



Compartments of the Forearm

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OUTLINE

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|---------------------------------|-----------------|
| I. Introduction | III. References |
| II. Compartments of the Forearm | |
| A. Anterior Compartment | |
| B. Posterior Compartment | |

LEARNING OBJECTIVES

At the end of the lecture, the student should be able to:

- ✓ Identify and describe the muscles of the anterior and posterior compartment of the forearm
- ✓ Differentiate the functional roles of anterior and posterior groups

I. INTRODUCTION

- The **forearm** (the distal part of the upper limb between the elbow and wrist) relies on two primary parallel bones and a specialized connective tissue structure to facilitate complex movement and load distribution.
 - **Radius:** Located on the lateral (thumb) side of the forearm, this long bone plays a pivotal role in wrist movement and enables rotation of the forearm during pronation (palm down) and supination (palm up).
 - **Ulna:** Positioned on the medial (little finger) side, the ulna is longer than the radius and forms the primary hinge joint of the elbow with the humerus, providing structural stability.
 - **Interosseous Membrane:** A broad, fibrous sheet of connective tissue spanning the gap between the internal borders of the radius and ulna. It acts as a flexible joint (syndesmosis) that holds the bones together, transfers mechanical forces from the radius to the ulna, and serves as an attachment site for deep forearm muscles.

II. COMPARTMENTS OF THE FOREARM

- Anterior Compartment
 - Flexors and pronators of the forearm
 - Median nerve (except for flexor carpi ulnaris because of 2 innervations)
- Posterior Compartment
 - Extensors and supinators of the forearm
 - Radial nerve

! THUMB as reference

- In a normal position, thumb is in lateral position
- Anything medial to the thumb is the anterior compartment

A. ANTERIOR COMPARTMENT

- All tendons of most flexor groups of muscles can be seen in anterior compartment of the wrist that are held in place by palmar carpal ligament
- Flexor retinaculum or the transverse carpal ligament
 - Thickenings of the antebrachial fascia
- Divided into 3 Layers
 - Superficial
 - Intermediate
 - Deep

! Elbow Joint Crossing

- Among all of the muscles of the anterior compartment, only the superficial layer and the intermediate layer crosses the elbow joint
- The deep layer doesn't cross the elbow joint

Superficial Layer

- Pronator teres
- Flexor carpi radialis
- Palmaris longus
- Flexor carpi ulnaris
 - These are all attached proximally by the common flexor tendon to the medial epicondyle of the humerus (aka **common flexor attachment**)

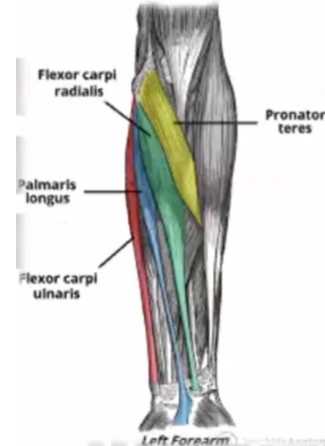


Figure 1. Superficial Layer of Forearm

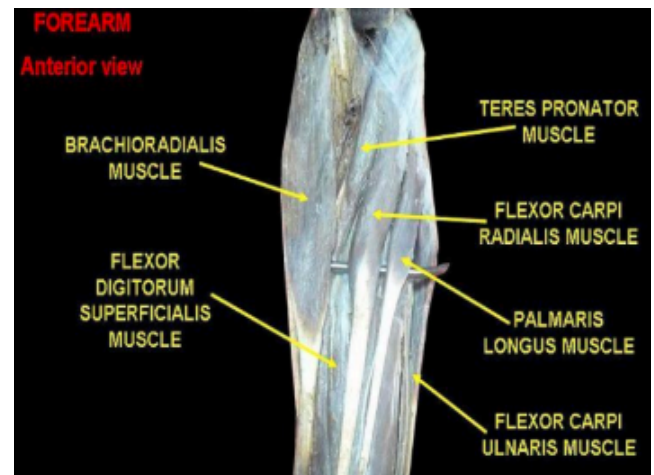


Figure 2. Parts of the Superficial and Intermediate Layer of the Forearm

Table 1. PRONATOR TERES

Category	Description
ORIGIN (O)	Ulnar head: Coronoid Process
	Humeral head: Medial epicondyle of humerus
INSERTION (I)	Lateral surface of radius
INNERVATION (NI)	Median nerve
ACTION (A)	Pronates and flexes forearm
! TAKE NOTE	
• Among the superficial group, this is the most lateral and most superficial	
• It forms the medial boundary of the cubital fossa	

PRONATOR TERES TEST

- The patient's forearm is flexed at the elbow and pronated from the supine position against resistance provided by the

examiner. If acting normally, the muscle is prominent and can be palpated at the medial margin of the cubital fossa



Figure 3. Superficial Layer of Forearm

Table 2. FLEXOR CARPI RADIALIS	
Category	Description
O	Medial epicondyle of humerus
I	Base of 2nd metacarpal
NI	Median nerve
A	Flexes and abducts the hand
! TAKE NOTE - It is located medial to the pronator teres - When it produces flexion, it acts together with flexor carpi ulnaris - When it acts together with the extensor carpi radialis longus and brevis, it produces abduction of the wrist - When it contracts alone, it produces a combination of flexion and abduction of wrist enhance	

FLEXOR CARPI RADIALIS TEST

- The patient's forearm is flexed at the elbow and pronated from the supine position against resistance provided by the examiner. If acting normally, the muscle is prominent and can be palpated at the medial margin of the cubital fossa



Figure 4. Test for Flexor carpi radialis

Table 3. PALMARIS LONGUS	
Category	Description
O	Medial epicondyle of humerus
I	Distal half of flexor retinaculum and apex of palmar aponeurosis
NI	Median nerve
A	Flexes and tenses palm aponeurosis
! TAKE NOTE - Small fusiform muscle only - Sometimes absent in some cadavers - Has short belly and long cord-like tendon - When locating median nerve, this can be used as landmark because the median nerve travels parallel to the tendon of palmaris longus	

PALMARIS LONGUS TEST

- The wrist is flexed and the pads of the little finger and thumb are tightly pinched together. If present and acting normally, the tendon can be easily seen and palpated



Figure 5. Test for Palmaris longus

Table 4. FLEXOR CARPI ULNARIS	
Category	Description
O	Ulnar head: Olecranon and posterior border of ulna Humeral head: Medial epicondyle of humerus
I	Pisiform, Hook of hamate, 5th metacarpal
NI	Ulnar nerve
A	Flexes and adducts hand
! TAKE NOTE - If it acts with flexor carpi radialis, it flexes the wrist - If it acts with extensor carpi ulnaris, it adducts the wrist	

FLEXOR CARPI ULNARIS TEST

- Patient puts the posterior aspect of the forearm and hand on a flat table, and is then asked to flex the wrist against resistance while the examiner palpates the muscle and its tendon

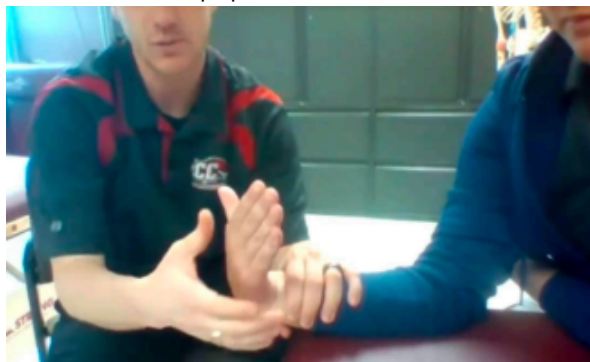


Figure 6. Test for Flexor carpi ulnaris

Intermediate Layer

- Flexor digitorum superficialis



Figure 7. Flexor digitorum superficialis

Table 5. FLEXOR DIGITORUM SUPERFICIALIS	
Category	Description
O	Humero-ulnar head: Medial epicondyle Radial head: Superior half of anterior border
I	Shafts of middle phalanges of medial four digits
NI	Median nerve
A	Flexes middle phalanges of proximal IP joints of middle four digits
! TAKE NOTE This can be seen when the two tendons of palmaris longus and flexor carpi radialis is removed	

FLEXOR DIGITORUM SUPERFICIALIS TEST

- One finger is flexed at the proximal interphalangeal joint against resistance and the other three fingers are held in an extended position to inactivate the flexor digitorum profundus

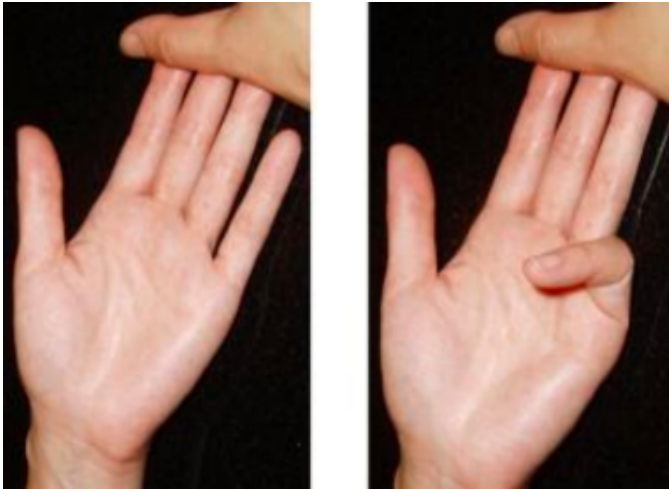


Figure 8. Test for Flexor digitorum superficialis

Deep Layer

- Flexor digitorum profundus
- Flexor pollicis longus
- Pronator quadratus
 - Once this is removed, radius ulna can be seen

- Digitum - muscles for digits (pointing, middle, & ring fingers)
- Pollicis - muscles for thumb
- Digit minimi - muscles for pinky finger

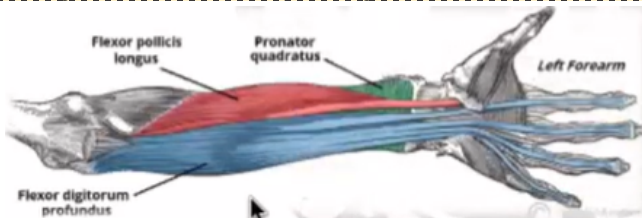


Figure 9. Parts of the Deep Layer of Anterior Compartment of the Forearm



Figure 10. Flexor digitorum profundus

Table 6. FLEXOR DIGITORUM PROFUNDUS	
Category	Description
O	Proximal three quarters of medial and anterior surfaces of ulna and interosseous membrane
I	Medial part: Base of distal phalanges of 4th and 5th digits Lateral part: Bases of distal phalanges of 2nd and 3rd digits
NI	Medial part: Ulnar nerve Lateral part: Median nerve
A	Flexes distal phalanges 4 and 5 at the distal IP joints
! TAKE NOTE The tendon of the index finger is separated going to the second digit	

FLEXOR DIGITORUM PROFUNDUS TEST

- The proximal interphalangeal joint is held in the extended position while the person attempts to flex the distal interphalangeal joint



Figure 11. Test for Flexor digitorum profundus



Figure 12. Flexor pollicis longus

Table 7. FLEXOR POLLICIS LONGUS	
Category	Description
O	Anterior surface of radius and interosseous membrane
I	Base of distal phalanx of thumb
NI	Median nerve
A	Flexes phalanges of first digit

FLEXOR POLLICIS LONGUS TEST

- The proximal phalanx of the thumb is held and the distal phalanx is flexed against resistance



Figure 13. Test for Flexor pollicis longus

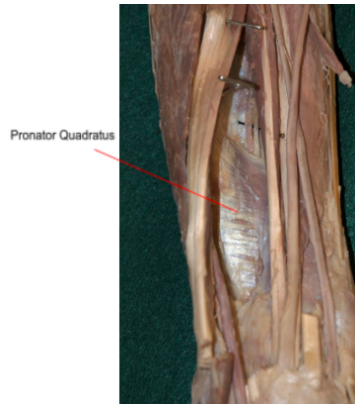


Figure 13. Pronator quadratus

Table 8. PRONATOR QUADRATUS	
Category	Description
O	Distal quarter of anterior surface of ulna
I	Distal quarter of anterior surface of radius
NI	Median nerve
A	Pronates forearm
! TAKE NOTE - A quadrangular type of muscle - The deepest muscle of the forearm - The only muscle attached to the ulna and radius - Prime mover of pronation of the forearm	

B. POSTERIOR COMPARTMENT

- Extensors and supinators of the forearm
- Radial nerve
- Extensor retinaculum
 - helps the tendons of the muscles in place in the wrist area on the posterior part
- Divided into 3 functional groups (Physiologically)
 - Muscles that extend and abduct or adduct the hand at the wrist joint:
 - Extensor carpi radialis longus
 - Extensor carpi radialis brevis
 - Extensor carpi ulnaris
 - Muscles that extend the medial four fingers
 - Extensor digitorum
 - Extensor indicis (index finger)
 - Extensor digiti minimi (fifth digit or pinky finger)
 - Muscles that extend or abduct the thumb
 - Abductor pollicis longus
 - Extensor pollicis brevis
 - Extensor pollicis longus
- Divided into 2 layers
 - Superficial**
 - Brachioradialis (almost seen in the anterior side of the forearm)
 - Extensor carpi radialis longus
 - These two muscles mentioned above are proximal attachment is to the lateral supracondylar ridge
 - Extensor carpi radialis brevis

- Extensor digitorum
- Extensor digiti minimi
- Extensor carpi ulnaris
 - The last four muscles mentioned are attached by the common extensor tendon to the lateral epicondyle

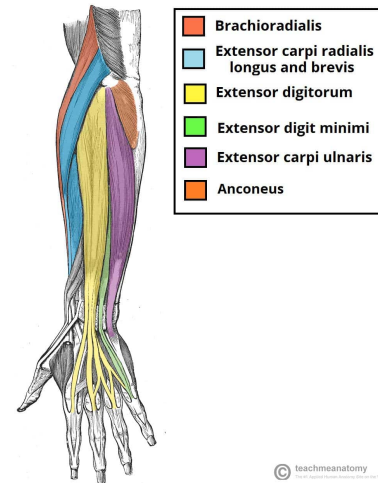


Figure 14. Superficial muscles

- Deep Layer:**
 - Supinator
 - Abductor pollicis longus
 - Extensor pollicis longus
 - Extensor pollicis brevis
 - these 3 muscles act on the thumb because of the word pollicis
 - Extensor indicis
 - This acts on the index finger or the second digit

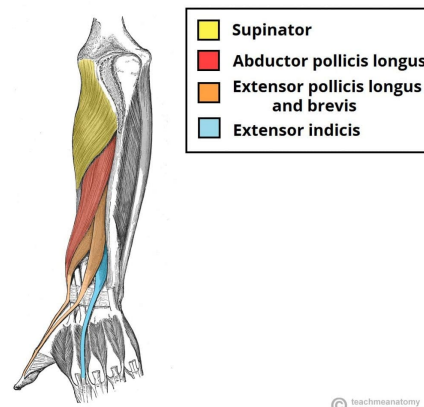


Figure 14. Deep muscles

SUPERFICIAL LAYER

1. Brachioradialis



Figure 15. Brachioradialis

O:	Proximal 2/3 of the supra-condylar ridge of humerus
I:	Lateral surface of distal end of radius proximal to styloid process
NI:	Radial nerve
A:	Weak flexion of the forearm

Test for brachioradialis:

- The elbow joint is flexed against resistance with the forearm in the midprone position. If the brachioradialis is acting normally, the muscle can be seen and palpated.



Figure 16. Test for Brachioradialis

2. Extensor Carpi Radialis Longus



Figure 17. ECRL

O:	Lateral supracondylar ridge of humerus
I	Dorsal aspect of base of 2nd metacarpal
NI:	Radial nerve
A	Extend and abduct hand at wrist joint, active during fist clenching.

Test for extensor carpi radialis longus:

- The wrist is extended and abducted with the forearm pronated. If acting normally, the muscle can be palpated interposterior to the lateral side of the elbow. Its tendon can be palpated proximal to the wrist.



Figure 18. Test for ECRL

3. Extensor Carpi Radialis Brevis



Figure 19. ECRB

O:	Lateral epicondyle of humerus
I	Dorsal aspect of base of 3rd metacarpal
NI:	Radial nerve
A	Extend and abduct hand at wrist joint.

4. Extensor Digitorum



Figure 20. Extensor Digitorum

O:	Lateral supracondylar ridge of humerus
I	Extensor expansions of medial four digits
NI:	Radial nerve
A	Extends medial four digits primarily at MCP joints, secondarily at IP joints

Test for extensor digitorum:

- The forearm is pronated and the fingers are extended. The person attempts to keep the digits extended at the metacarpophalangeal joints as the examiner exerts pressure on the proximal phalanges by attempting to flex them. If acting normally, the extensor digitorum can be palpated in the forearm, and its tendons can be seen and palpated on the dorsum of the hand



Figure 21. Extensor Digitorum

5. Extensor Digiti Minimi

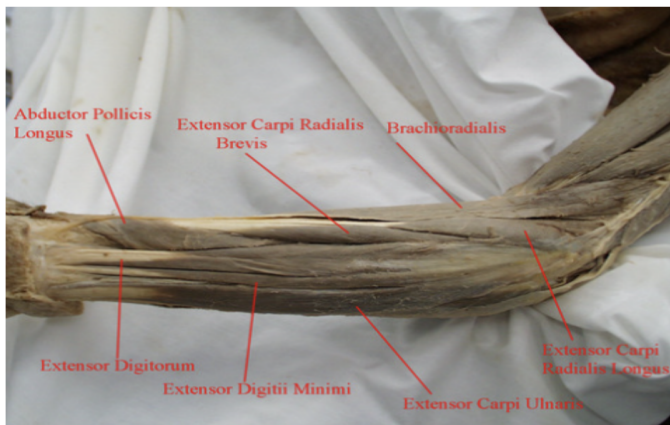


Figure 22. Extensor Digiti Minimi

O:	Lateral epicondyle of humerus
I:	Extensor expansion of 5th digit
NI:	Radial nerve
A	Extends 5th digit primarily at MCP joints, secondarily at IP joints.

Test for extensor digiti minimi:

- The little finger is extended against resistance while holding digits 2-4 flexed at the metacarpophalangeal joints



Figure 23. Test for Extensor Digiti Minimi

6. Extensor Carpi Ulnaris



Figure 24. Extensor Carpi Ulnaris

O:	Lateral epicondyle of humerus; posterior border of ulna via shared aponeurosis
I:	Dorsal aspect of base of 5th digit
NI:	Radial nerve
A	Extends and adducts hand and wrist joint, active during fist clenching.

Test for extensor carpi ulnaris:

- The forearm is pronated and the fingers are extended. The extended wrist is then adducted against resistance. If acting normally, the muscle can be seen and palpated in the proximal part of the forearm and its tendon can be felt proximal to the head of the ulna.



Figure 25. Test for ECU

DEEP LAYER

1. Supinator



Figure 26. Supinator

O:	Lateral epicondyle; radial collateral and annular ligaments; supinator fossa; crest of ulna
I:	Lateral, posterior and anterior surfaces of proximal third of radius
NI:	Radial nerve
A	Supinates forearm; rotates radius to turn palm anteriorly and superiorly.

2. Extensor Indicis

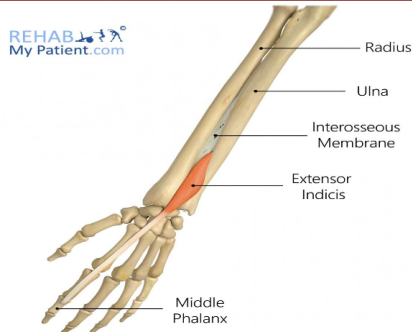


Figure 27. Extensor Indicis

O:	Posterior surface of distal third of ulna and interosseous membrane
I:	Extensor expansion of 2nd digit
NI:	Radial nerve
A	Extends 2nd digit; helps extend hand at wrist.

3. Abductor Pollicis Longus

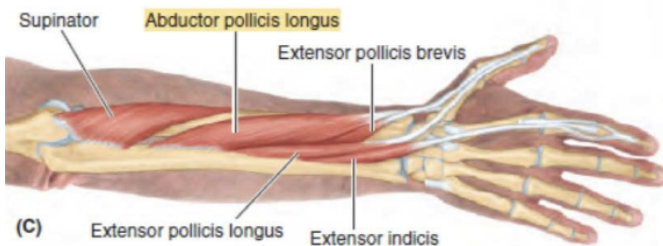


Figure 28. APL

O:	Posterior surface of proximal halves of ulna, radius and interosseous membrane
I:	Base of 1st metacarpal
NI:	Radial nerve
A	Abducts the thumb and extends it at the carpometacarpal joint.

Test for abductor pollicis longus:

- The thumb is abducted against resistance at the metacarpophalangeal joint. If acting normally, its tendon can be seen and palpated at the lateral side of the anatomical snuff box and on the lateral side of the adjacent extensor pollicis brevis tendon.

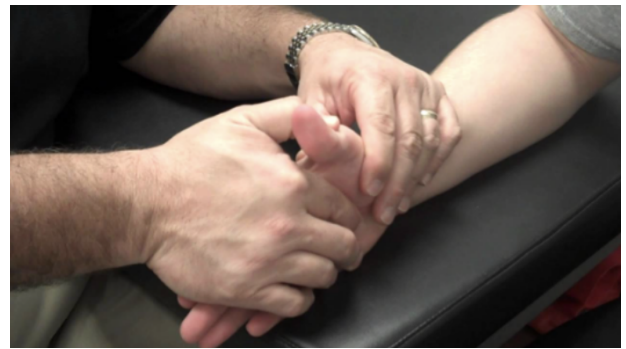


Figure 29. Test for Abductor Pollicis Longus

4. Extensor Pollicis Brevis

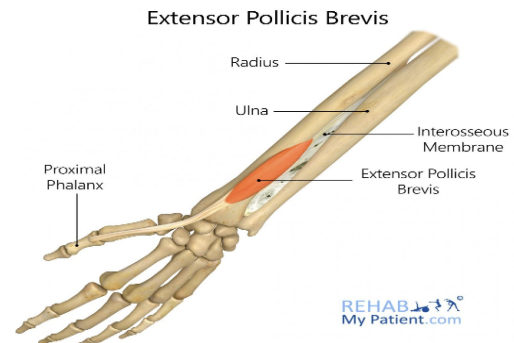


Figure 30. Extensor Pollicis Brevis

O:	Posterior surface of distal third of radius and interosseous membrane
I:	Dorsal aspect of base of proximal phalanx of thumb
NI:	Radial nerve
A	Extends proximal phalanx of thumb at metacarpophalangeal; extends carpometacarpal joint

Test for extensor pollicis brevis:

- The thumb is extended against resistance at the metacarpophalangeal joint. If the EPB is acting normally, the tendon of the muscle can be seen and palpated at the lateral side of the anatomical snuff box and on the medial side of the adjacent APL tendon.

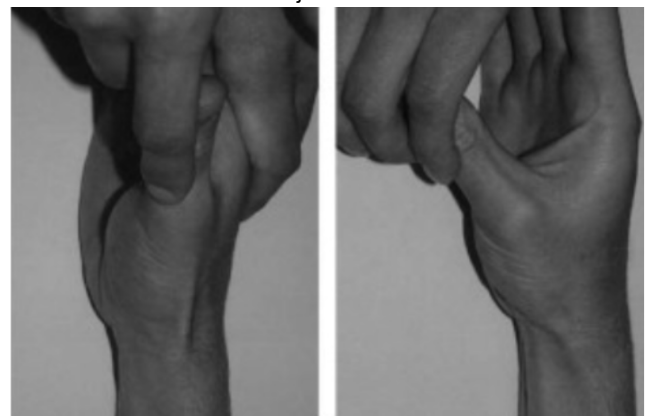


Figure 31. Test for Extensor Pollicis Brevis

5. Extensor Pollicis Longus



Figure 32. EPL

O:	Posterior surface of middle third of ulna and interosseous membrane
I:	Dorsal aspect of base of distal phalanx of thumb
NI:	Radial nerve
A	Extends distal phalanx of thumb at IP joint; extends metacarpophalangeal and carpometacarpal joints

Test for extensor pollicis longus;

- The thumb is extended against resistance at the interphalangeal joint. If the EPL is acting normally, the tendon of the muscle can be seen and palpated on the medial side of the anatomical snuff box.

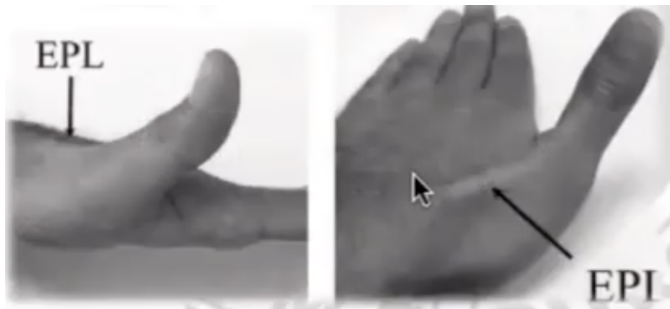


Figure 34. Test for EPL

ANATOMICAL SNUFF BOX

- Boundaries:
 - Anterior:
 - APL tendon
 - EBP tendon
 - Posterior:
 - EPL tendon

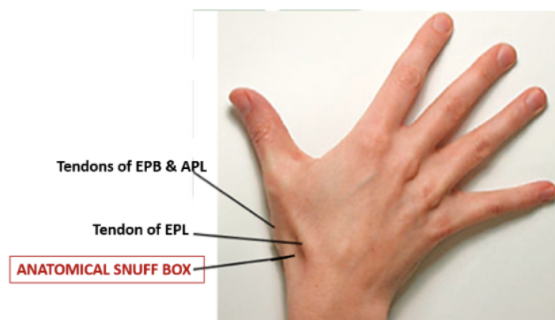


Figure 35. Anatomical Snuff Box

REFERENCES

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- Moore, (2023), Clinically Oriented Anatomy 9th Edition
- GA Trans (2025)