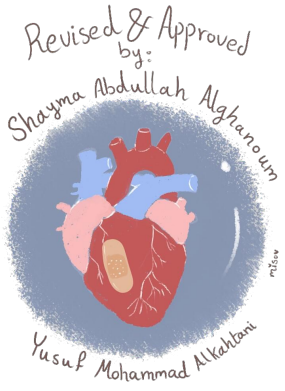
MED439
KING SAUD UNIVERSITY

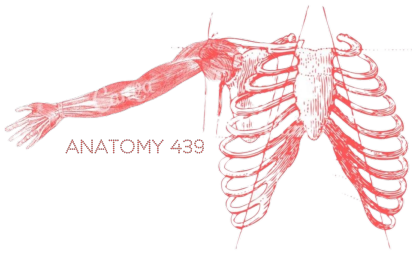
Hand and wrist

Musculoskeletal Block - Lecture 12

Objective:
At the end of the lecture, students should be able to:
- ✓ Describe the anatomy of the deep fascia of the wrist & hand (flexor & extensor retinaculae & palmar aponeurosis)
- ✓ List the structures passing superficial & deep to flexor retinaculum.
- ✓ Describe the anatomy of the insertion of long flexor & extensor tendons.
- ✓ Describe the anatomy of the small muscles of the hand (origin, insertion action & nerve supply)

Color index:
Important
In male's slides only
In female's slides only
Extra information, explanation





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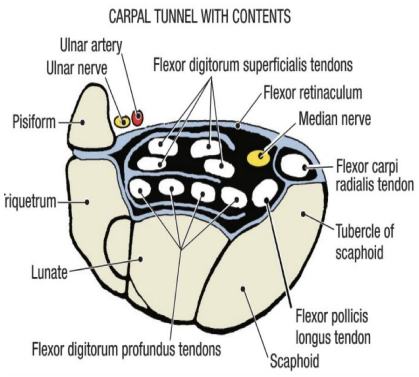
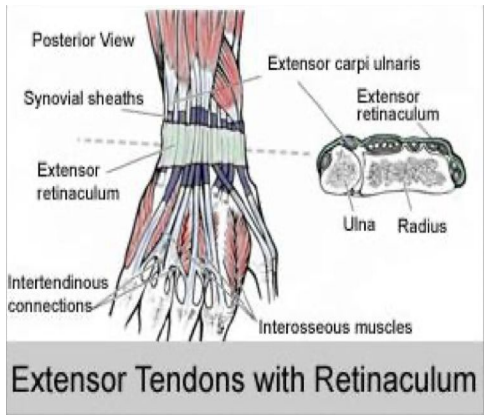
Retinacula

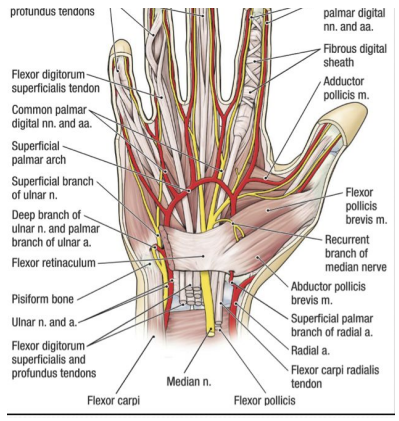
- **Flexor & Extensor Retinaculua:**
Bands of Deep Fascia at the Wrist

- **Function:**
 Hold the long flexor and extensor tendons at the wrist in position.





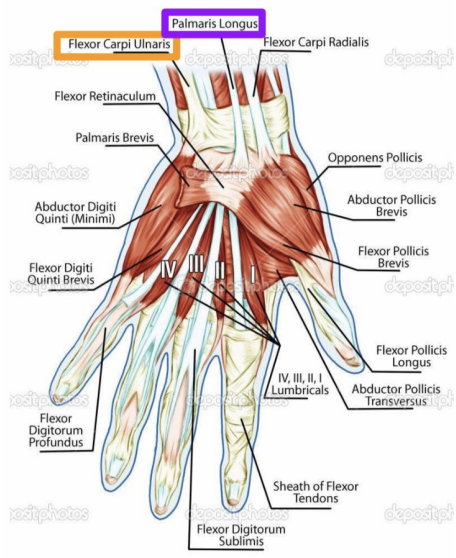
Attachment	Medially	Laterally
Flexor Retinaculum	Pisiform & Hook of hamate	Tubercle of scaphoid & Trapezium
Extensor Retinaculum		Distal end of radius

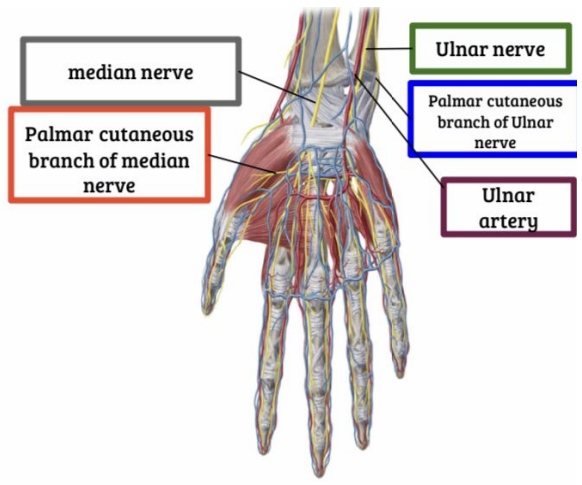


Structures Superficial to Flexor Retinaculum:

From Medial to Lateral:

Tendon of Flexor carpi ulnaris.
Ulnar nerve.
Ulnar artery
Palmar cutaneous branch of ulnar nerve.
Palmaris longus tendon.
Palmar cutaneous branch of median nerve.



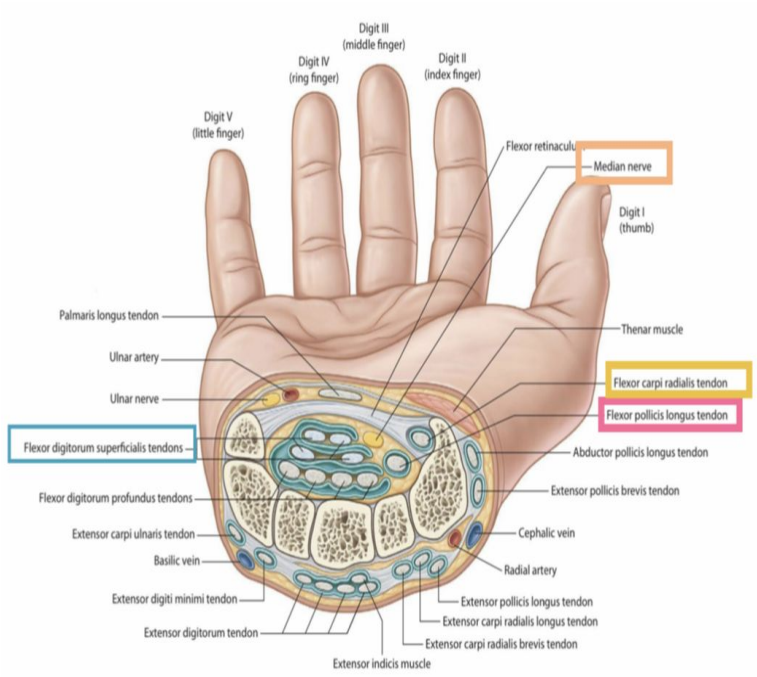


Carpal Tunnel

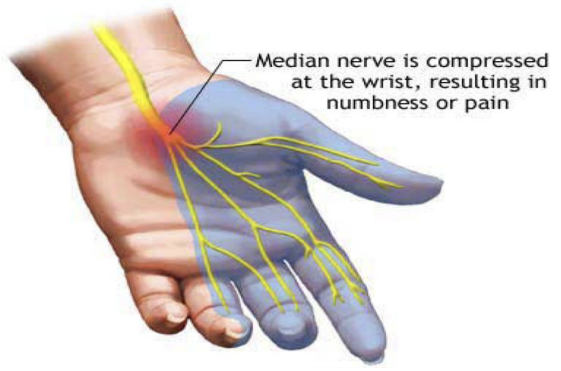
Formed from: Concave anterior surface of the Carpus (carpal bones) covered by Flexor Retinaculum.
Contents : From **Medial** to **Lateral**

- **Tendons of flexor digitorum superficialis & profundus**
- **Median nerve**
- **Flexor Pollicis Longus**
- **(Flexor carpi radialis)**

Note the flexor carpi radialis is in between brackets because it has a special compartment in the fascia



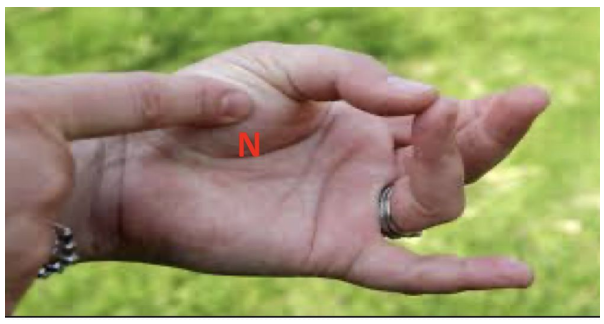
Carpal Tunnel syndrome



Causes :
- Compression of the median nerve within the carpal tunnel.

Manifestations:
1. Burning pain (pins and needles) in the lateral three and half fingers.
- No paresthesia over the thenar eminence (because it is supplied by the palmar cutaneous branch of the median which is superficial to the flexor retinaculum)

2. Weakness or atrophy of the thenar muscles (Ape Hand).
- Inability to Oppose the thumb.



Palmar Aponeurosis:

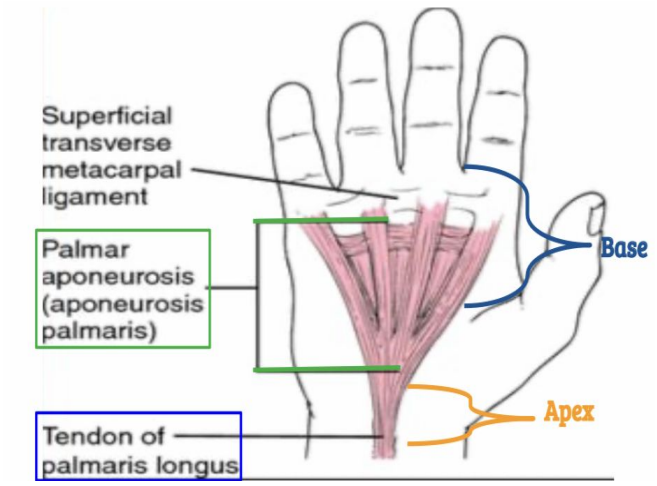
- The thickened deep fascia of the palm.
- It is **triangular** in shape, occupies the central area of the palm

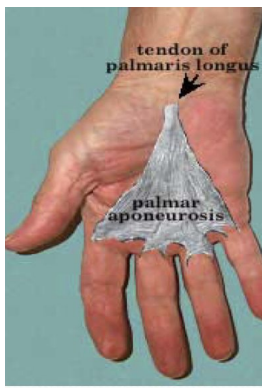
- It has

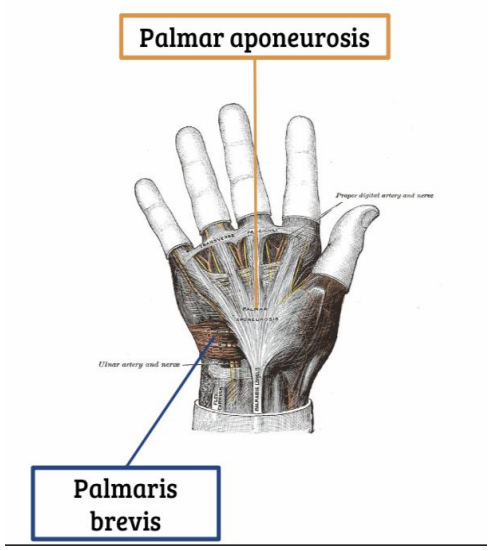
1. **Apex:** attached to the **distal border** of flexor retinaculum and receives the insertion of palmaris longus tendon.
2. **Base:** divides at the bases of the fingers into four slips that pass into the fingers

- **Function:**

1. Firmly attached to the overlying skin and improves the grip
2. Protects the underlying tendons, vessels & nerves.
3. Gives origin to palmaris brevis muscle.







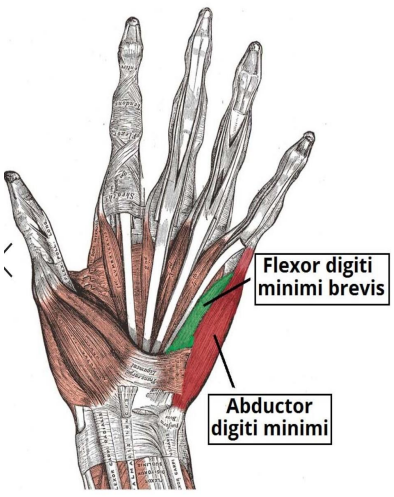
Palmaris Brevis:

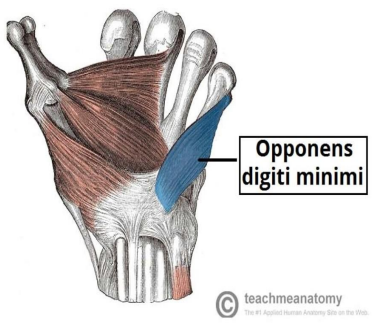
Origin	Insertion	Nerve supply	Action
Flexor retinaculum (FR) & Palmar aponeurosis (PA)	Skin of the palm	Ulnar nerve (superficial branch)	Prevents Corrugation of skin to improve grip.

the only muscle in the hand that is supplied by superficial branch of ulnar nerve

Short muscles of the hand (Little Finger)

Hypothenar eminence (3 muscles)			
	Abductor digiti minimi	**Flexor digiti minimi**	**Opponens digiti minimi**
origin	Pisiform	Flexor retinaculum	Palmar surface of 5th metacarpal
insertion	Base of proximal phalanx		*whole length of the ulnar margin of the 5th metacarpal
nerve supply	All by deep branch of ulnar nerve		
action	abduction	Flexion	Pulls the 5th metacarpal forward(cup the palm)



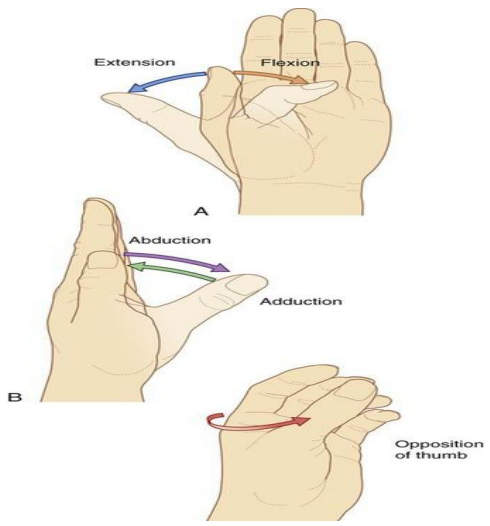


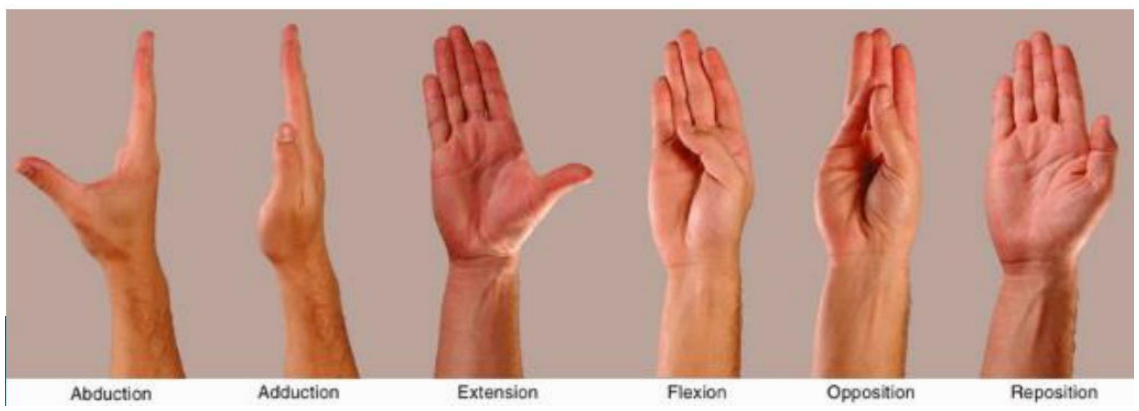
*Extra information:
Abductor digiti minimi abducts the little finger away from the fourth.

Flexor digiti minimi produces flexion of the little finger at its metacarpophalangeal joint

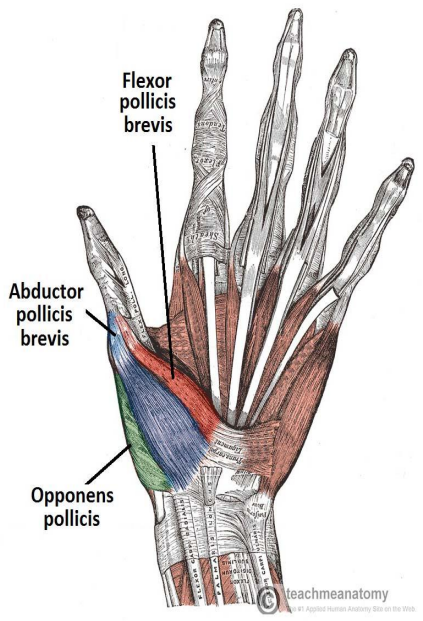
*From gray's book edition 41

Movements of the Thumb

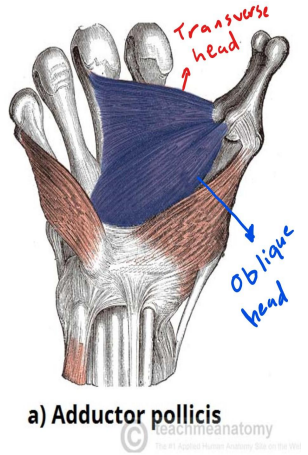




Short muscles of the hand (thumb)

Thenar eminence (3 muscles)				
	Abductor pollicis brevis	flexor pollicis brevis	opponens pollicis	
Origin	Flexor retinaculum, Scaphoid & Trapezium	Flexor retinaculum		
Insertion	Base of proximal phalanx		Lateral part of 1st metacarpal	
Nerve supply	All supplied by median nerve			
Action	Abduction	Flexion	Opposition	

Short muscles of the hand

	Origin	Insertion	Nerve supply	Action	
Adductor pollicis (is not of hypothenar or thenar eminence)	**Oblique head:** Anterior bases of 2nd&3rd metacarpal transverse head: 3rd metacarpal	Medial side of base of proximal phalanx of thumb	Deep branch of ulnar nerve	Adduction	

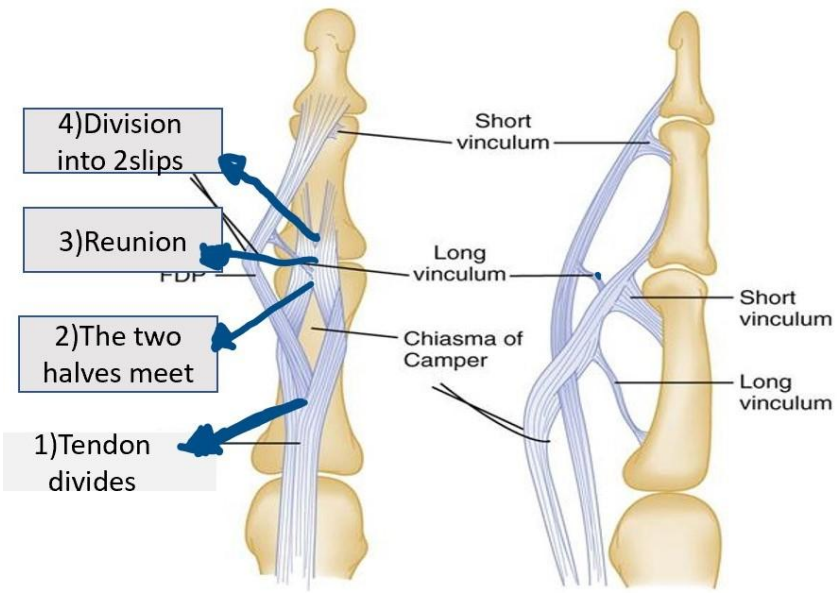
Insertion of flexor digitorum: (Superficialis & Profundus)

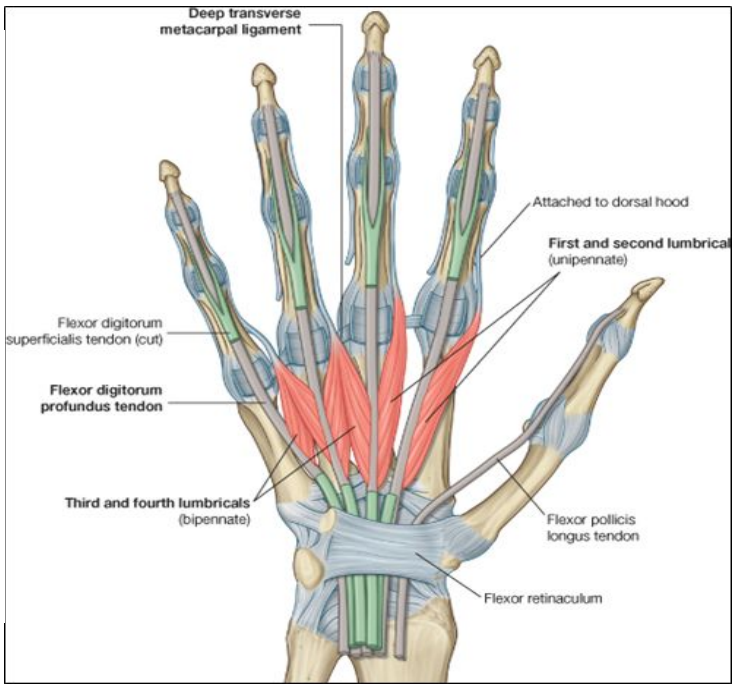
Flexor digitorum Superficialis:

1. Each tendon Divides into two halves & pass around the Profundus tendon.
2. The two halves **Meet** on the posterior aspect of Profundus tendon(partial decussation of fibers)
3. **Reunion** of the two halves
4. Further Division into two slips attached to the **borders of Middle phalanx**.

Flexor digitorum Profundus:

- Inserted into the **Base of the Distal Phalanx**

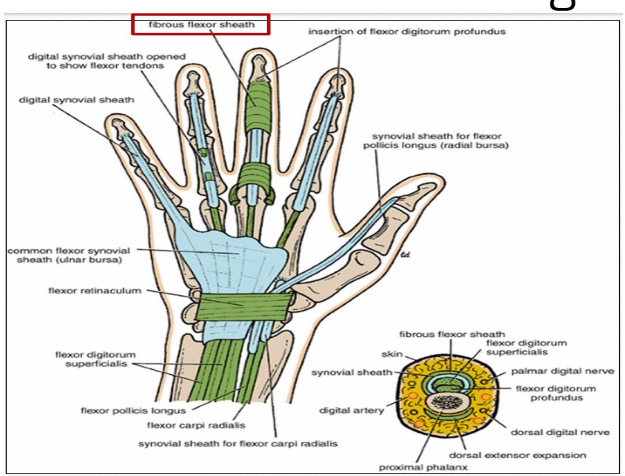




Fibrous Flexor (Digital) sheath

- A strong fibrous sheath, which covers the anterior surface of the fingers and attached to the sides of the phalanges.
- Its **Proximal** end is **opened**,
- Its **Distal** end is **closed**.

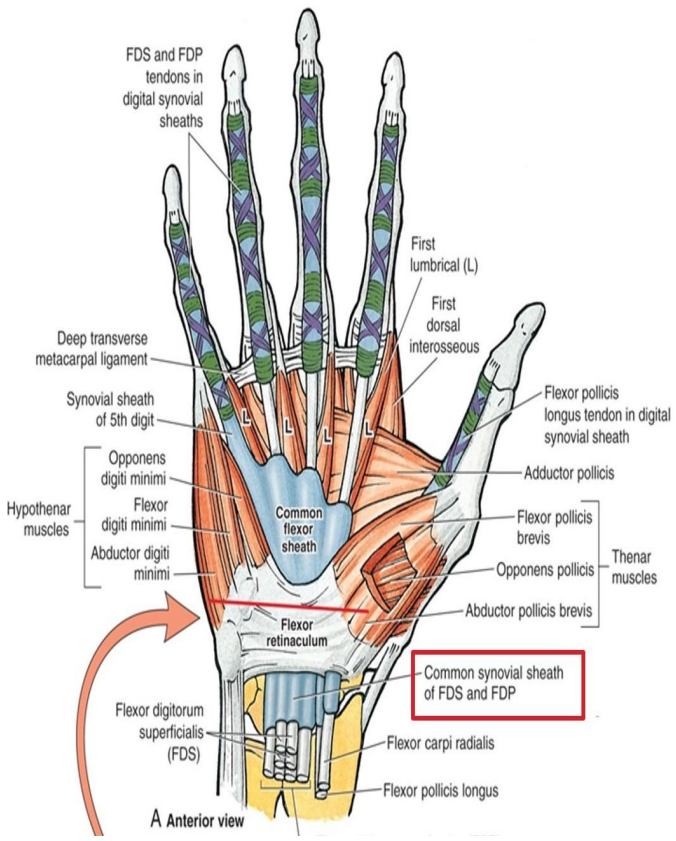
- The sheath with the anterior surfaces of the phalanges & the interphalangeal joints form an Osteofibrous blind tunnel for the long flexor tendons of the fingers.



Synovial Flexor Sheaths

A-Common synovial sheath (Ulnar bursa):

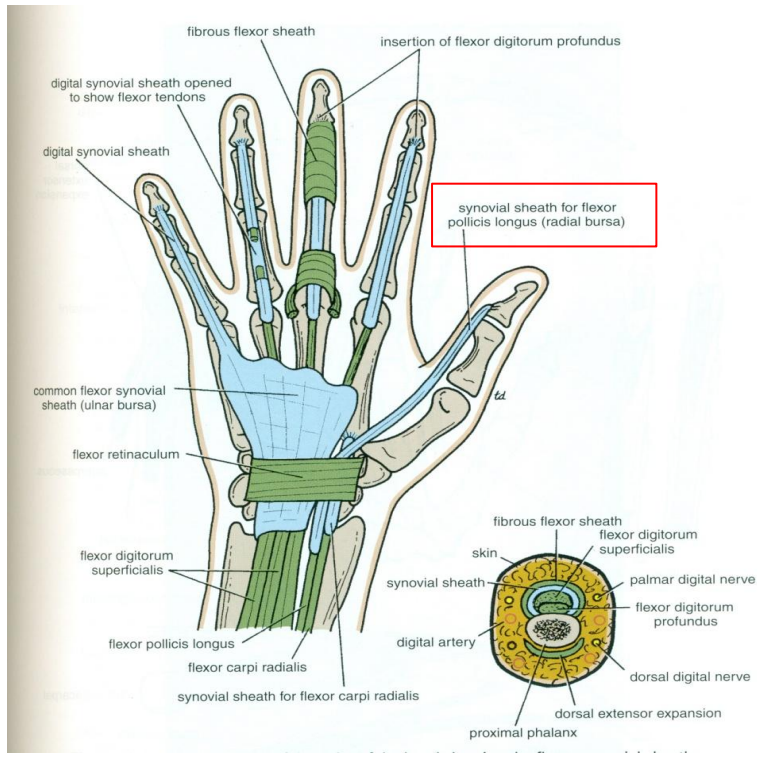
- Contains tendons of flexor digitorum superficialis & profundus.
- The Medial part of the sheath **extends** distally (without interruption) on the tendons of the little finger.
- The Lateral part of the sheath **stops** on the middle of the palm.
- The distal ends of the long flexor tendons to (**Index, Middle & Ring**) fingers acquire digital synovial sheaths.



B- Flexor Pollicis Longus

tendon has its own synovial sheath **(Radial Bursa)**

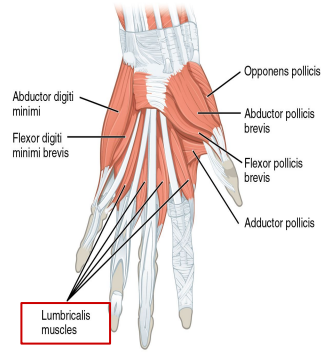
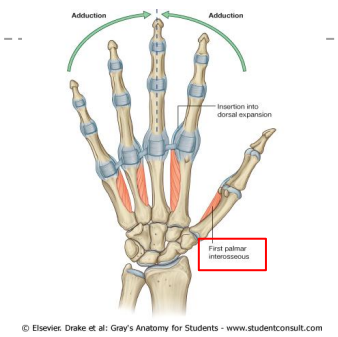
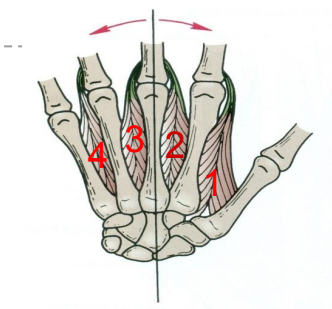
Function of synovial sheaths: They allow the long tendons to move smoothly with a minimum of friction beneath the flexor retinaculum and the fibrous flexor sheaths.



note:(438)

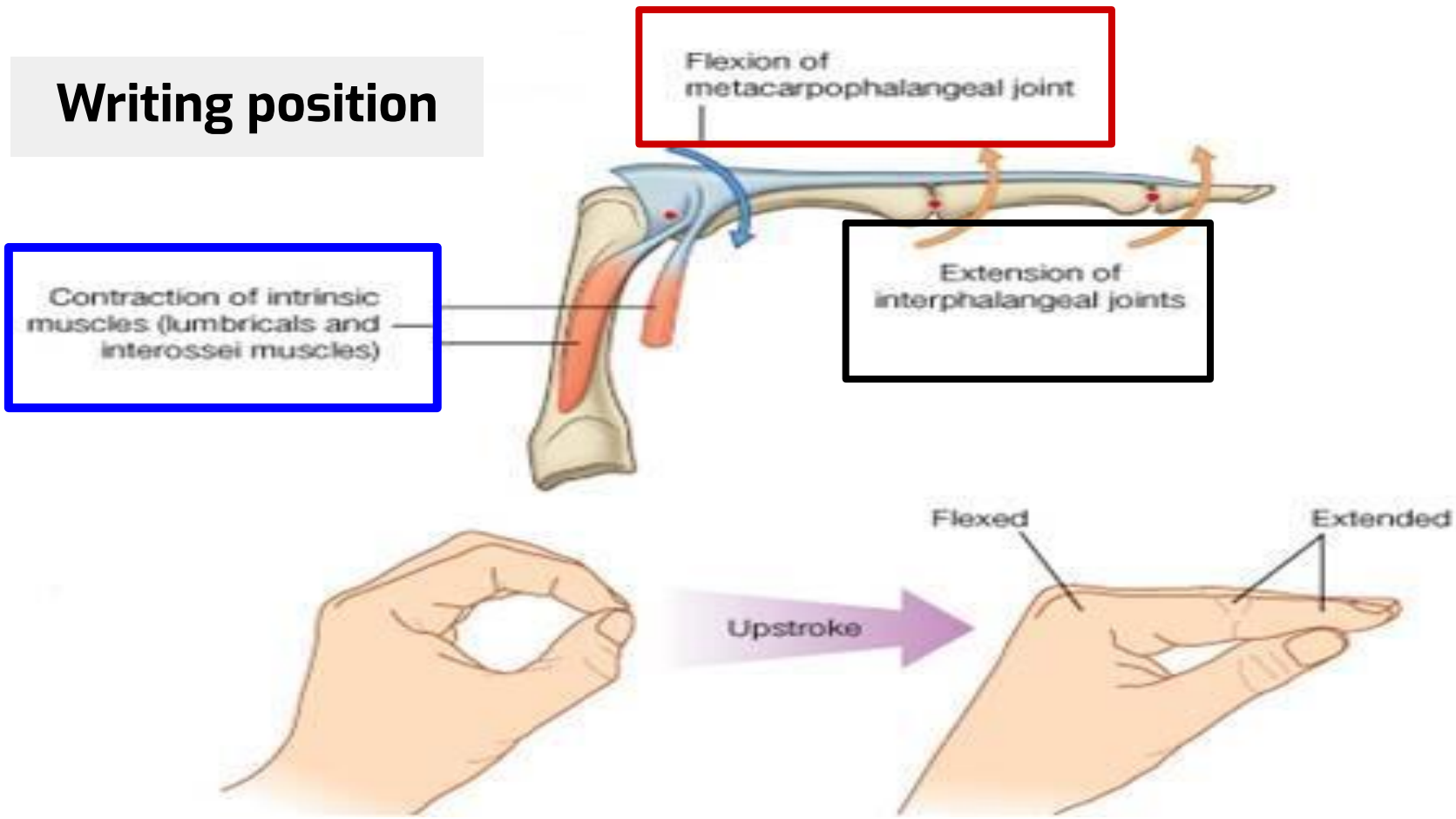
The importance of the digital synovial sheath is that it prevents the infection from spreading. For example if you have an infection in the forearm the synovial sheath changing is going to prevent it from spreading to the hand .

Each finger has a tendon covered by (fibrous flexor sheath) to protect it and between the tendon and the fibrous sheath there are synovial sheaths to reduce friction.

Name of muscle	Origin	Insertion	Nerve supply	Action	Picture
Lumbrical Muscles (4)	Tendons of Flex.dig. profundus fingers	Extensor expansion of medial four fingers	**1ST** &**2ND** (Lateral two) Median N **3RD**&**4TH**: UlnarN (Deep branch)	**Flex** metacarpophala-geal joints and **extend** interphalangeal joints of fingers Except thumb	
Palmar Interossei (4)	**1st** :Base of 1st metacarpal. Other three: Ant. Surface of Shafts of 2nd ,4rd & 5th metacarpals.	Proximal phalanges of **thumb** ,**index**, **ring**,& **little** fingers and **Extensor expansion**	deep Branch of ulnar nerve	Adduction of fingers toward center of the 3rd one.	
Dorsal Interossei (4)	Contiguous sides of shafts of Metacarpals	Proximal Phalang of **index**,**ring**,**mid** finger & EX	deep Branch of ulnar nerve	Abduction of fingers away from the 3rd one.	

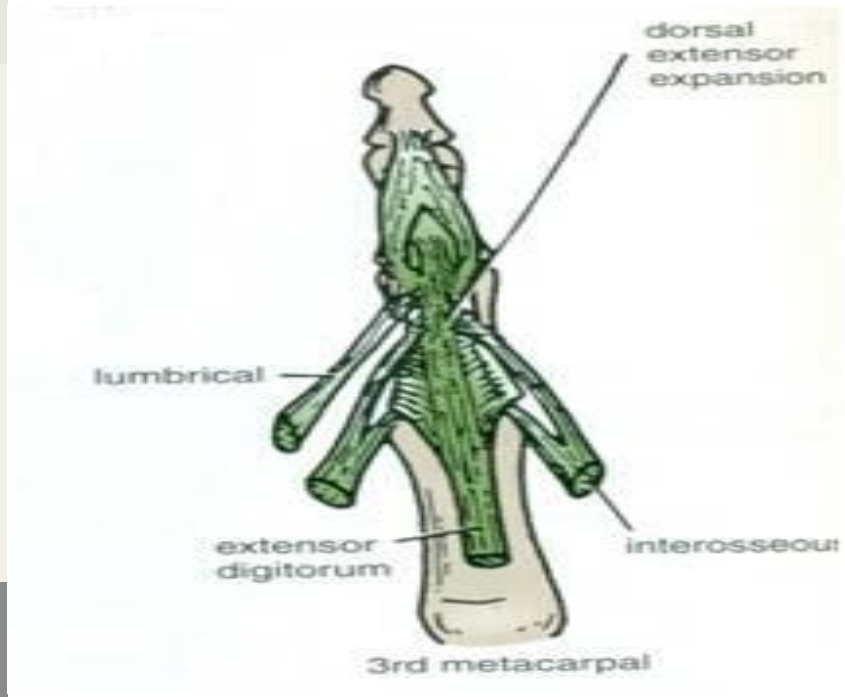
Action of Lumbricals & Interossei

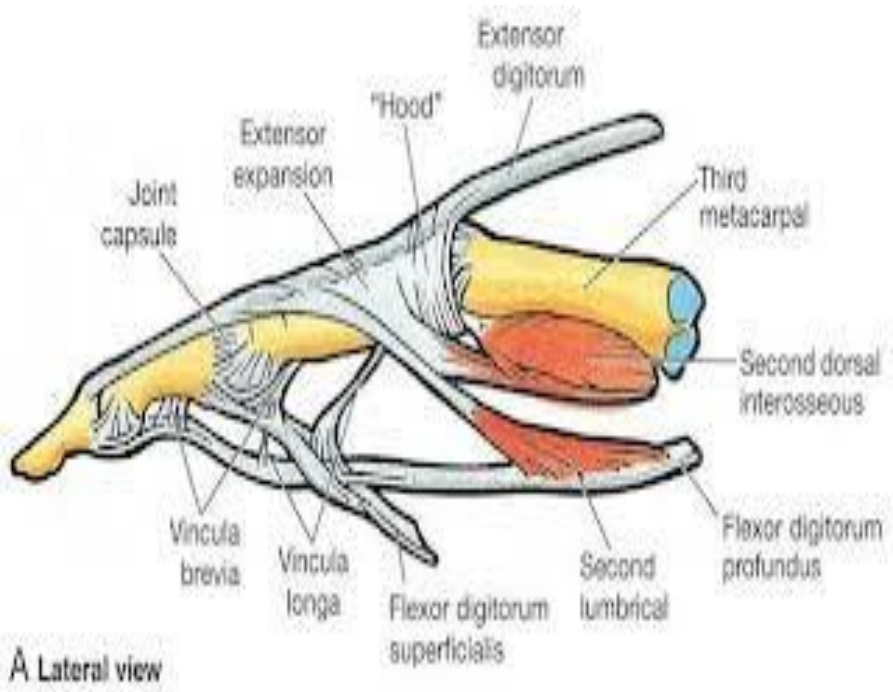
Writing position



Extensor Expansion

- Formed from the expansion of the tendons of extensor dig. at the PIJ (proximal interphalangeal joint)
- **The tendon splits into three parts**:
  One Central: inserted into the **base** of Middle phalanx.
  Two laterals: inserted into the **base of the** Distal phalanx.
- The Expansion Receives the insertions of:
  Corresponding Interosseous **muscle (on each side),**
  Lumbrical **muscle (on the lateral side)**.
- This is the same as the extensor expansion mentioned in the last lecture





MCQs

Q1: insertion of tendon of flexor digitorum profundus

A. Base of 1st metacarpal
B. Base of the distal phalanx
C. proximal phalanx of thumb
D. flexor retinaculum

Q2: Abductor digiti minimi is supplied by
A. deep branch of ulnar nerve
B. cutaneous branch of median nerve
C. deep branch of radial nerve
D. musculocutaneous nerve

Q3: action of opponens pollicis

A. abduction
B. flexion
C. adduction
D. opposition

Q4: origin of flexor digiti minimi

A. flexor retinaculum
B. pisiform
C. middle phalanx of little finger
D. scaphoid

Q5: What the nerve supply of palmaris brevis?

A. Median
B. radial
C. Axillary
D. Ulnar

Q6: Carpal tunnel syndrome is compression of which nerve?

A. radial
B. axillary
C. median
D. ulnar

Q7: nerve supply for Palmar Interossei muscle is
A. Deep branch of ulnar nerve
B. medial nerve
C. Axillary nerve
D. Radius nerve

Q8: action of Dorsal Interossei
A. Prevents Corrugation of skin to improve grip.
B. Flexion
C. Opposition
D. Abduction of fingers away from the 3rd one.

Q9: origin of Lumbrical Muscles
A. Flexor retinaculum, Scaphoid and Trapezium
B. Tendons of Flex.dig. profundus fingers
C. Flexor retinaculum (FR) & Palmar aponeurosis (PA)
D. Pisiform

Q10: What the first superficial structure from medial to lateral of flexor Retinaculum?
A. Palmaris longus tendon.
B. Tendon of Flexor carpi ulnaris.
C. Ulnar nerve.
D. Ulnar artery

Q11: insertion of Lumbrical Muscles
A. EXT. EXP of medial four fingers
B. Base of proximal phalanx
C. Proximal Phalang of index,ring,mid finger & EX
D. 5th metacarpal

1)B
2)A
3)D
4)A
5)D
6)B
7)A
8)D
9)B
10)B
11)A

SAQs

What is the Function of synovial sheaths?

Q2- what is the function of Retinacula?

Q3-What is the origin of Adductor pollicis?

Answers
Q1: They allow the long tendons to move smoothly with a minimum of friction beneath the flexor retinaculum and the fibrous flexor sheaths.

Q2:
Hold the long flexor and extensor tendons at the wrist in position.

Q3:
1- Oblique head: Anterior bases of 2nd & 3rd metacarpal
2- Transverse head: 3rd metacarpal

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SPECIAL THANKS TO THE AMAZING
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