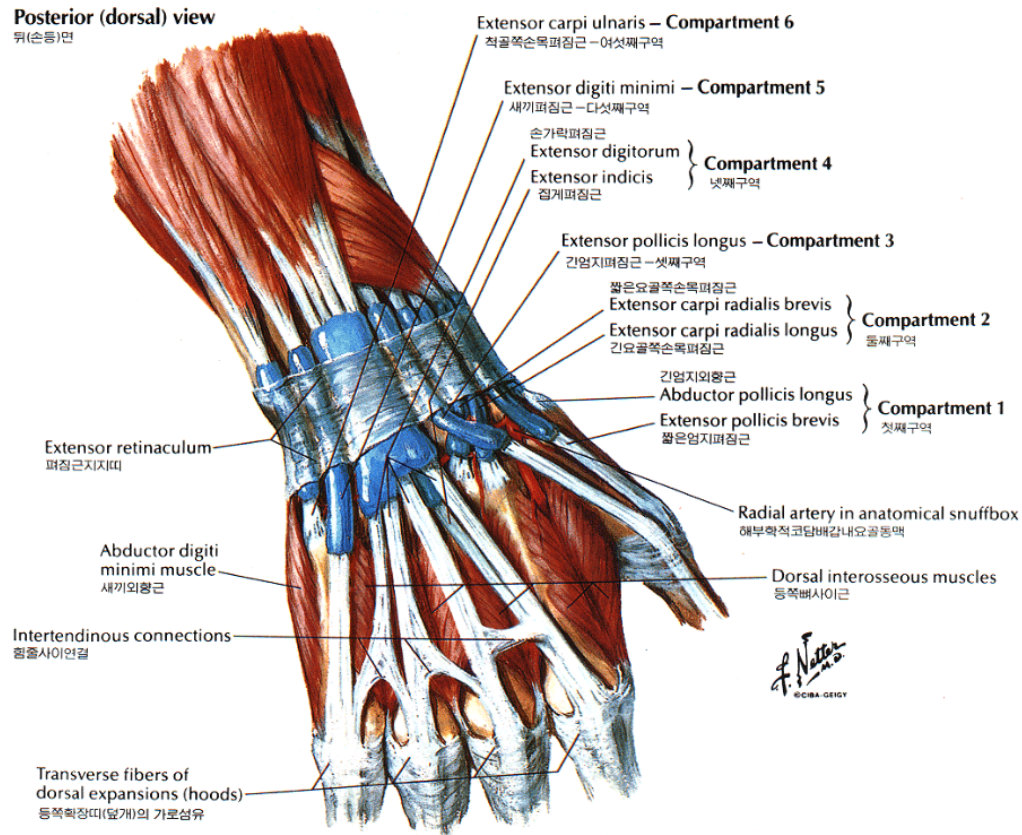
II

III

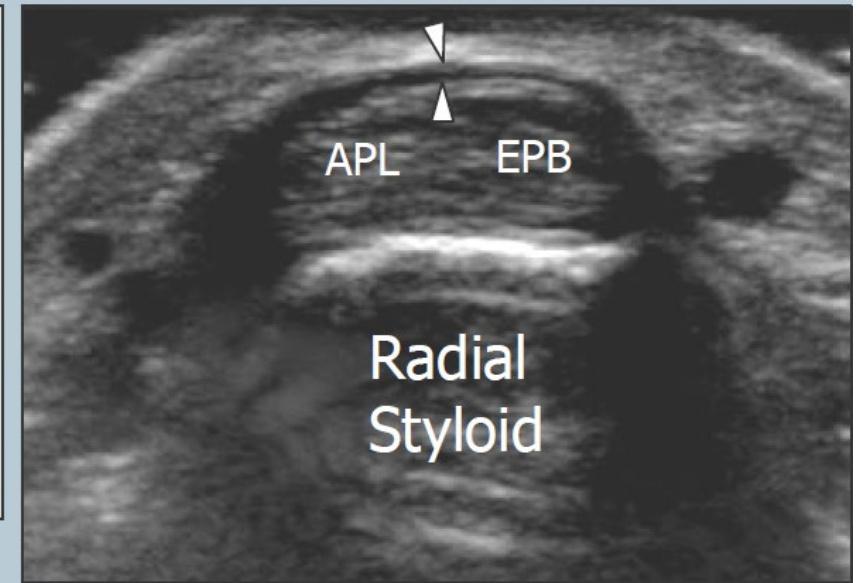
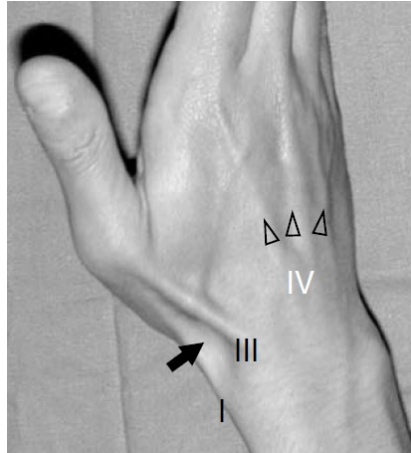
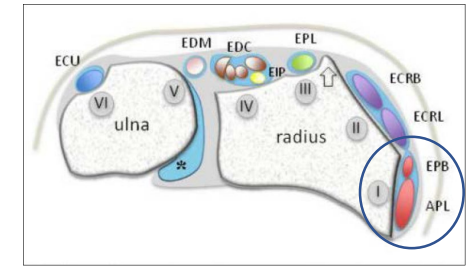


Dorsal wrist

- 6 compartment (extensor tendon)

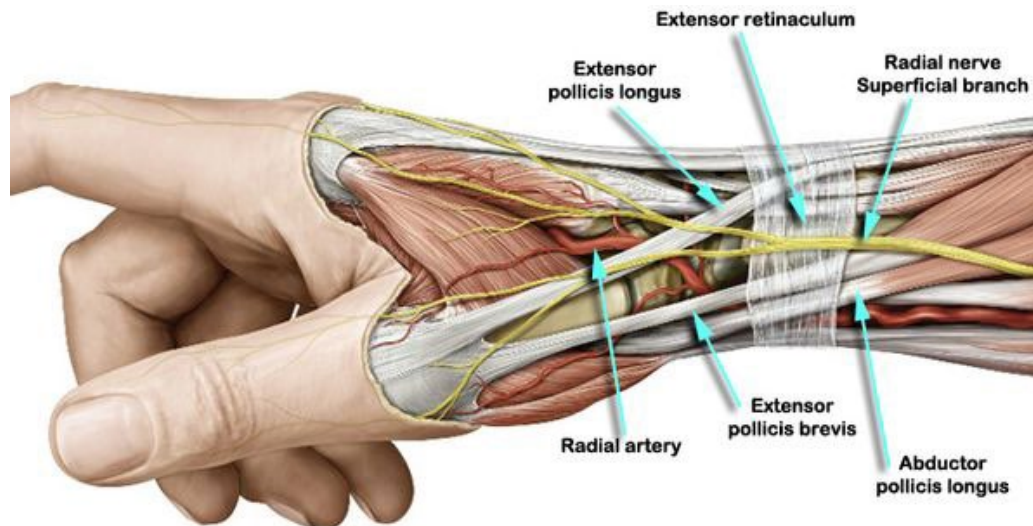


1st compartment : APL, EPB



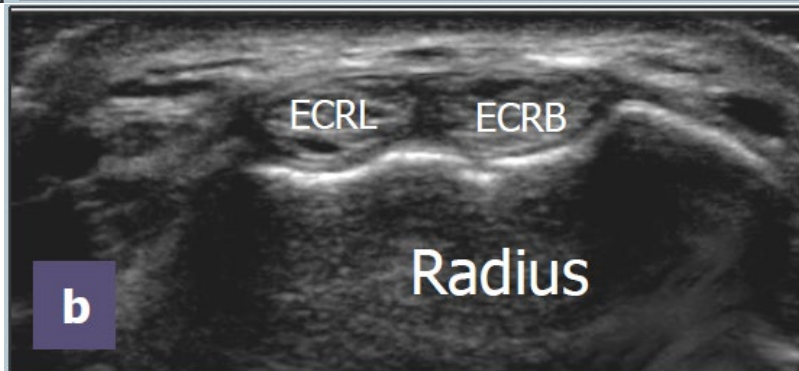
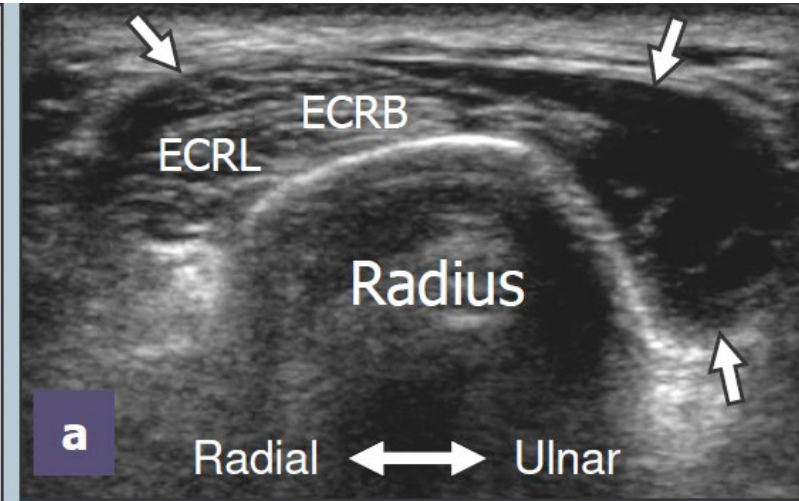
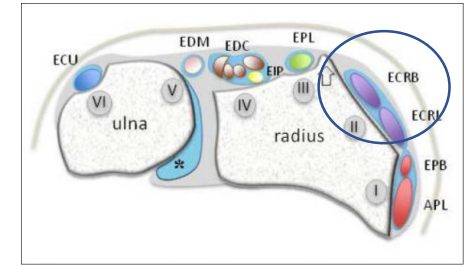
volar

dorsum



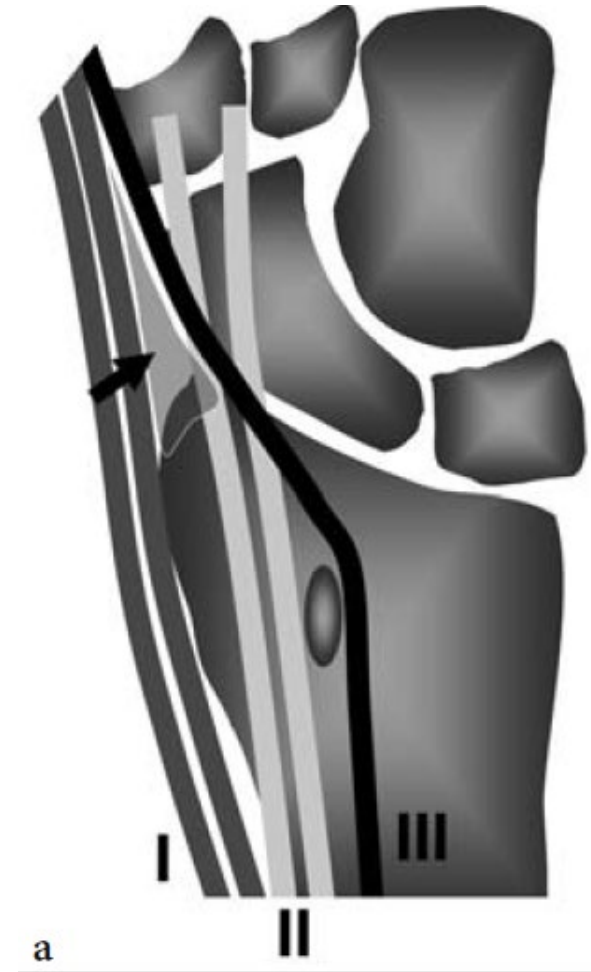
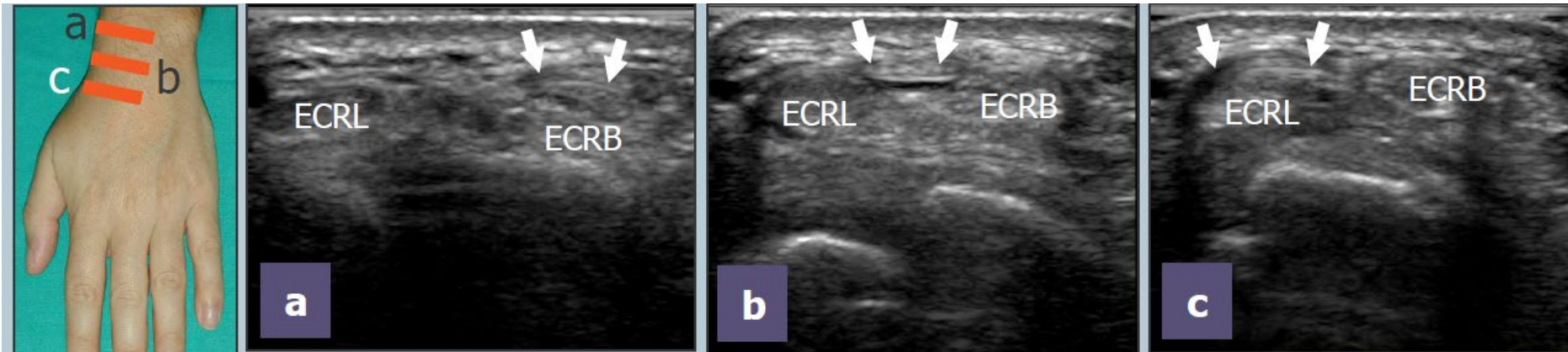
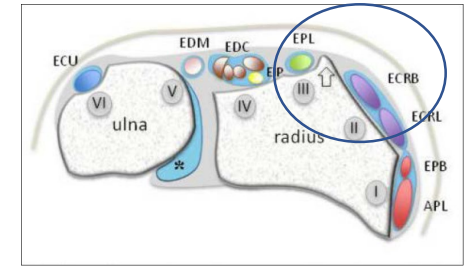
2nd compartment (ECRL, ECRB)

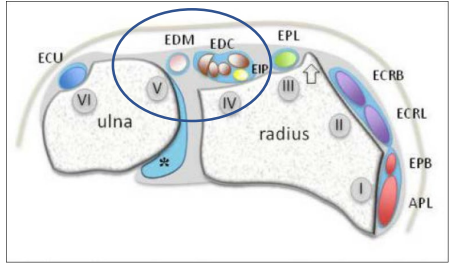
- Intersection with APL, EPB (1st)



2nd~3rd compartment

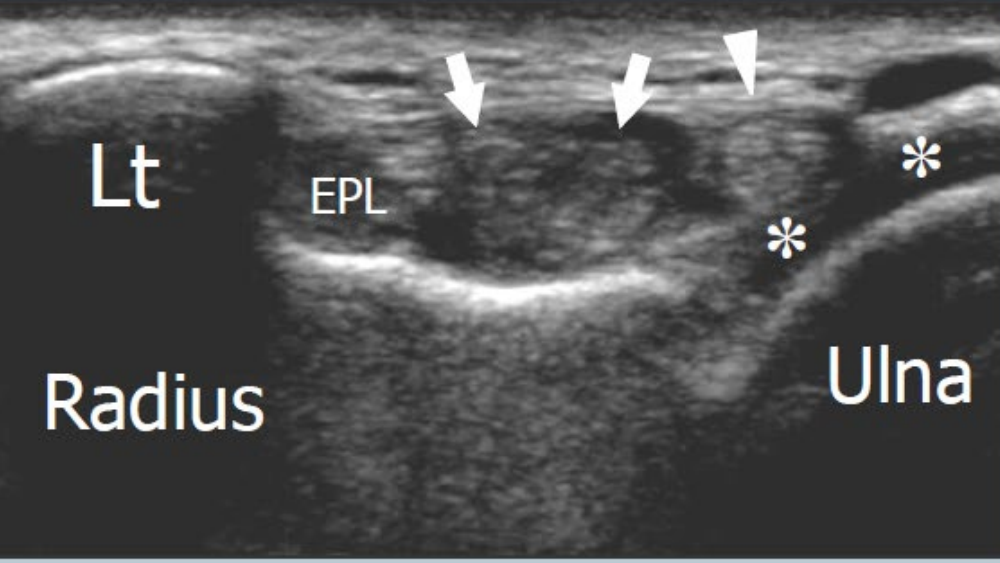
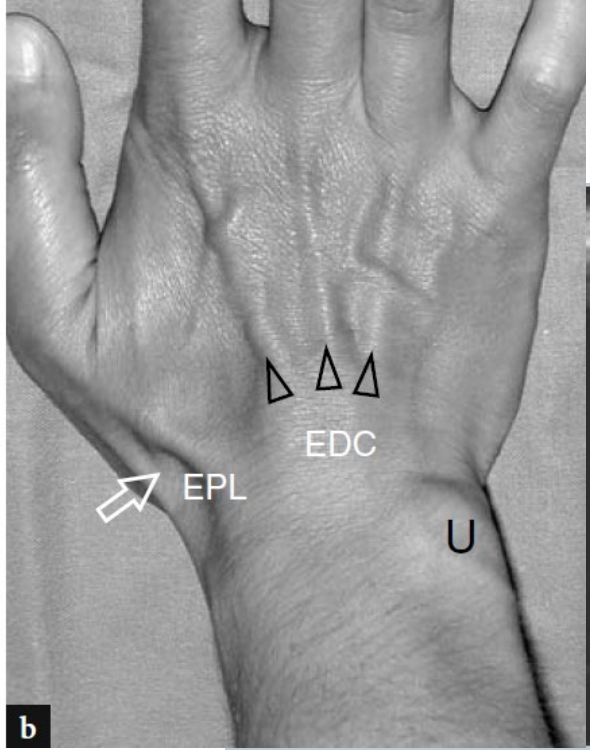
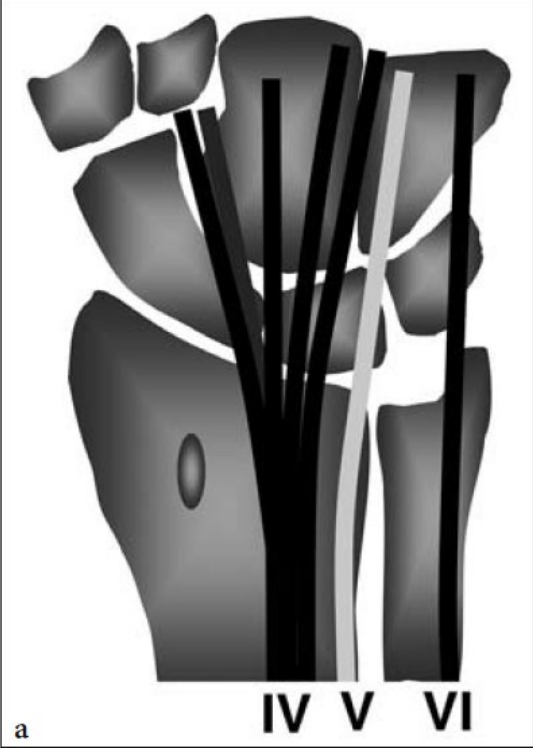
- Intersection with EPL (3rd)



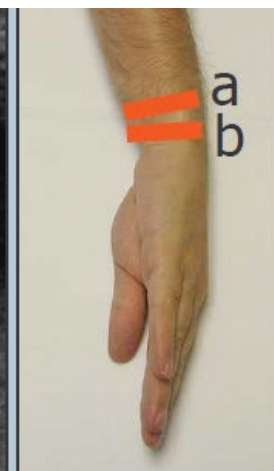
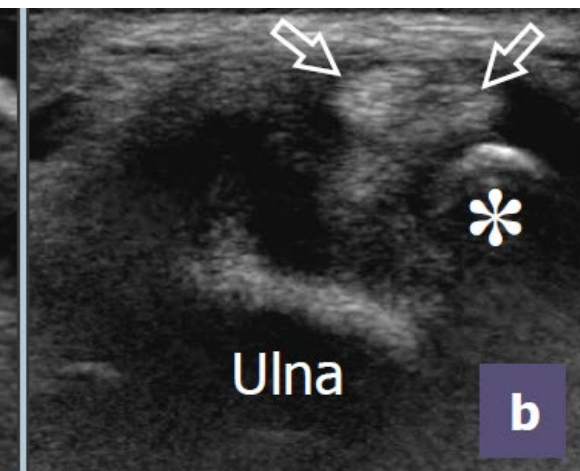
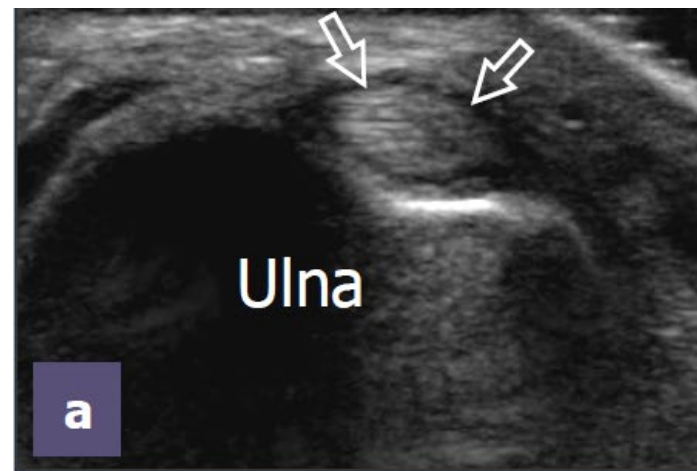
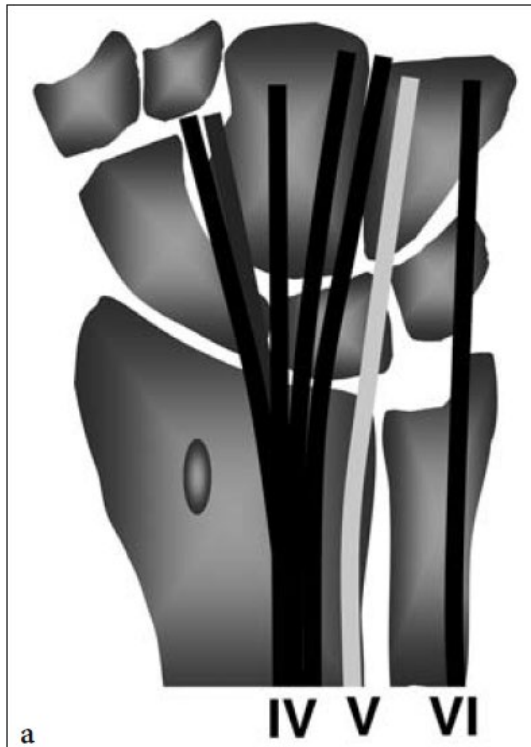
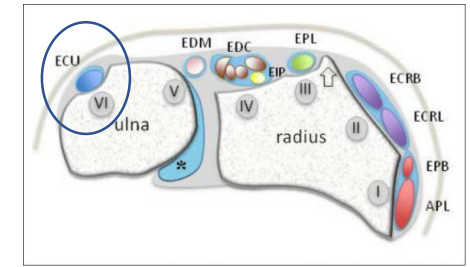


4th ~ 5th compartment

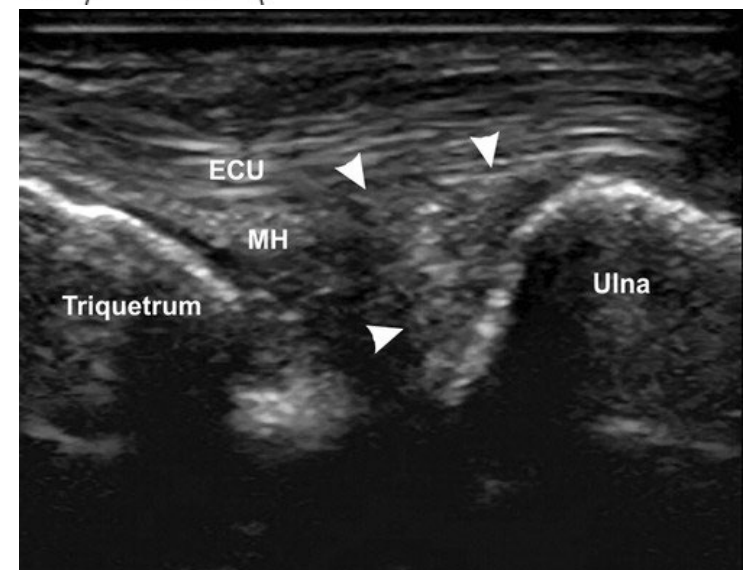
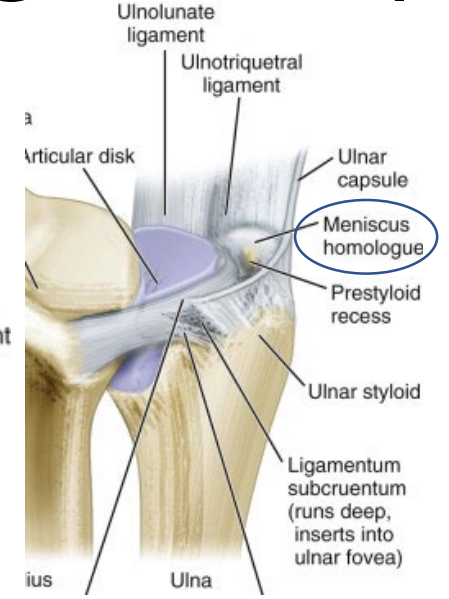
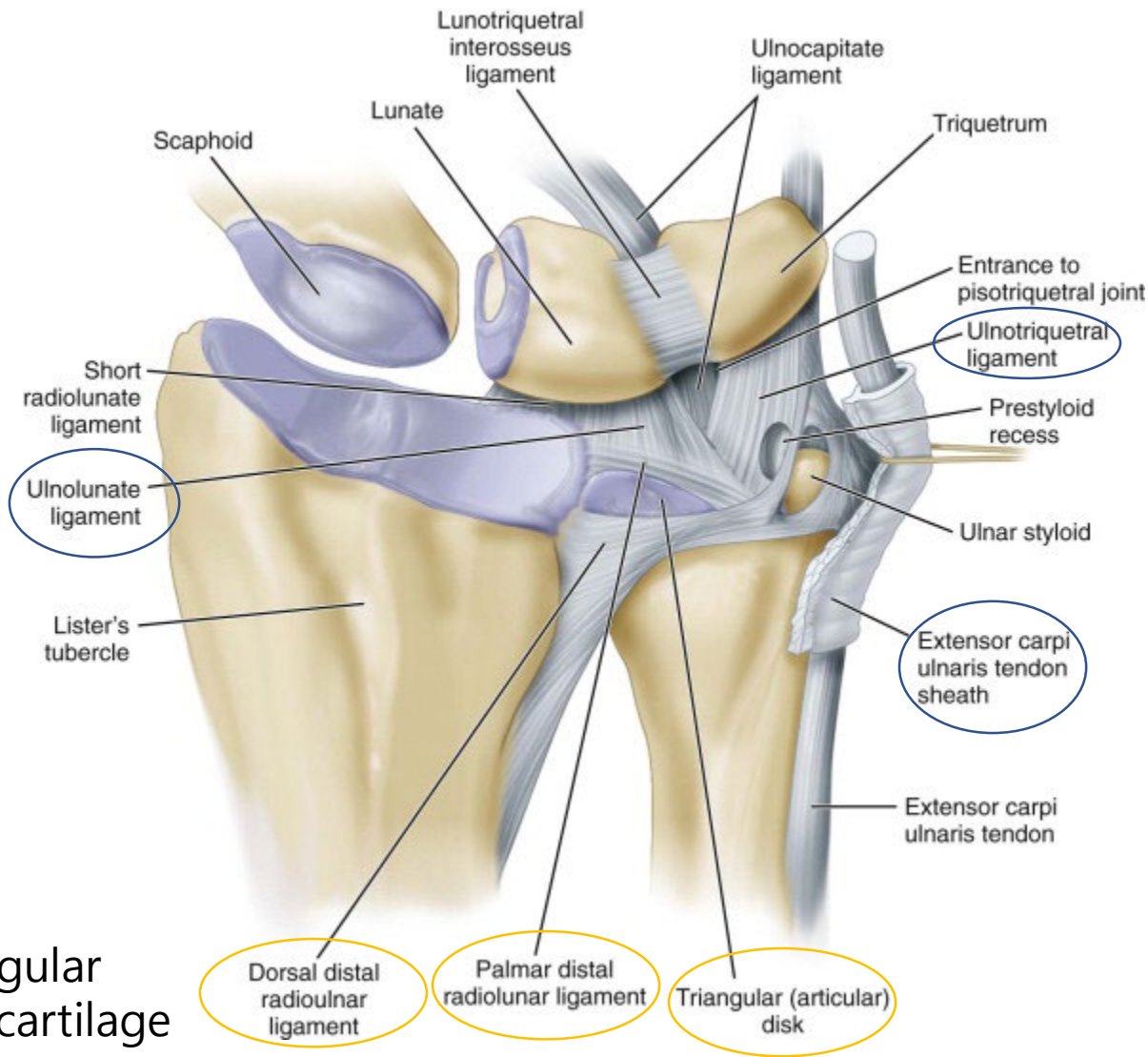
- 4th : EDC, EIP, 5th : EDM



6th compartment (ECU)



Triangular fibrocartilage complex (TFCC)

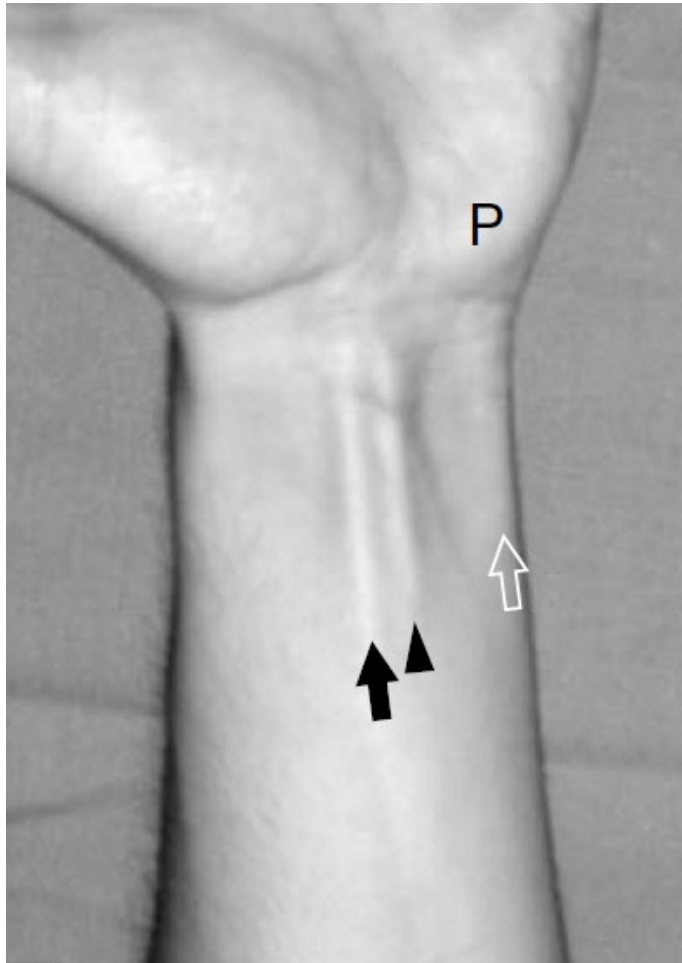


Triangular fibrocartilage

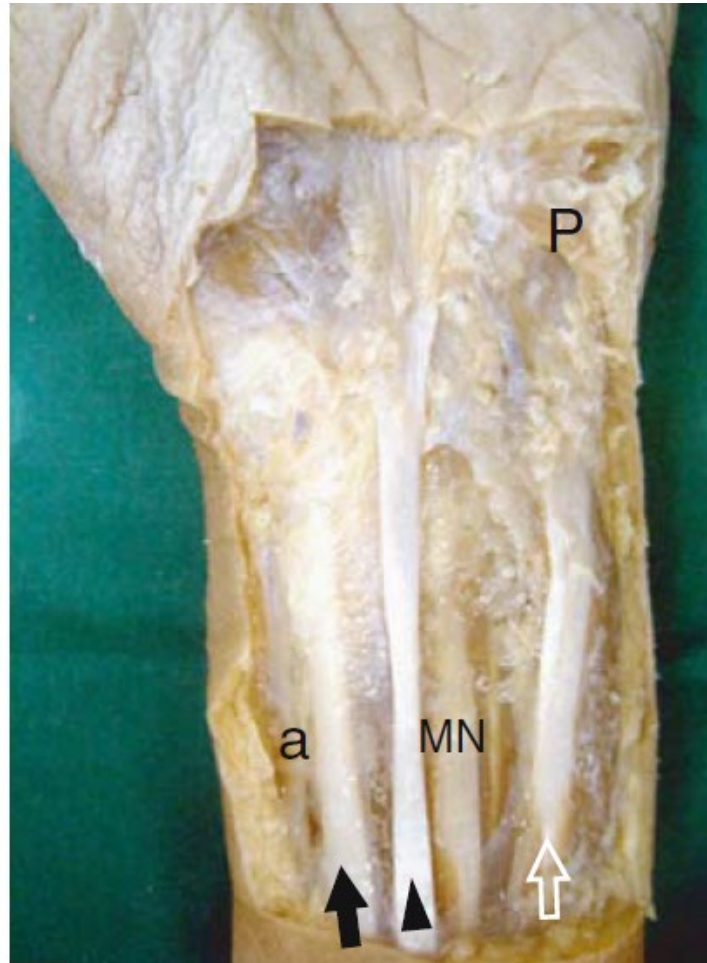
Palmar wrist

- **Carpal tunnel**
 - Proximal/Distal
 - Median nerve, FDP, FDS, FPL
- **Guyon's tunnel**
 - Ulnar nerve, ulnar artery
- FCR, FCU tendon

Palmar wrist



FCR, PL, FCU

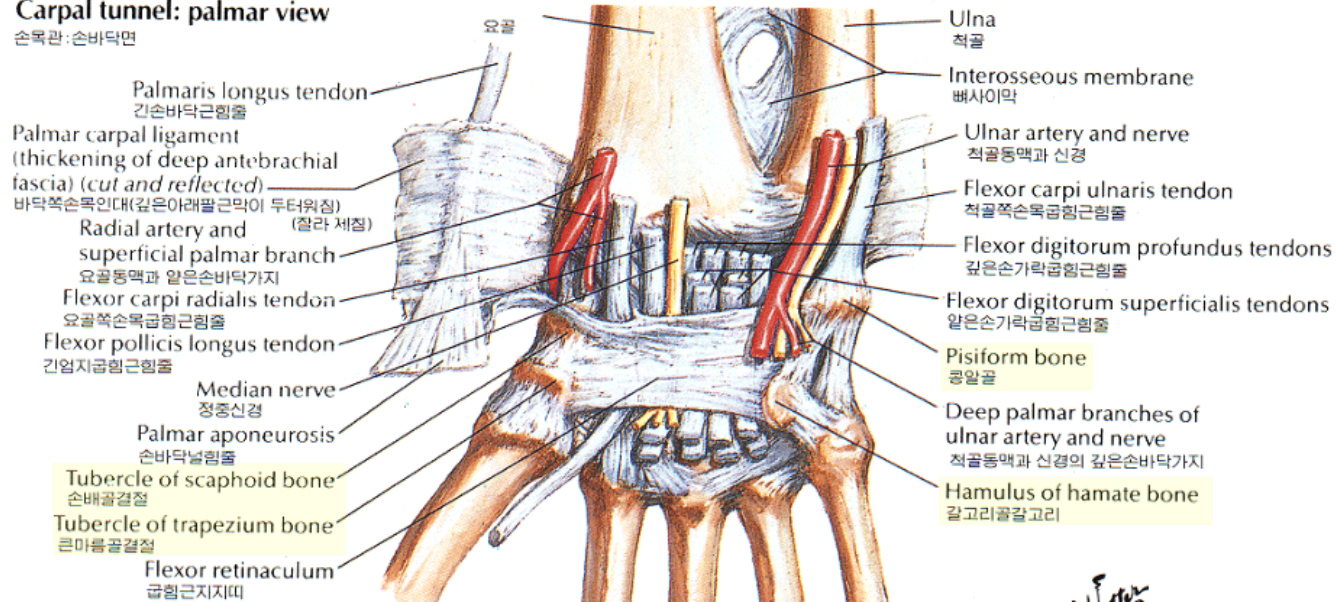


Radial a., FCR, PL, Median n., FCU

Carpal tunnel

Carpal tunnel: palmar view

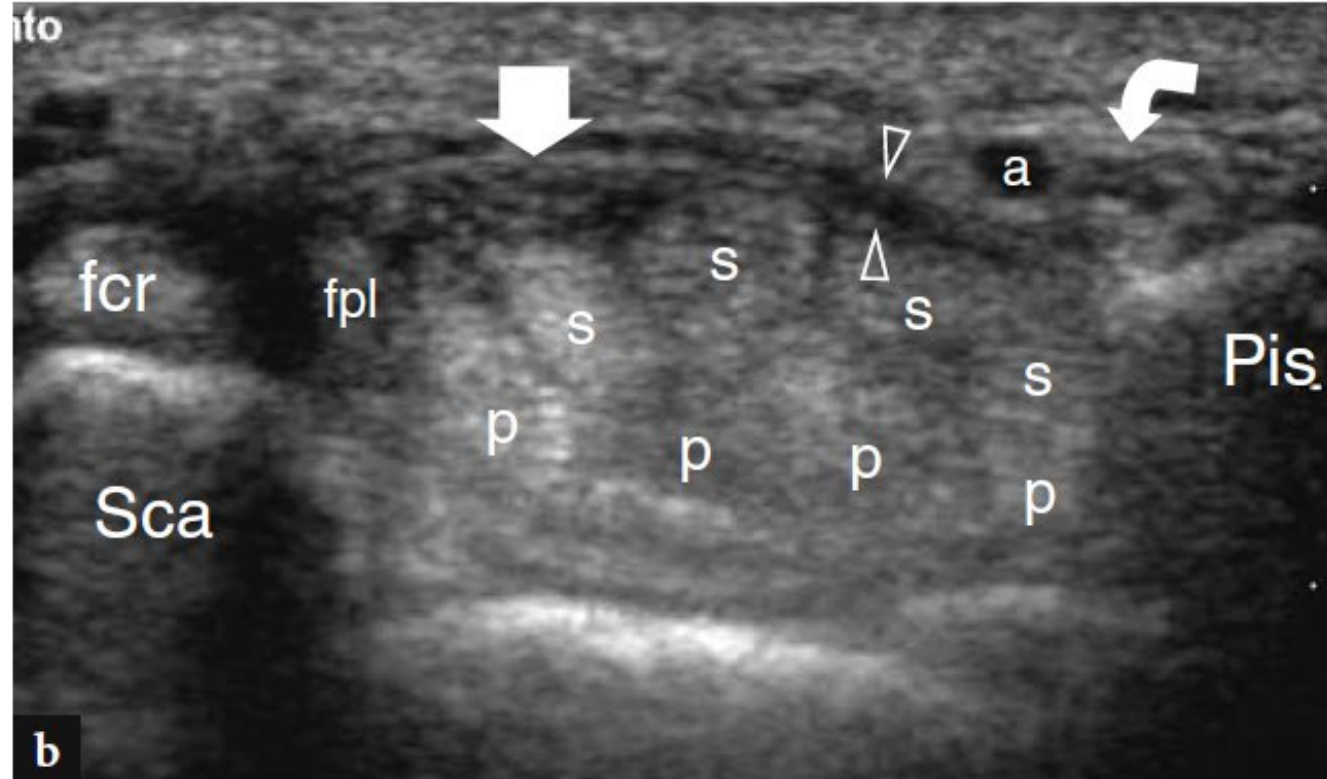
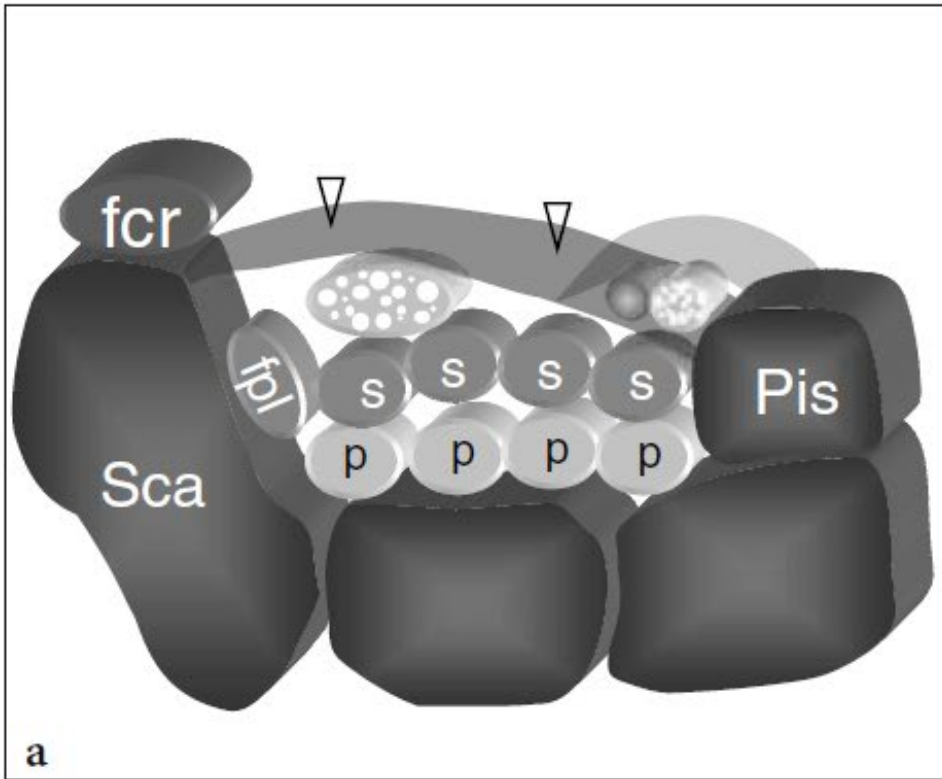
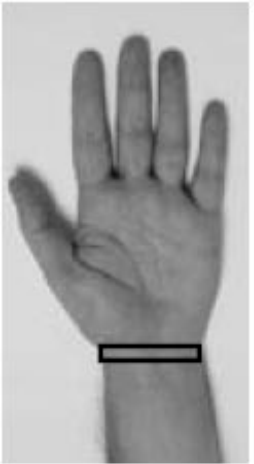
손목관: 손바닥면



- **Osteo-fibrous tunnel**

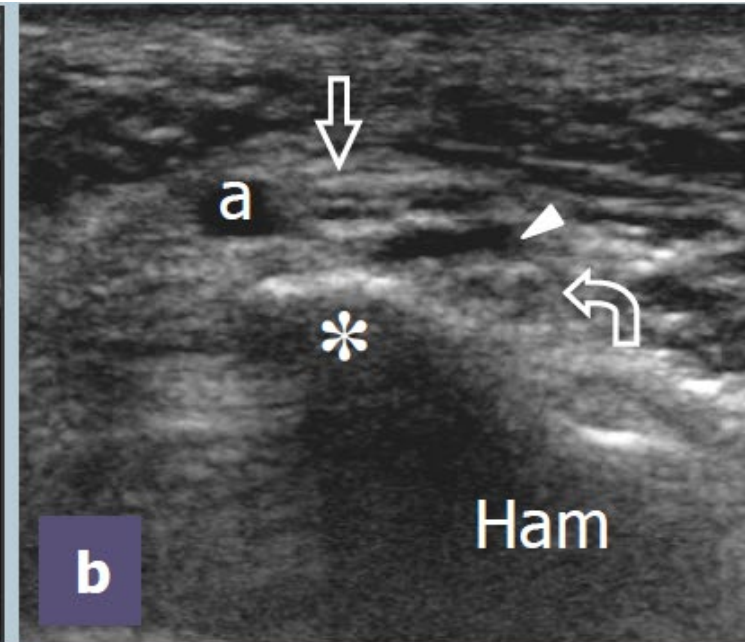
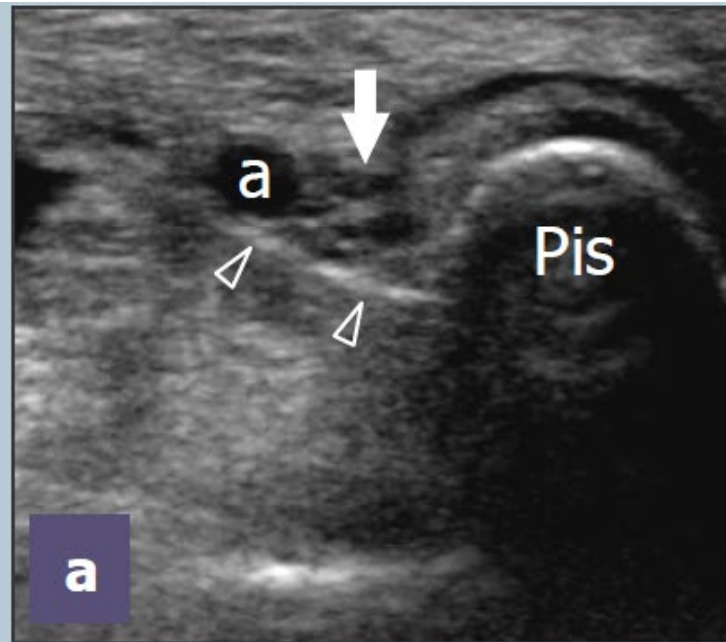
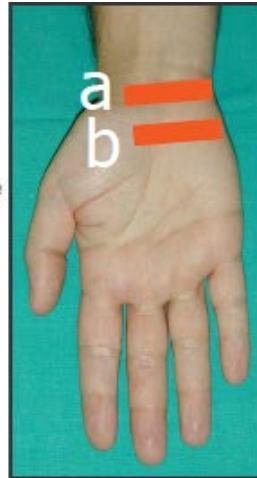
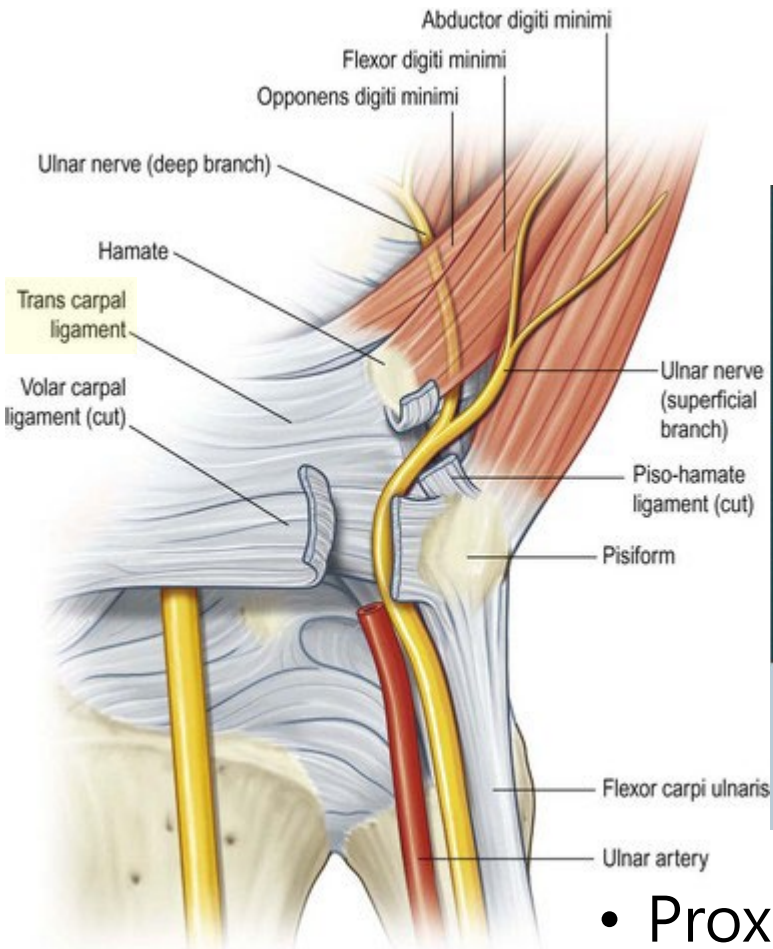
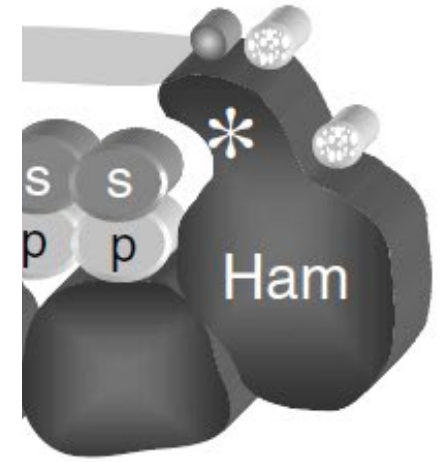
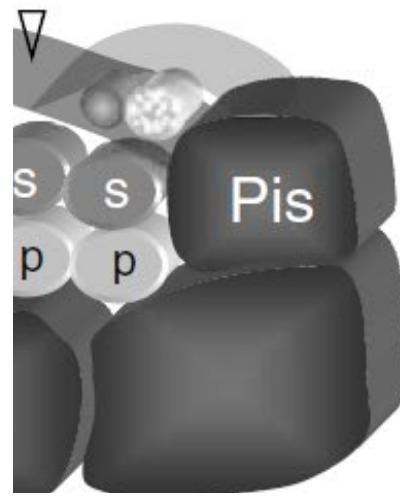
- Proximal : scaphoid ~ pisiform
- Distal : trapezium tubercle ~ hook of hamate
- Roof : flexor retinaculum (transverse carpal ligament)
- Contents : Median nerve, 4 FDP, 4 FDS, FPL

Carpal tunnel



- Proximal carpal tunnel : scaphoid ~ pisiform
- Transverse carpal ligament : carpal tunnel 의 roof 이자 Guyon canal 의 floor

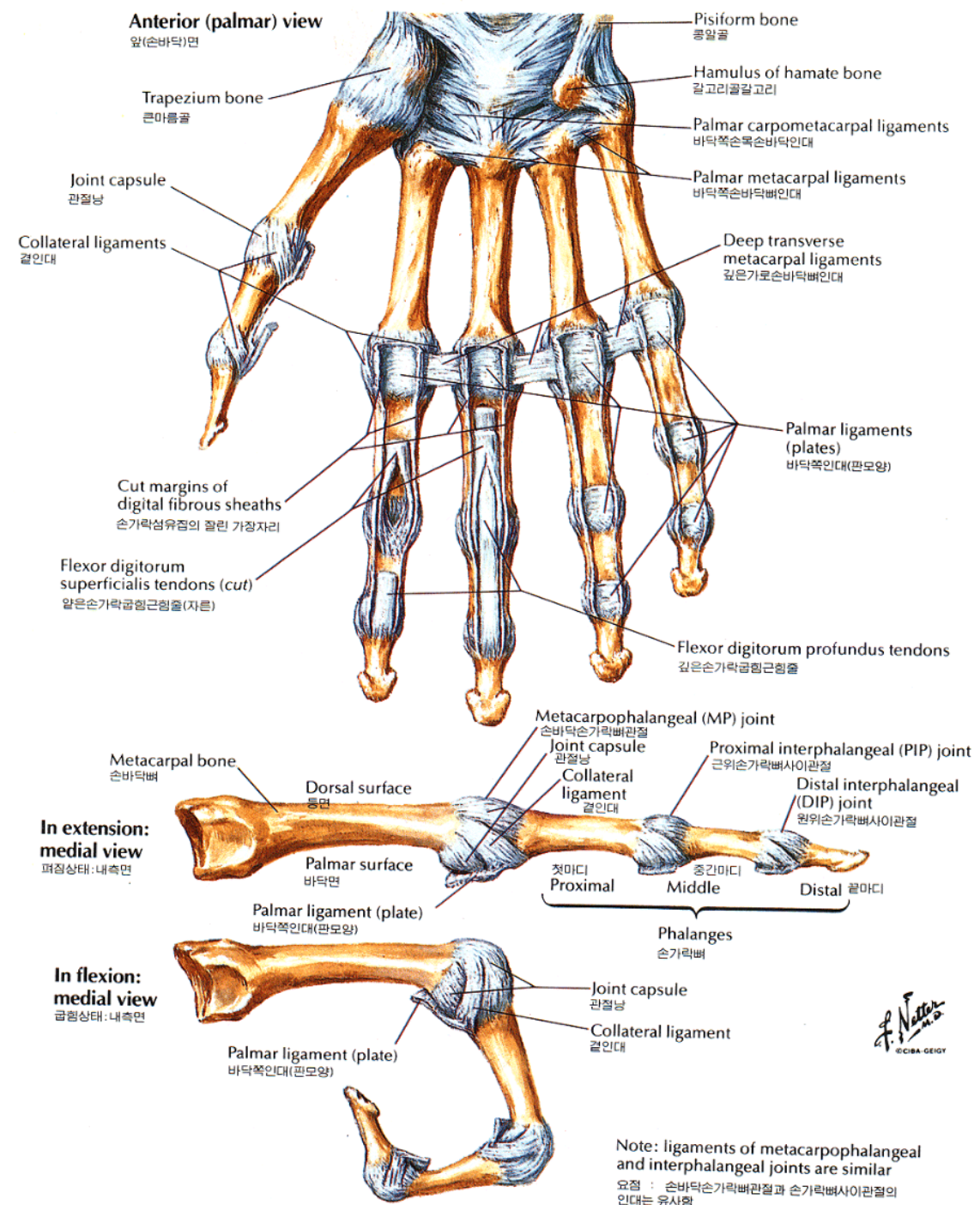
Guyon tunnel



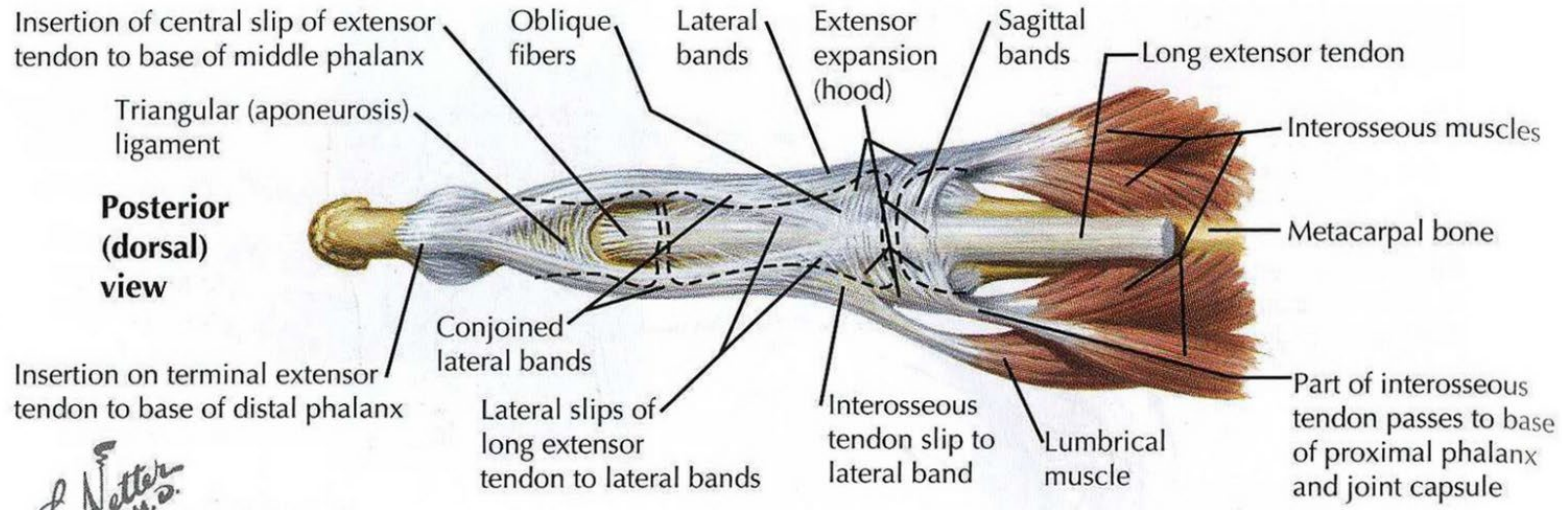
- Proximal : Pisiform, ulnar artery & nerve
- Distal : Hook of hamate, 2 branches of ulnar nerve

Hand & fingers

- Joint capsule
- Collateral ligament
- Palmar ligament
- Deep transverse metacarpal ligament(2-5th)

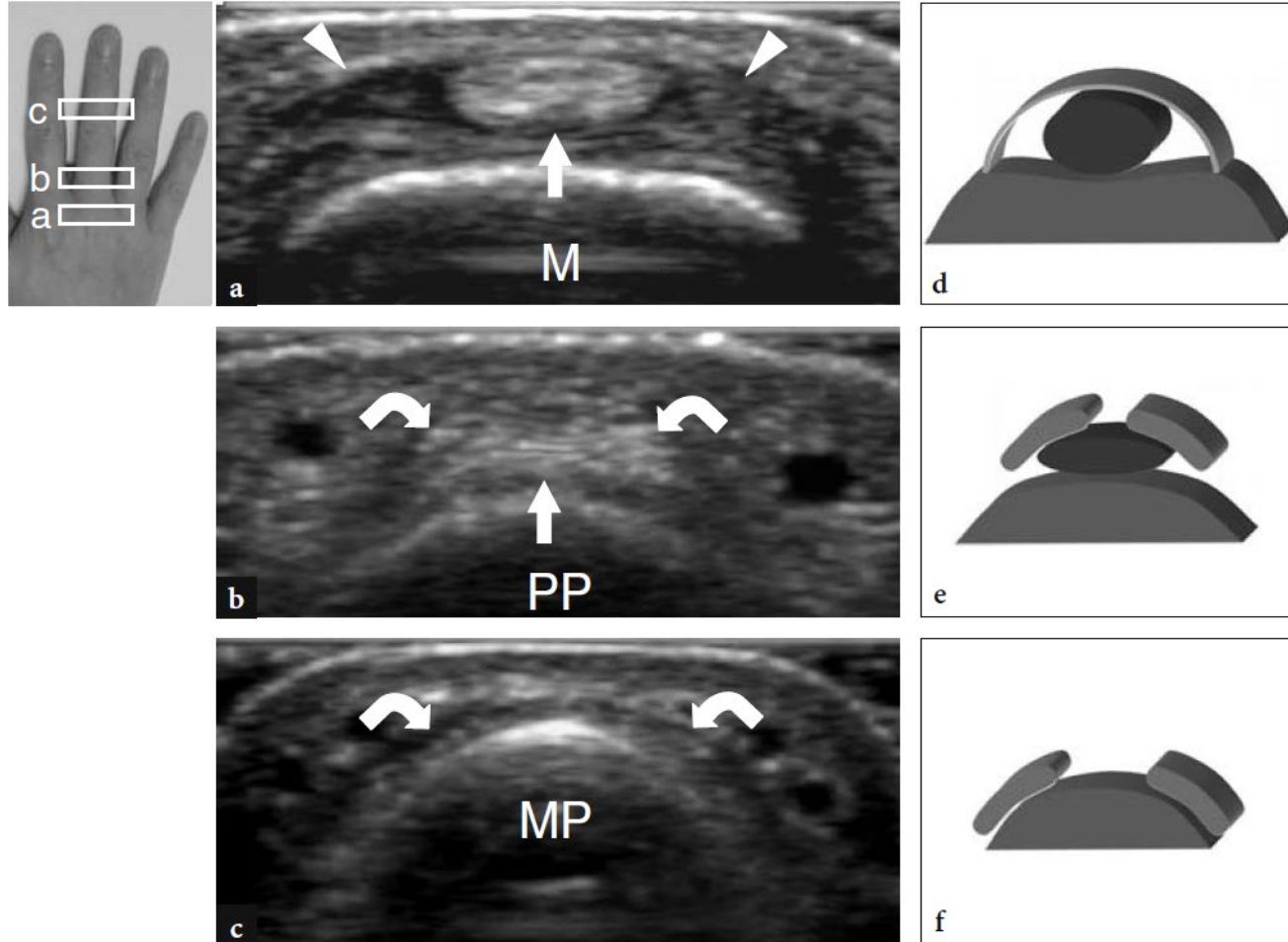


Hand & fingers (extensor)



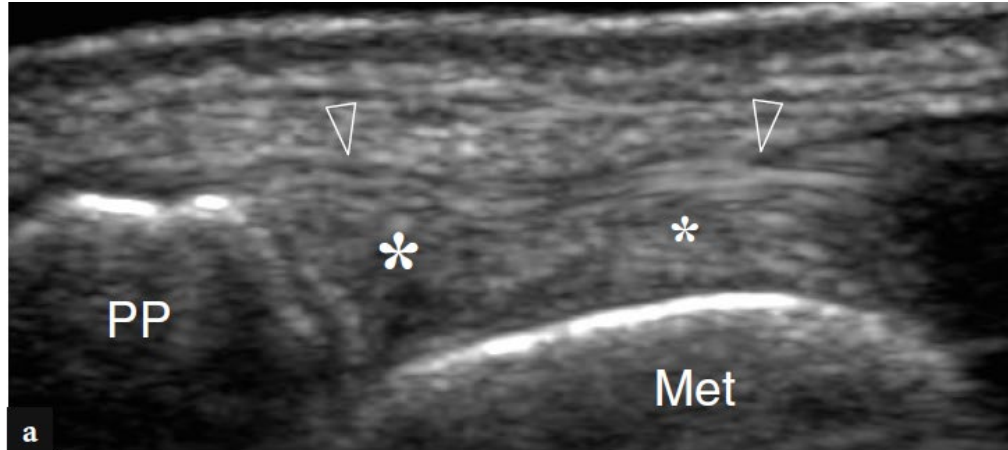
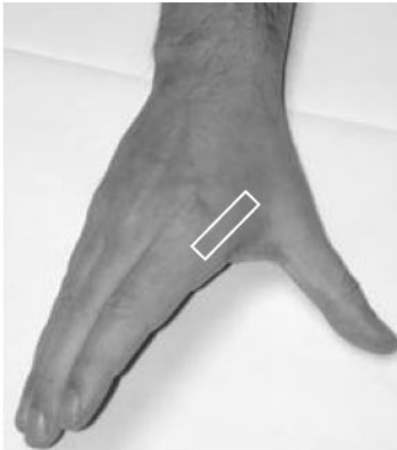
- Dorsal extensor aponeurosis : long extensor tendon 의 expansion sagittal & lateral band, oblique fiber
- Lateral & central slip, terminal extensor tendon : inserted in middle & distal phalanges

Hand & fingers (extensor)

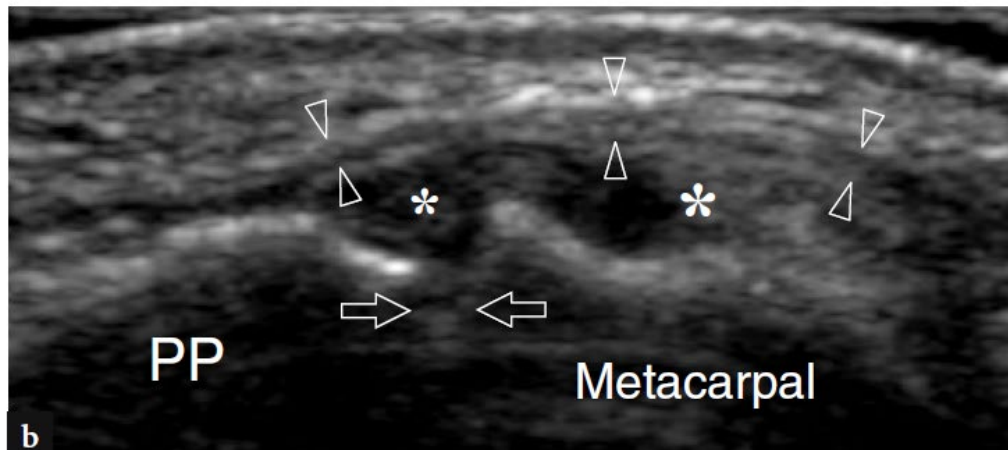


- Extensor tendon
- Sagittal band
- Central slip
- 2 Lateral slips
- 2 lateral slips

Collateral ligament (MCP joint)

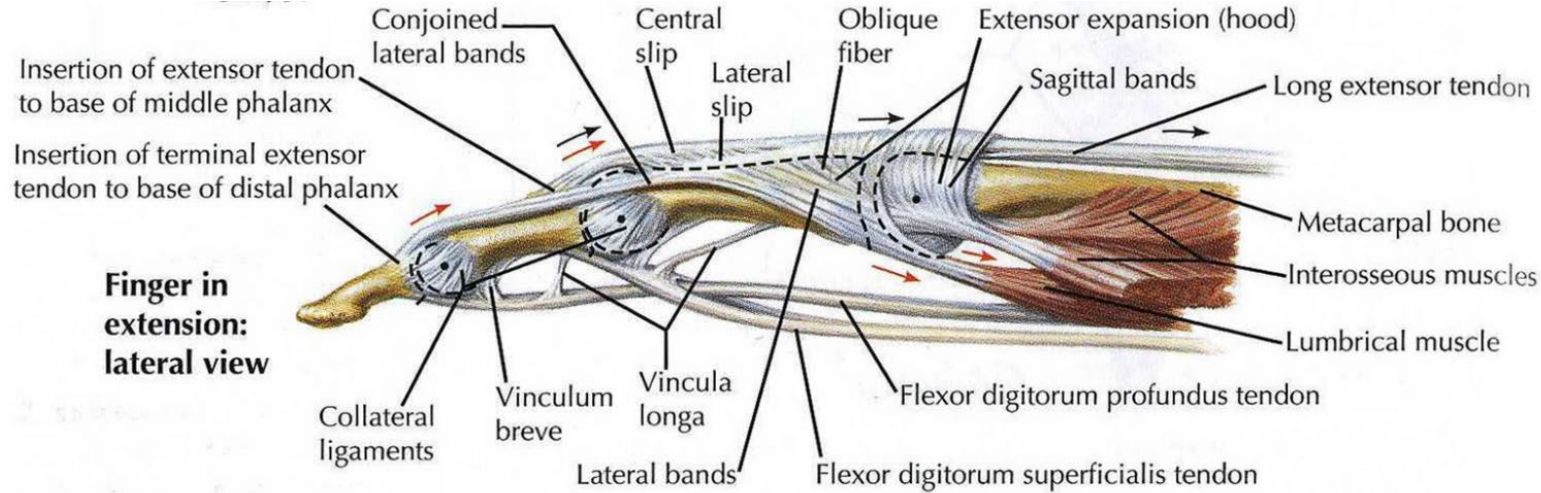


- FDI tendon
- Collateral ligament



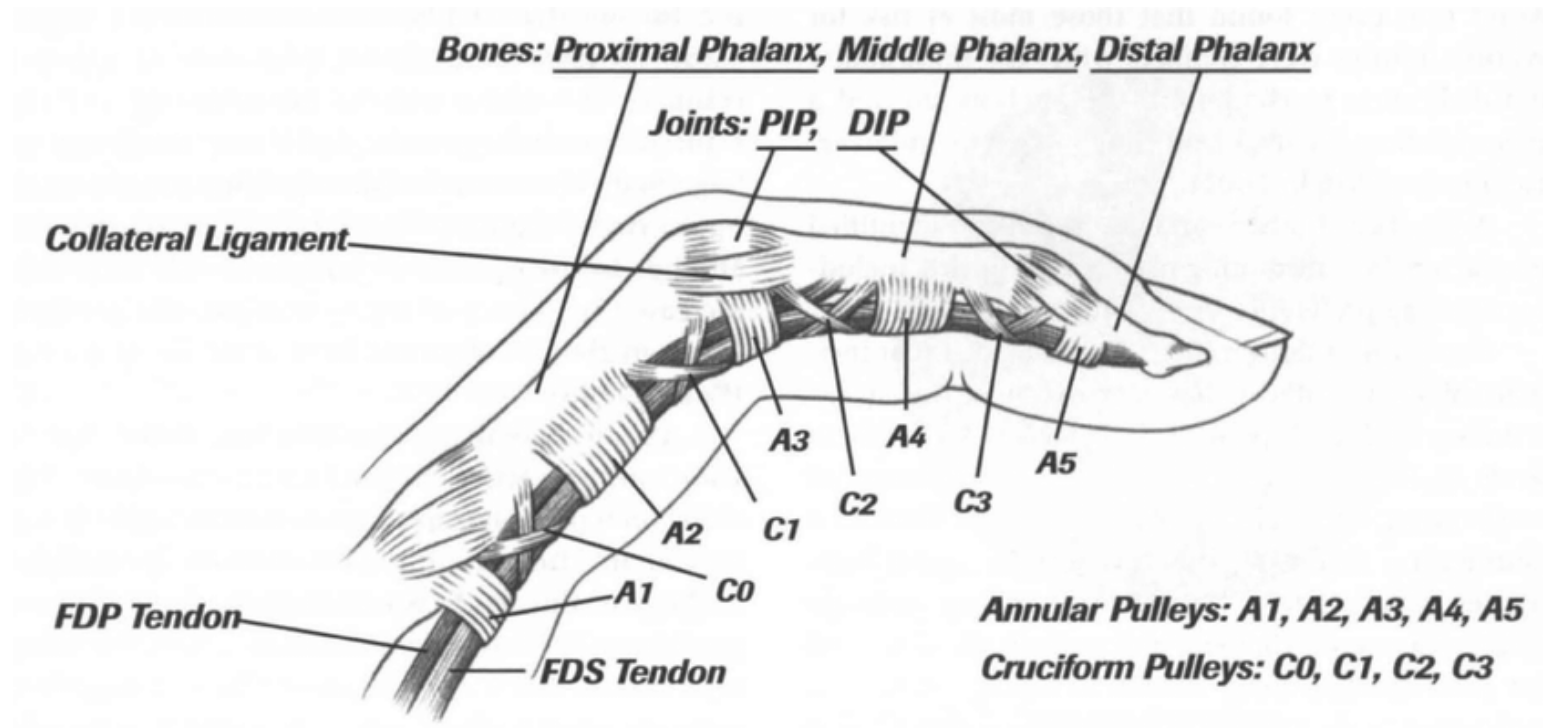
- Adductor pollicis aponeurosis
- Collateral ligament

Hand & fingers (flexor)



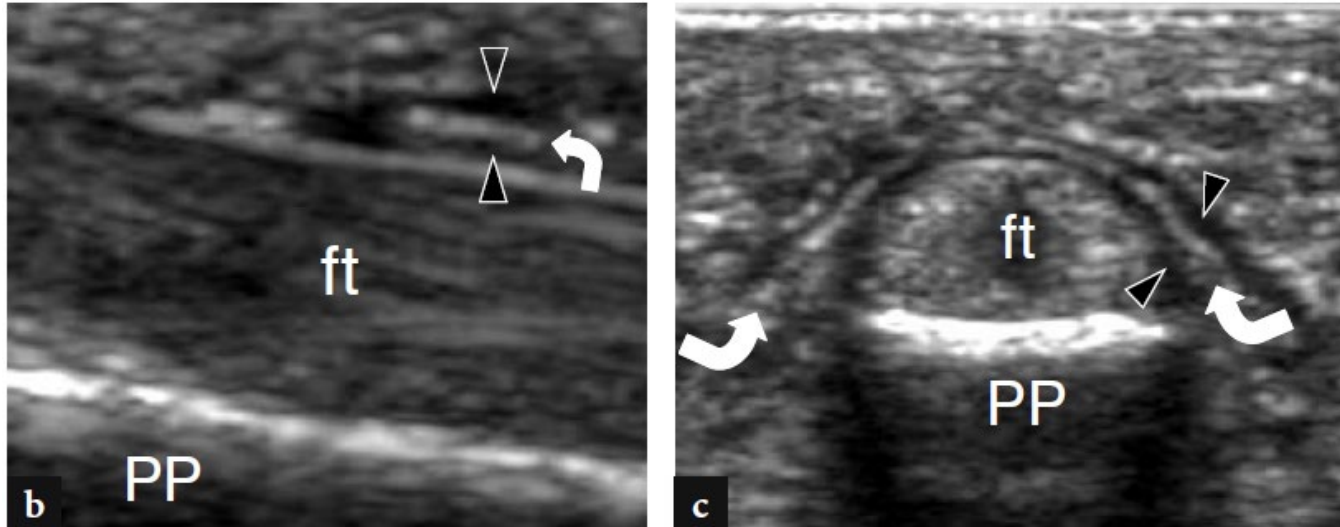
- FDS tendon : PIP joint 에서 두 갈래로 나뉘어 각각 FDP tendon 옆으로 주행하여 middle phalanx 에 insertion, FDP tendon 은 distal phalanx 에 insertion

Pulley system of hand



- Thick annular pulleys and thin cruciform pulleys

Flexor tendon and annular pulley



- A2 pulley and flexor tendon

**경청해 주셔서
감사합니다**