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~ More Than Skin Deep ~



# SurgSoc Anatomy Tutorials 2020/21

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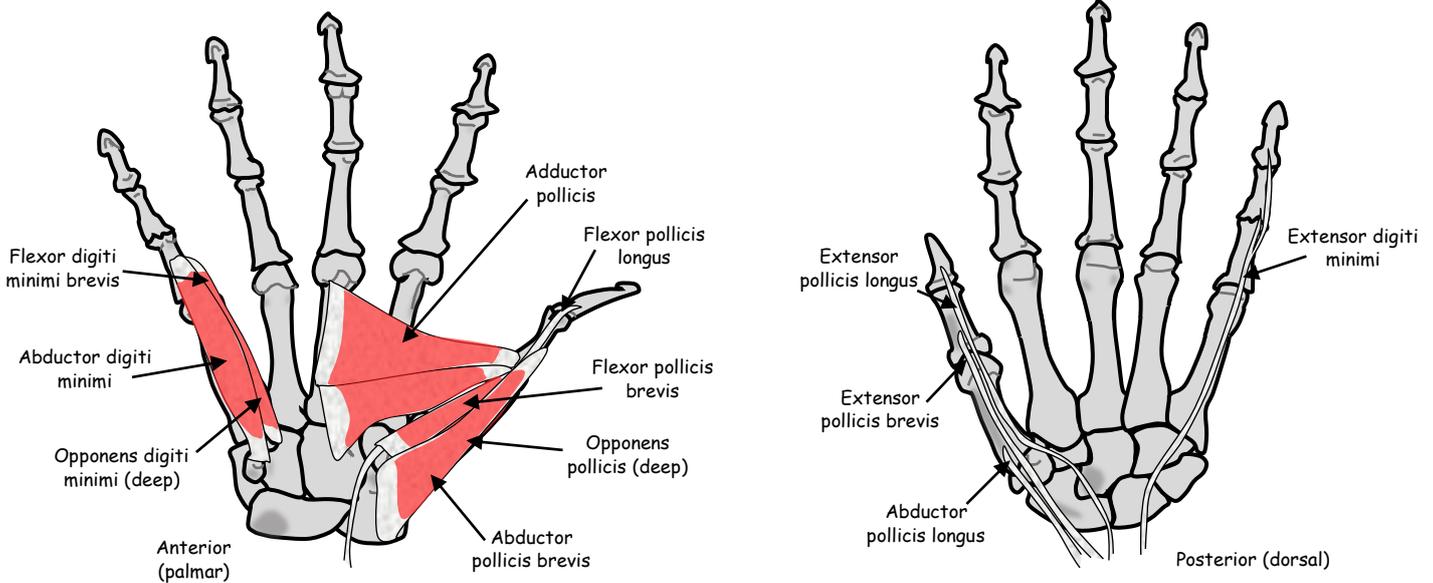
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# Musculoskeletal Anatomy: The Hand Bones

By Conor Boylan

## Introduction

- The muscles of the hand can be broadly divided into those acting directly on the thumb or little finger, the interossei, lumbricals, long flexors and extensors and miscellaneous
- The extensor hood is a complex structure allowing the more intricate movements of the fingers



## Thumb Muscles

Muscles acting solely on the anterior thumb include:

- **Flexor pollicis longus** (flexion of all joints)
- **Opponens pollicis** (opposition)
- **Adductor pollicis** (adduction)
- **Flexor pollicis brevis** (flexion all but most distal joint)
- **Abductor pollicis brevis** (abduction)

On the anterior surface, the thenar eminence is produced by the flexor pollicis brevis, opponens pollicis and abductor pollicis brevis.

Adductor pollicis has two heads: horizontal and oblique.

Muscles acting solely on the posterior thumb include:

- **Abductor pollicis longus** (abduction)
- **Extensor pollicis brevis** (extension of all but most distal joint)
- **Extensor pollicis longus** (extension of all joints)

The **anatomical snuffbox** is a triangular area bounded by the extensor pollicis longus tendon medially, radial styloid process proximally and extensor pollicis brevis and abductor pollicis longus tendons laterally. It contains part of the **radial artery** and **radial nerve** and the origin of the **cephalic vein**.

## Little Finger Muscles

Muscles acting solely on the anterior little finger include:

- **Opponens digiti minimi** (opposition)
- **Flexor digiti minimi brevis** (flexion at metacarpophalangeal joint)
- **Abductor digiti minimi**: (abduction)

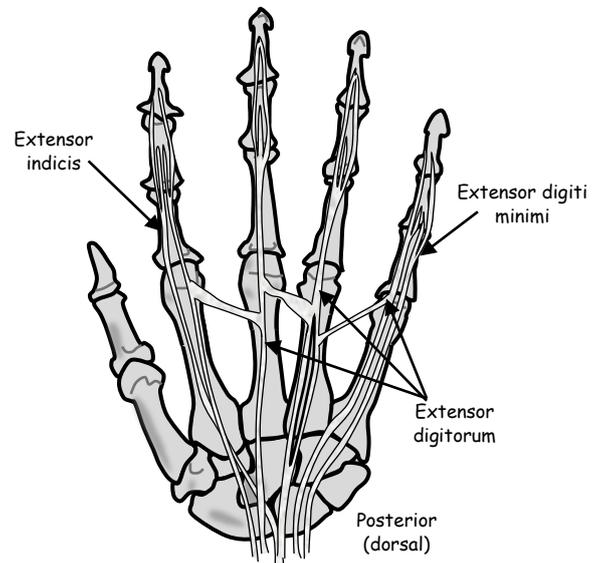
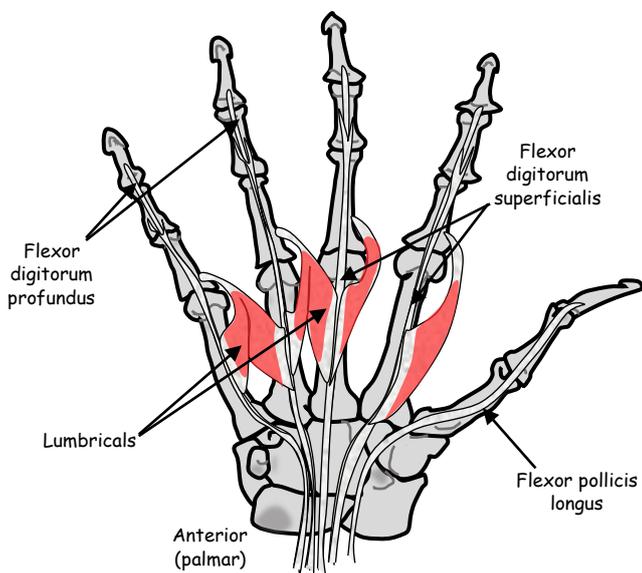
Muscles acting solely on the posterior little finger include:

- **Extensor digiti minimi** (extension of all joints)

The anterior hypothenar eminence is formed by opponens digiti minimi, flexor digiti minimi brevis and abductor digiti minimi.

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## Long Flexors and Extensors

The long flexors of the anterior hand are:

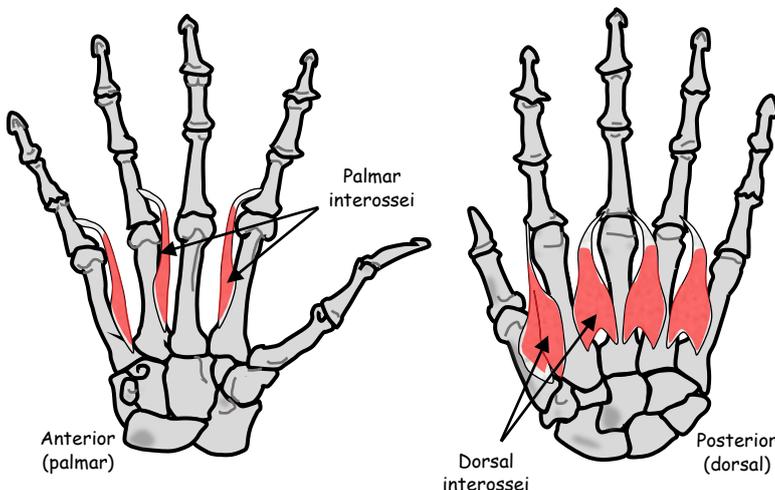
- **Flexor digitorum profundus** (flexion of every joint in all four fingers)
- **Flexor digitorum superficialis** (flexion of all but the most distal joint in all four fingers)

Superficialis splits around the level of the metacarpal heads to insert either side of profundus.

The **Lumbrical** muscles originate from the flexor digitorum profundus tendons and act to flex at metacarpophalangeal joints and extend at proximal and distal interphalangeal joints of all four fingers.

The long extensors of the posterior hand are:

- **Extensor indicis** (extension of all joints of the index finger)
- **Extensor digitorum** (extension of all joints of all four fingers)



## Interossei and Others

Between the metacarpal bones sit two unique groups of muscles:

- **Palmar interossei** (flexion and adduction at metacarpophalangeal joints and extension at proximal and distal interphalangeal joints of the 2<sup>nd</sup>, 4<sup>th</sup> and 5<sup>th</sup> digits)
- **Dorsal interossei** (flexion and abduction at metacarpophalangeal joints and extension at proximal and distal interphalangeal joints of all of the fingers)

Finally, on the anterior hand are **palmaris longus** and **palmaris brevis**, which act to deepen the grip.

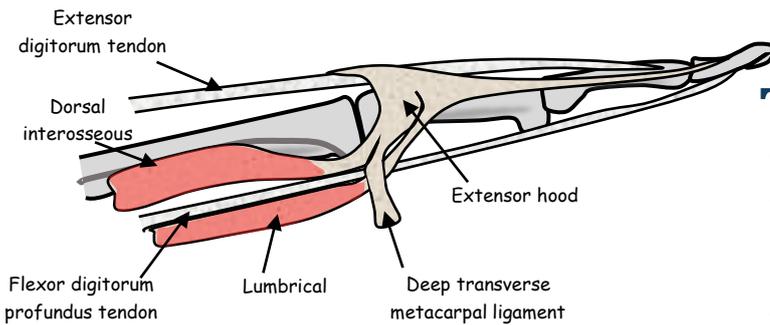
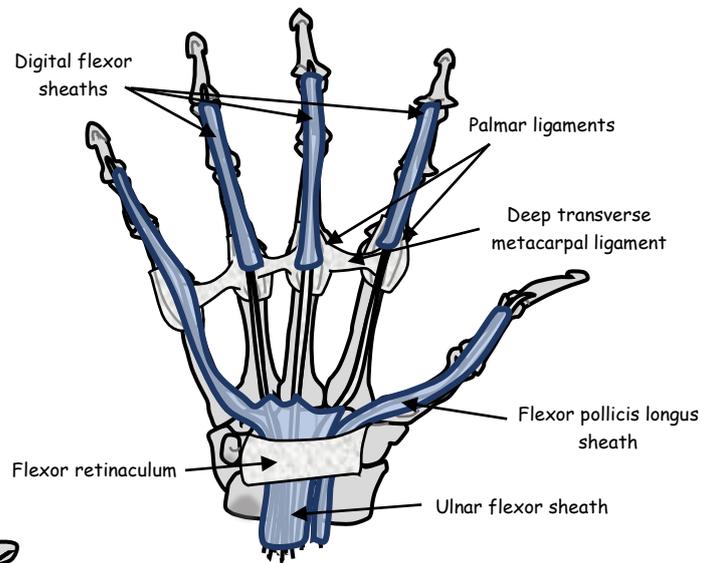
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## Tendon Sheaths and Ligaments

The metacarpophalangeal joints are reinforced anteriorly by the **palmar ligaments** (sometimes called volar). These are joined together by the **deep transverse metacarpal ligament**, which ensures the four fingers (not the thumb) work as a unified unit. **Flexor retinaculum** prevents bowstringing at the wrist.

The long tendons are lubricated by synovial sheaths, which can be divided into **digital flexor sheaths**, the **ulnar flexor sheath** and the **flexor pollicis longus sheath**.



## The Extensor Hood

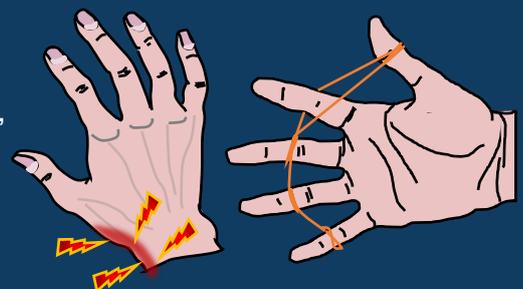
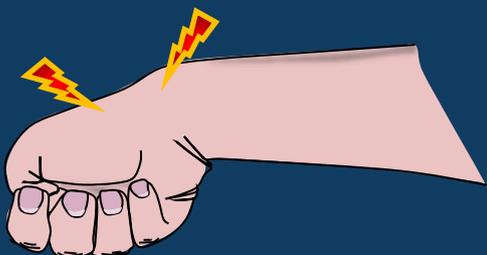
This is a structure formed by an expansion of the extensor digitorum and extensor pollicis longus tendons. It attaches to the distal phalanx, intermediate phalanx and the deep transverse metacarpal ligament.

Muscles inserting into the extensor hood include extensor digiti minimi, extensor indicis, extensor pollicis brevis, both interossei, the lumbricals, abductor digiti minimi, adductor pollicis and abductor pollicis brevis.

The extensor hood is the sole connection between the flexor and extensor compartments of the hand.

## Case Vignette

The **first extensor compartment of the wrist** contains the extensor pollicis brevis and abductor pollicis longus tendons, which share a synovial sheath. Inflammation of this compartment is known as **De Quervain's tenosynovitis**. This condition is most common in recently pregnant women aged 30-50 and is usually caused by **repetitive strain**.



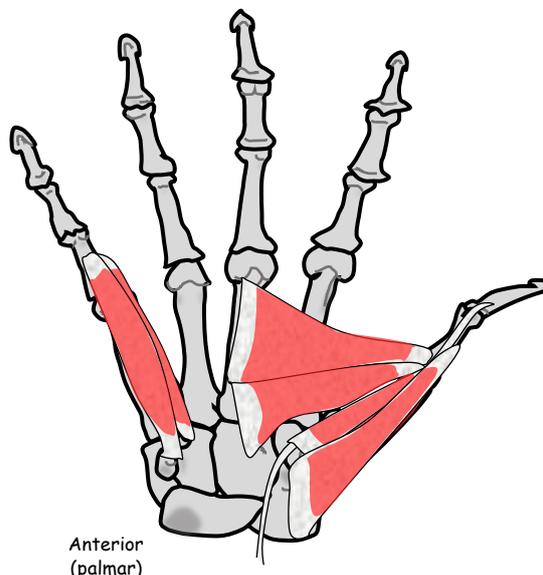
It can be diagnosed clinically with **Finkelstein's test** and is usually treated with **lifestyle changes** and **gentle exercises**, with splinting, steroid injections and surgery reserved for more serious cases.

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## Test Yourself!

**Question 1:** Label the muscles acting on the thumb and little finger from an anterior view.



**Question 2:** What are the actions of the palmar and dorsal interossei?

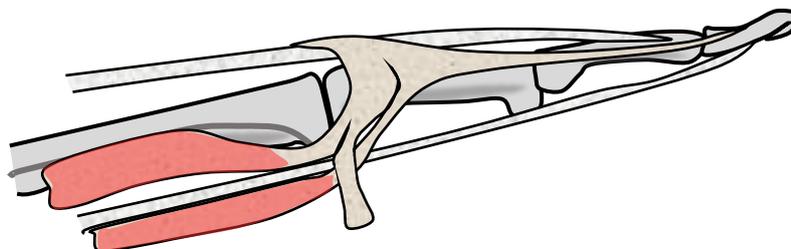
**Question 3:** What is the purpose of the extensor hood?

**Question 4:** Inflammation of the ulnar flexor sheath would impact what movements of the hand?

**Question 5:** What muscles form the thenar eminence?

**Question 6:** Why does the deep metacarpal ligament not insert into the thumb?

**Question 7:** Label the structures of the extensor sheath.



**Answers:** 1. See page two. 2. Palmar interossei flex and adduct at the metacarpophalangeal joints and extend at the proximal and distal interphalangeal joints of the 2<sup>nd</sup>, 4<sup>th</sup> and 5<sup>th</sup> digits, whilst dorsal interossei flex and abduct at metacarpophalangeal joints and extend at proximal and distal interphalangeal joints of all of the fingers. 3. To connect the flexor and extensor compartment and allow intricate hand movements, for example the upstroke in the letter 't'. 4. Flexion of all four fingers (little finger in particular) and flexion of the wrist. 5. Muscle bellies of flexor pollicis brevis, opponens pollicis and abductor pollicis brevis. 6. To allow the thumb to move freely and independently. 7. See page 4.