



AL MUSTAQBAL UNIVERSITY

College of Medicine / First Year



ANATOMY

(L7) Arm, Forearm, and Hand

Assist Prof. Dr. Abdulhusein Mizhir Almaamuri



Learning Objectives

By the end of this lecture, first-year medical students should be able to:

- 1. Define** osseofascial compartments and explain their anatomical basis in the upper limb.
- 2. Describe** the osseofascial compartments of the arm, forearm, and hand.
- 3. Identify** the boundaries of each compartment using bones, deep fascia, and intermuscular septa.
- 4. List** the muscles contained within each compartment of the upper limb.
- 5. State** the nerve supply of each compartment and correlate it with muscle function.
- 6. Outline** the main blood supply associated with each compartment.
- 7. Explain** the functional significance of compartmental organization (flexion, extension, pronation, supination, fine movements).
- 8. Describe** the anatomical boundaries and contents of the cubital fossa.
- 9. Correlate** anatomical knowledge with common clinical conditions such as compartment syndrome, supracondylar fracture, and Volkmann's ischemic contracture.
- 10. Apply** compartmental anatomy to basic clinical and examination scenarios in first-year medical assessments

Osseofascial Compartments of the Upper Limb

1. Introduction

The **osseofascial compartments** of the upper limb are anatomical spaces formed by **bones (osseous structures), deep fascia, and intermuscular septa**. These compartments group muscles with similar **functions, nerve supply, and vascular patterns**.

The compartments are clinically important because increased pressure within them can lead to **compartment syndrome**, compromising neurovascular structures.

2. Arm (Brachium): The muscles of the arm are organized in **two** osseofascial compartments, **anterior and posterior**, by the **medial and lateral intermuscular septa**, which extend from the deep fascia to the humerus. The muscles influence the shoulder and/or elbow joints, with the anterior compartment muscles acting mainly as flexors and the posterior compartment muscle producing mainly extension. **The musculocutaneous nerve** supplies the entire anterior compartment, whereas the **radial nerve** innervates the posterior compartment.

A. Anterior (Flexor) Compartment of the Arm Boundaries

Anterior: Deep fascia of the arm

Posterior: Humerus and intermuscular septa

Medial & Lateral: Intermuscular septa

Muscles

Biceps brachii: is a powerful flexor of the elbow joint and a weak flexor of the shoulder joint. Additionally, the biceps brachii is a powerful supinator, especially during supination against resistance.

Brachialis

Coracobrachialis

Nerve Supply

Musculocutaneous nerve

Blood Supply

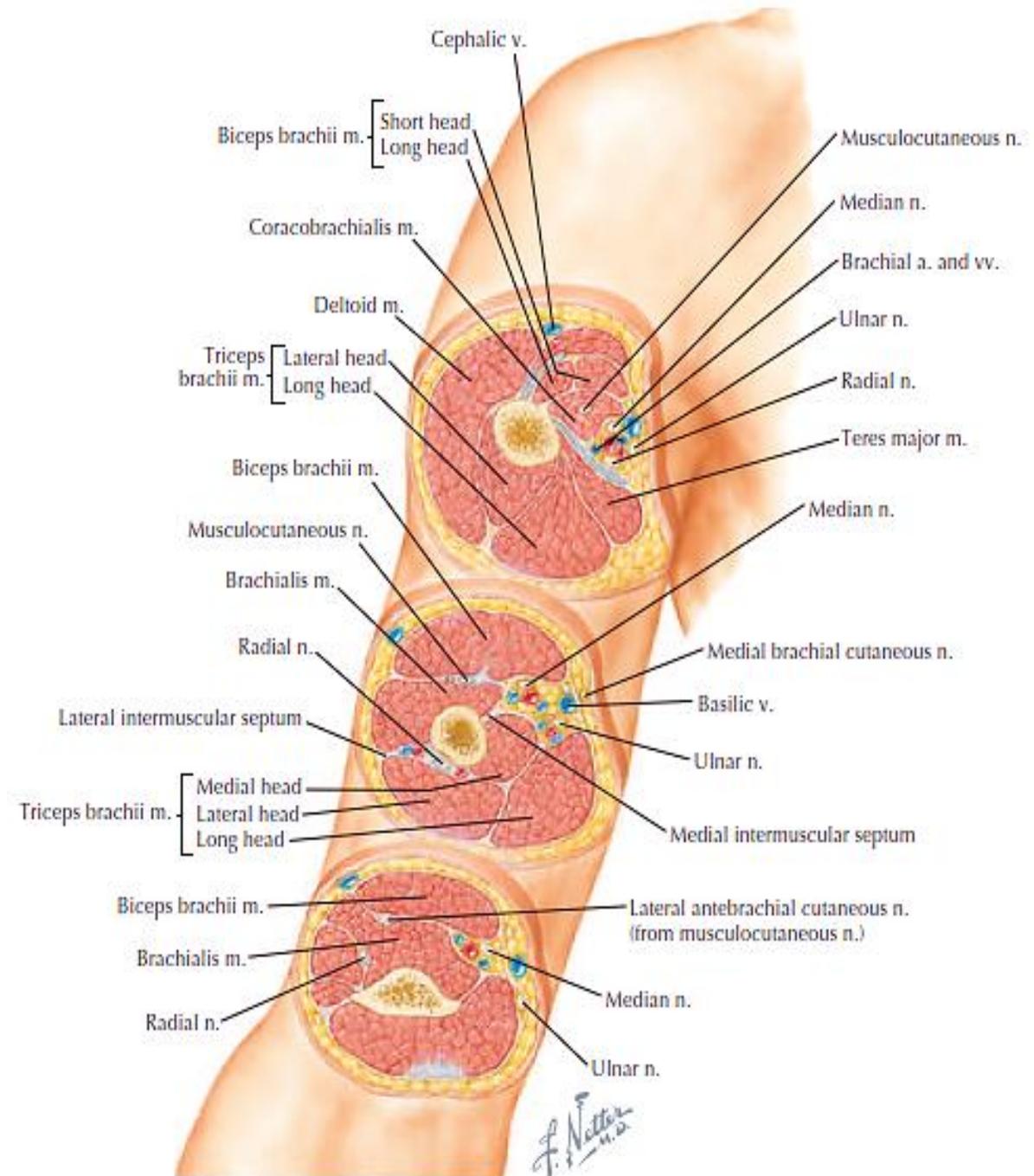
Brachial artery

Function

Flexion of the elbow

Supination of the forearm

Weak flexion of the shoulder



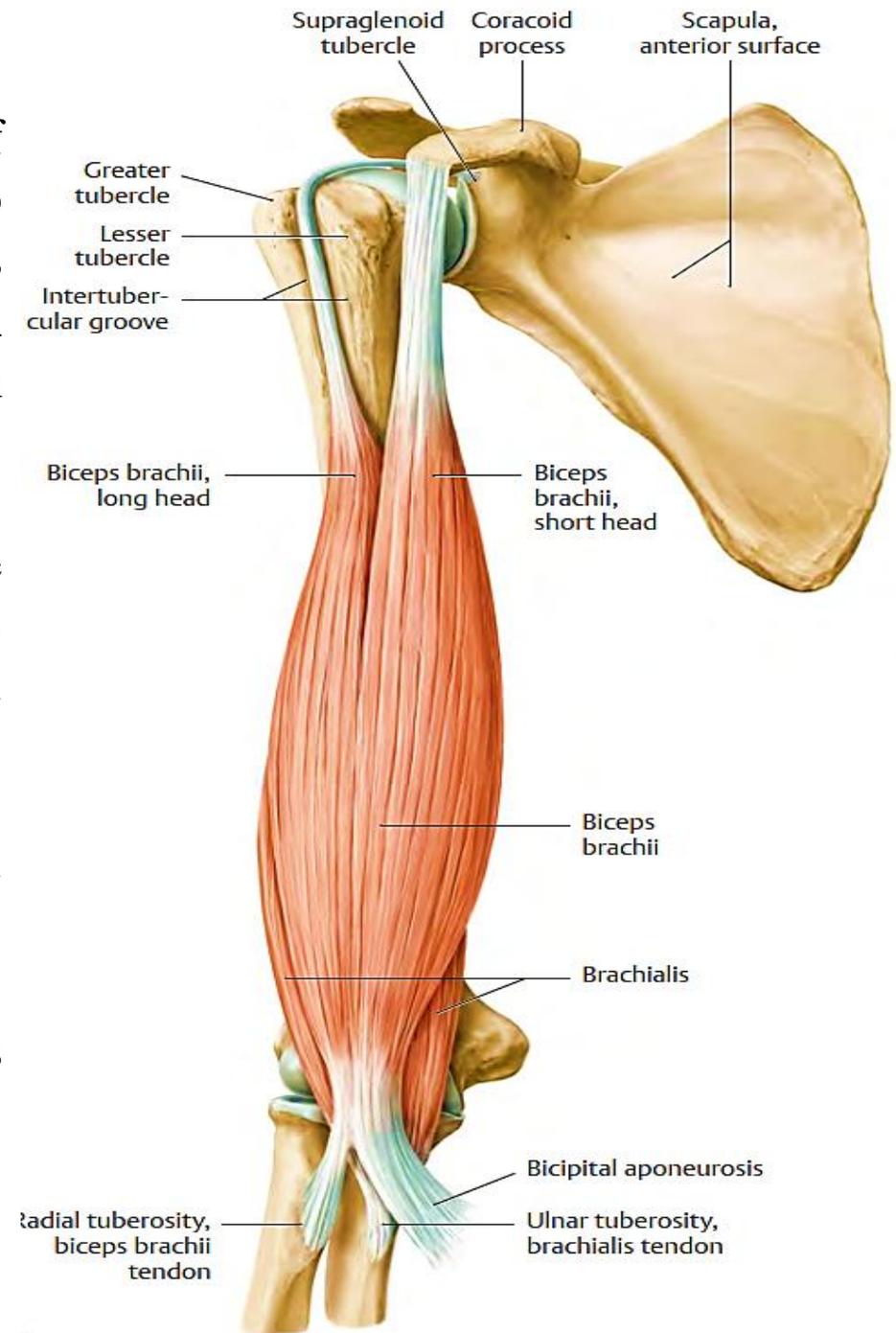
Biceps Brachii

The biceps brachii is a two-headed muscle. Although the majority of the muscle mass is located **anteriorly** to the [humerus](#), it has no attachment to the bone itself. As the tendon of biceps brachii enters the forearm, a connective tissue sheet is given off, the **bicipital aponeurosis**. This forms the roof of the [cubital fossa](#) and blends with the deep fascia of the anterior forearm.

- Attachments:** Long head originates from the supraglenoid tubercle of the [scapula](#), and the short head originates from the coracoid process of the scapula. Both heads insert distally into the radial tuberosity and the fascia of the forearm via the bicipital aponeurosis.

- Function:** Supination of the forearm. It also flexes the arm at the elbow and at the shoulder.

- Innervation:** Musculocutaneous nerve. The bicep tendon reflex tests spinal cord segment C6.



Coracobrachialis

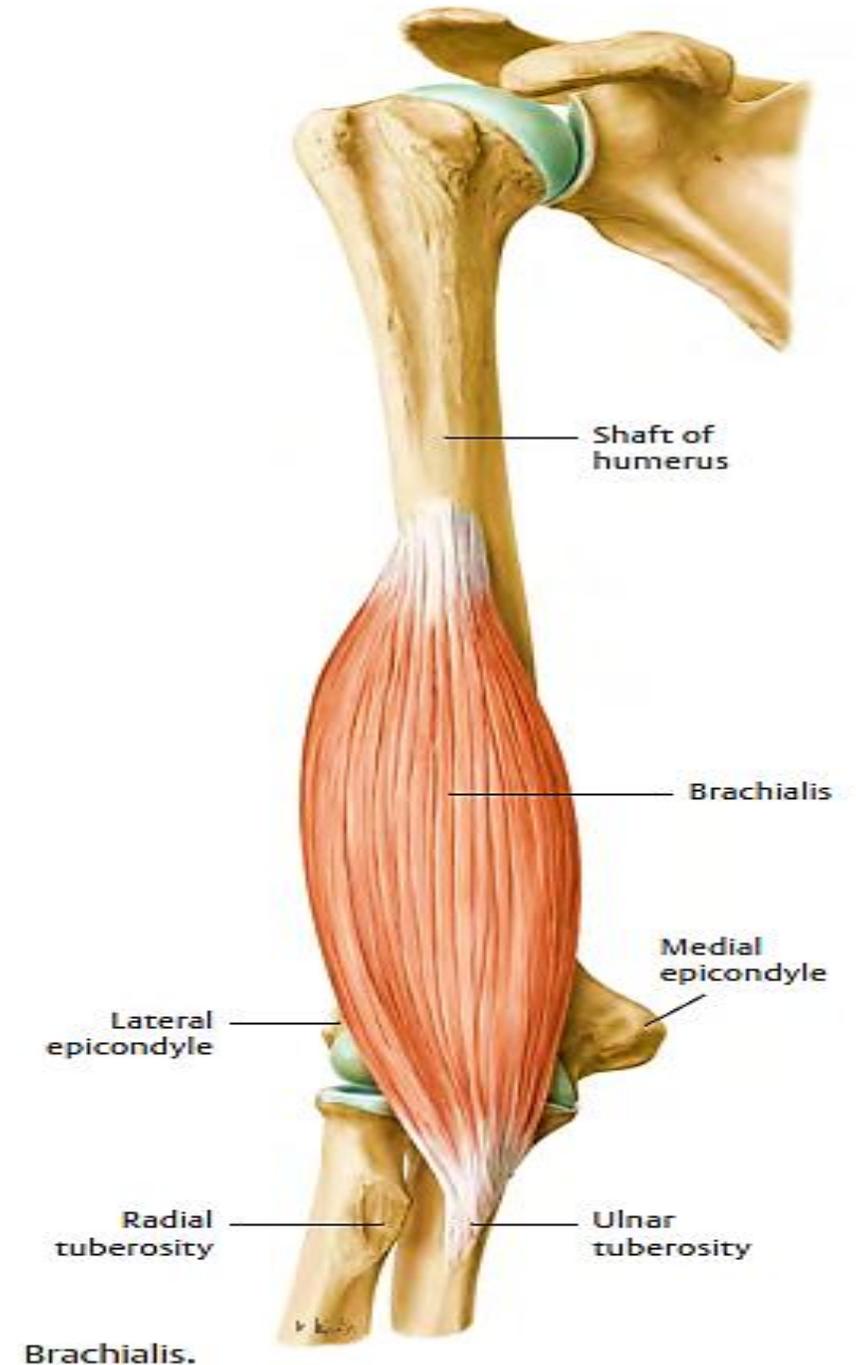
The coracobrachialis muscle lies deep to the biceps brachii in the arm.

- Attachments:** Originates from the coracoid process of the scapula. The muscle passes through the [axilla](#), and attaches the medial side of the humeral shaft, at the level of the deltoid tubercle.
- Function:** Flexion of the arm at the shoulder, and weak adduction.
- Innervation:** Musculocutaneous nerve.

Brachialis

The brachialis muscle lies deep to the biceps brachii, and is found more distally than the other muscles of the arm. It forms the floor of the cubital fossa.

- Attachments:** Originates from the medial and lateral surfaces of the humeral shaft and inserts into the [ulnar](#) tuberosity, just distal to the elbow joint.
- Function:** Flexion at the elbow.
- Innervation:** Musculocutaneous nerve, with contributions from the radial nerve.



Anterior Compartment Arm Muscles

MUSCLE	PROXIMAL ATTACHMENT (ORIGIN)	DISTAL ATTACHMENT (INSERTION)	INNERVATION	MAIN ACTIONS
Biceps brachii	<i>Short head:</i> apex of coracoid process of scapula <i>Long head:</i> supraglenoid tubercle of scapula	Tuberosity of radius and fascia of forearm via bicipital aponeurosis	Musculocutaneous nerve (C5-C6)	Supinates flexed forearm; flexes forearm at elbow
Brachialis	Distal half of anterior humerus	Coronoid process and tuberosity of ulna	Musculocutaneous nerve (C5-C6), and contribution from radial nerve (C7)	Flexes forearm at elbow in all positions
Coracobrachialis	Tip of coracoid process of scapula	Middle third of medial surface of humerus	Musculocutaneous nerve (C5-C7)	Helps to flex and adduct arm at shoulder

B. Posterior (Extensor) Compartment of the Arm

Boundaries

- **Anterior:** Humerus and intermuscular septa
- **Posterior:** Deep fascia of the arm

Muscles

- Triceps brachii
- Anconeus

Nerve Supply

- **Radial nerve**

Blood Supply

- **Profunda brachii artery**

Function

- Extension of the elbow
- Extension and adduction of the shoulder (long head of triceps)

Posterior Compartment Arm Muscles				
MUSCLE	PROXIMAL ATTACHMENT (ORIGIN)	DISTAL ATTACHMENT (INSERTION)	INNERVATION	MAIN ACTIONS
Triceps brachii	<i>Long head:</i> infraglenoid tubercle of scapula <i>Lateral head:</i> posterior surface of humerus <i>Medial head:</i> posterior surface of humerus, inferior to radial groove	Posterior surface of olecranon of ulna and fascia of forearm	Radial nerve (C6-C8)	Extends forearm at elbow; is chief extensor of elbow; steadies head of abducted humerus (long head)
Anconeus	Lateral epicondyle of humerus	Lateral surface of olecranon and superior part of posterior surface of ulna	Radial nerve (C6-C8)	Assists triceps in extending elbow; abducts ulna during pronation

Triceps Brachii

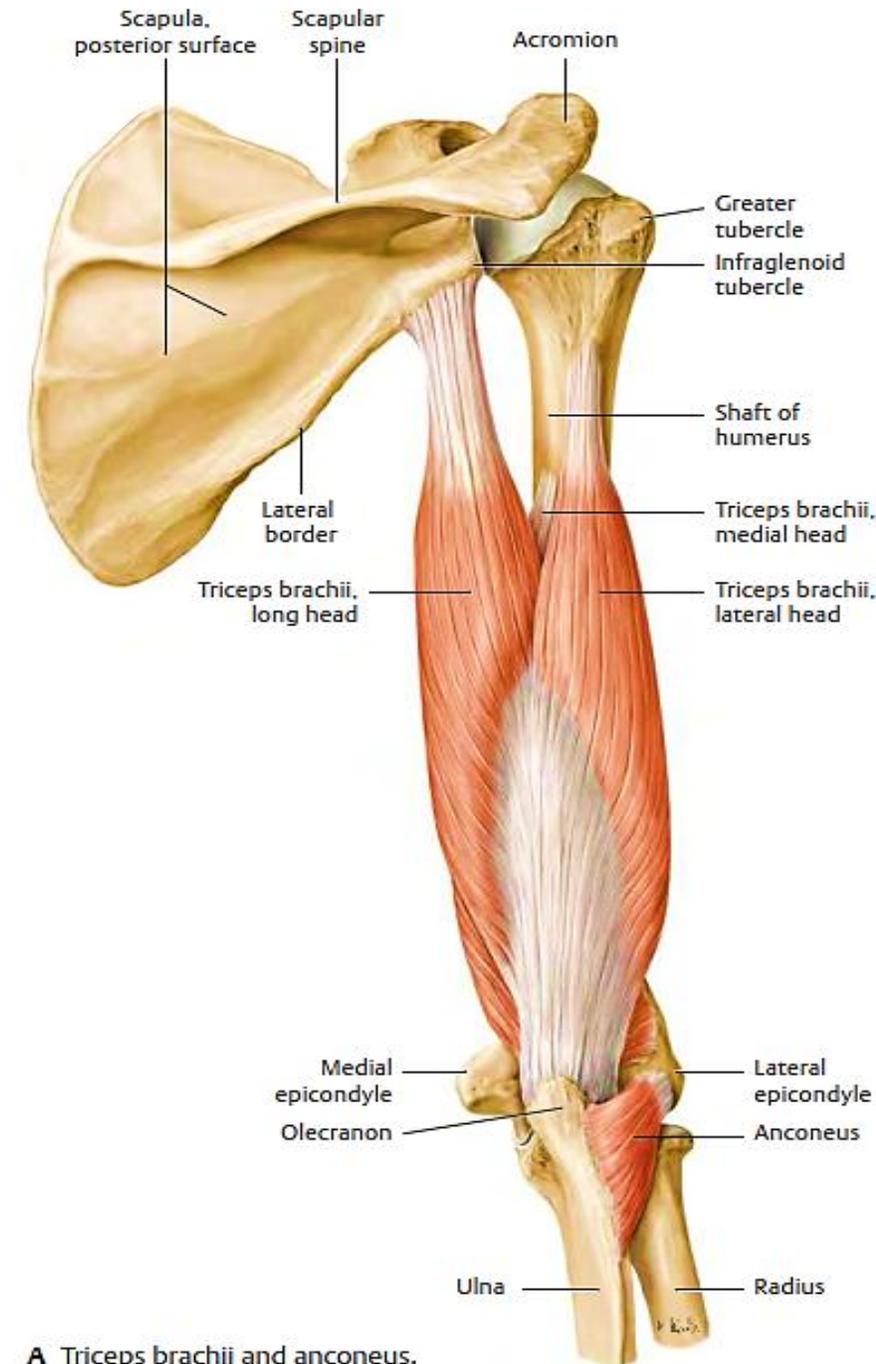
•Attachments:

- Long head originates from the infraglenoid tubercle of the scapula.
- Lateral head originates from the [humerus](#) (superior to the radial groove).
- Medial head originates from the humerus (inferior to the radial groove).
- Distally, the heads converge into one tendon which inserts onto the olecranon of the [ulna](#).

•**Function:** Extension of the arm at the elbow.

•**Innervation:** [Radial nerve](#). A tap on the triceps tendon tests spinal segment C7.

- *Note: In some individuals, the long head of the triceps brachii is innervated by the axillary nerve*



A Triceps brachii and anconeus.

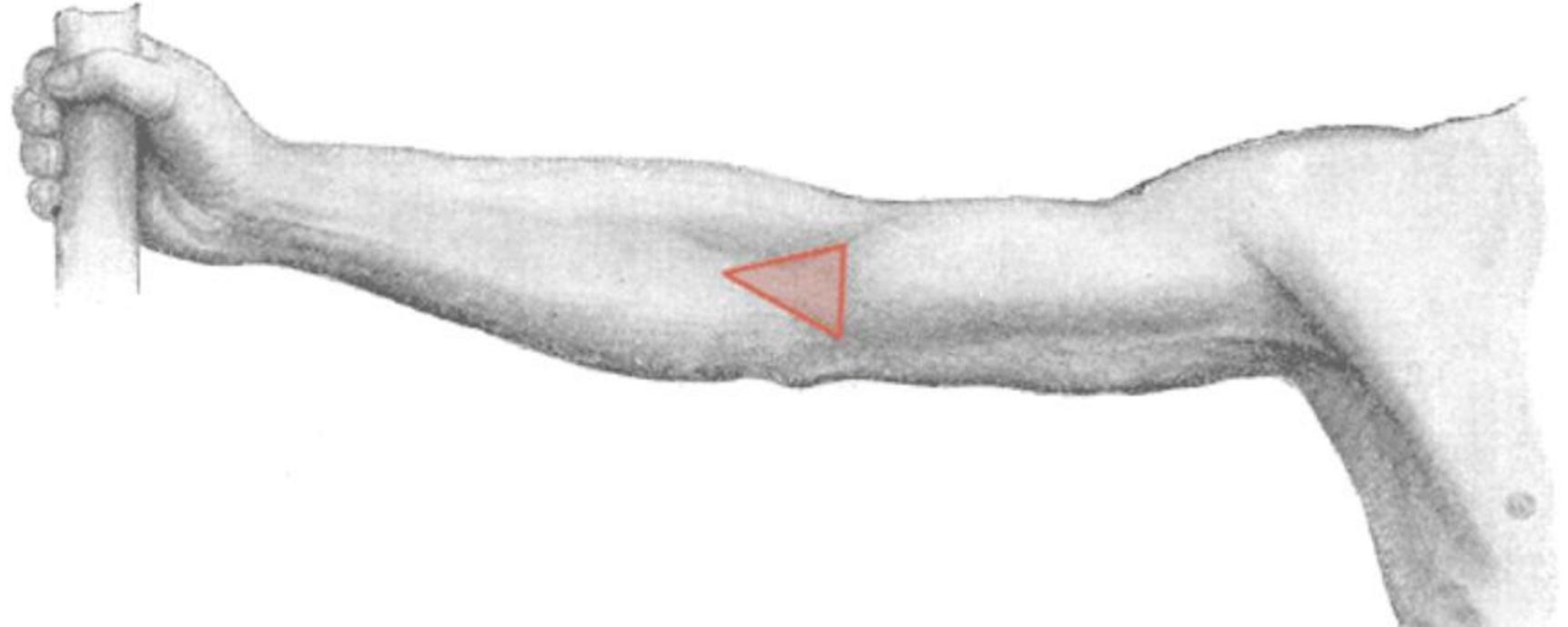
The **cubital (anticubital) fossa:**

is a triangular-shaped depression over the anterior aspect of the elbow joint. It represents an area of transition between the anatomical arm and the **forearm**, and conveys several important structures between these two areas

Borders

The **cubital fossa** is triangular in shape and consists of three borders, a roof, and a floor:

- **Lateral border** – medial border of the brachioradialis muscle.
- **Medial border** – lateral border of the pronator teres muscle.
- **Superior border** – horizontal line drawn between the epicondyles of the humerus.
- **Roof** – bicipital aponeurosis, fascia, subcutaneous fat and skin.
- **Floor** – brachialis (proximally) and supinator (distally)

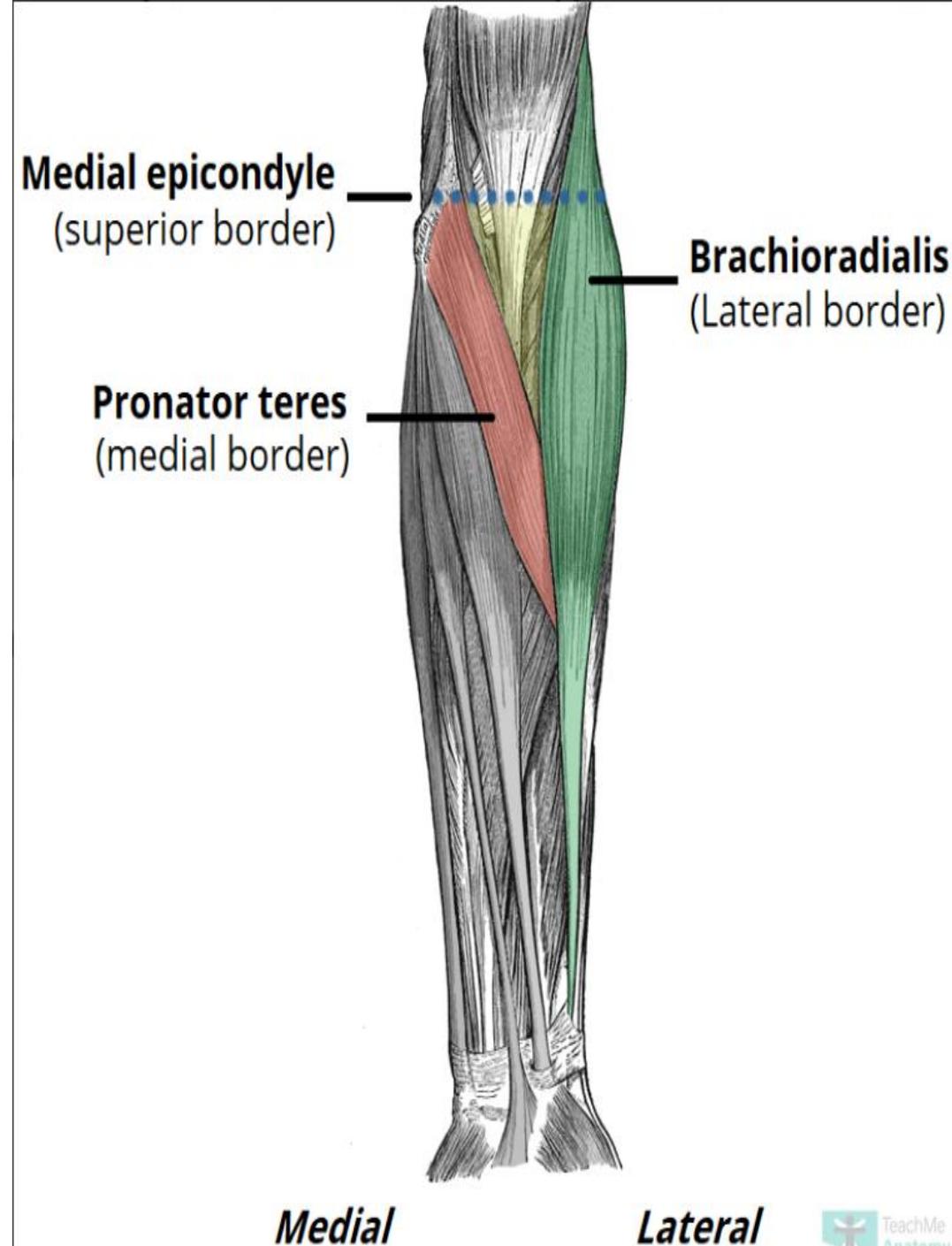


Contents

The cubital fossa is a **passageway** for structures to pass between the upper arm and forearm.

Its contents are (lateral to medial):

- **Radial nerve** – travels along the lateral border of the cubital fossa and divides into superficial and deep branches.
 - It has a motor and sensory function in the posterior forearm and hand.
- **Biceps tendon** – passes centrally through the cubital fossa and attaches the radial tuberosity (immediately distal to the radial neck).
 - It gives rise to the bicipital aponeurosis which contributes to the roof of the cubital fossa.
- **Brachial artery** – bifurcates into the radial and ulnar arteries at the apex of the cubital fossa.
 - The brachial pulse can be felt in the cubital fossa by palpating medial to the biceps tendon
- **Median nerve** – travels medially through the cubital fossa, exiting by passing between the two heads of the pronator teres.
 - It has a motor and sensory function in the anterior forearm and hand.



Brachial artery

Biceps brachii

Median nerve

Radial nerve

Pronator teres

Contents of the cubital fossa

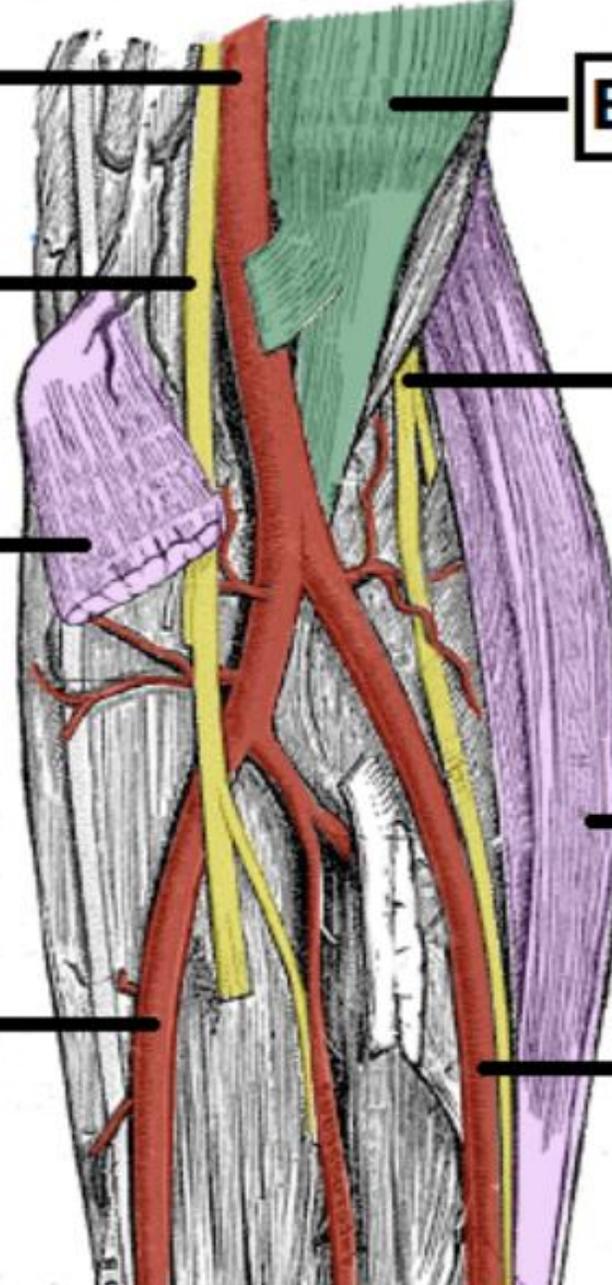
Brachioradialis

Ulnar artery

Radial artery

Medial

Lateral



Supracondylar Fracture

A **supracondylar fracture** is a fracture of the distal humerus. The fracture is typically transverse or oblique, and the most common mechanism of injury is falling on an outstretched hand. It is more common in children than adults.

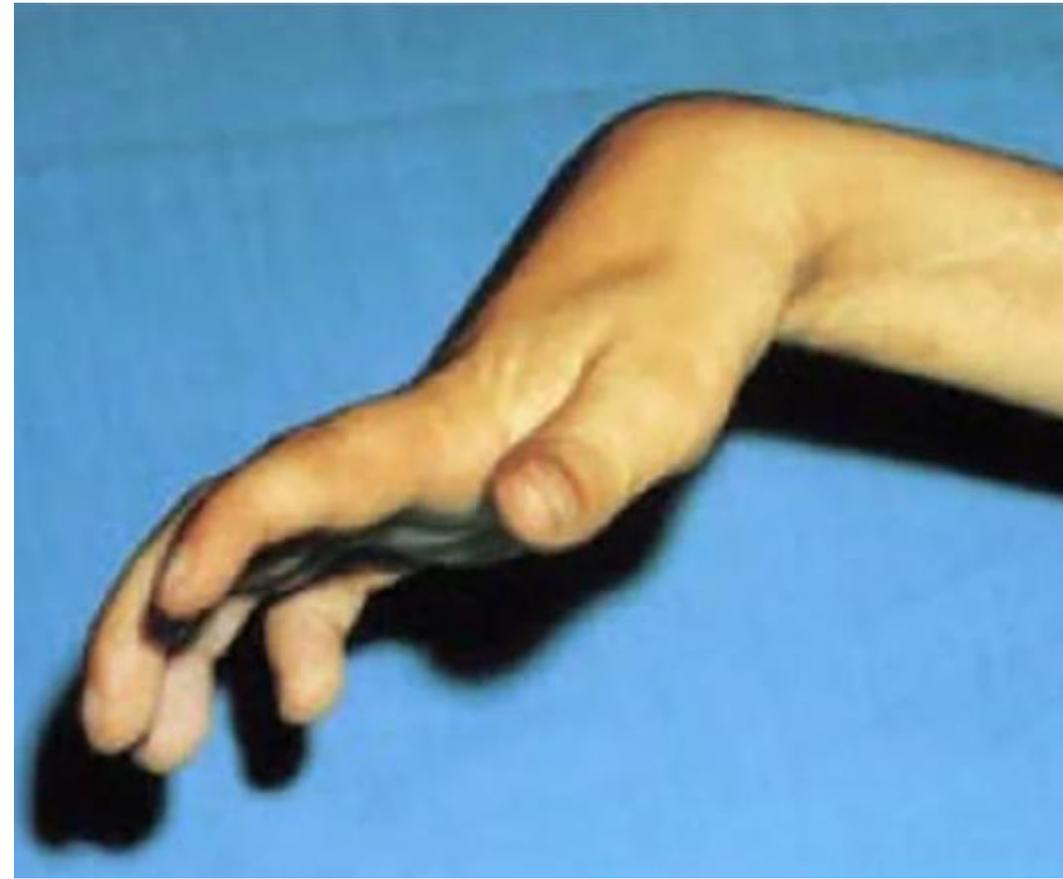
In this type of injury, the contents of the cubital fossa can be damaged – either directly, or by soft tissue swelling following the trauma. Damage to the brachial artery, if not repaired, can cause **Volkman's ischaemic contracture** (uncontrolled flexion of the hand) as the forearm flexor muscles become fibrotic and short.

There also can be damage to the **anterior interosseous nerve** (branch of the median nerve), ulnar nerve or radial nerve. The anterior interosseous nerve can be tested by asking the patient to make an 'OK' sign, testing for weakness of flexor pollicis longus.



Volkman's Ischemic Contracture

Volkman's ischemic contracture is a contracture of the muscles of the forearm that commonly follows fractures of the distal end of the humerus or fractures of the radius and ulna. In this syndrome, a localized segment of the brachial artery goes into spasm, reducing the arterial flow to the flexor and the extensor muscles so that they undergo ischemic necrosis. The flexor muscles are larger than the extensor muscles, and they are therefore the ones mainly affected. The muscles are replaced by fibrous tissue, which contracts, producing the deformity. An overtight cast usually causes the arterial spasm, but in some cases, the fracture itself may be responsible. The deformity can be explained only by understanding the anatomy of the region.



Contraction vs Contracture

A contraction: is a normal physiological function (active), is the activation of muscle fibers to generate force. It is the basis of all human movement

A contracture: is a pathological structural change (passive) is a **permanent shortening** of the soft tissues (muscles, tendons, or even the palmar aponeurosis)

Anterior compartment of the forearm

Muscle	Origin	Insertion	Innervation	Action
Superficial muscles				
① Pronator teres	Humeral head: medial epicondyle of humerus Ulnar head: coronoid process	Lateral radius (distal to supinator insertion)	Median n. (C6, C7)	Elbow: weak flexion Forearm: pronation
② Flexor carpi radialis	Medial epicondyle of humerus	Base of 2nd metacarpal (variance: base of 3rd metacarpal)		Wrist: flexion and abduction (radial deviation) of hand
③ Palmaris longus		Palmar aponeurosis	Median n. (C7, C8)	Elbow: weak flexion Wrist: flexion tightens palmar aponeurosis
④ Flexor carpi ulnaris	Humeral head: medial epicondyle Ulnar head: olecranon	Pisiform; hook of hamate; base of 5th metacarpal	Ulnar n. (C7–T1)	Wrist: flexion and adduction (ulnar deviation) of hand
Intermediate muscles				
⑤ Flexor digitorum superficialis	Humeral-ulnar head: medial epicondyle of humerus and coronoid process of ulna Radial head: upper half of anterior border of radius	Sides of middle phalanges of 2nd to 5th digits	Median n. (C8, T1)	Elbow: weak flexion Wrist, MCP, and PIP joints of 2nd to 5th digits: flexion
Deep muscles				
⑥ Flexor digitorum profundus	Ulna (proximal two thirds of flexor surface) and interosseous membrane	Distal phalanges of 2nd to 5th digits (palmar surface)	Median n. (C8, T1, radial half of fingers 2 and 3) Ulnar n. (C8, T1, ulnar half of fingers 4 and 5)	Wrist, MCP, PIP, and DIP joints of 2nd to 5th digits: flexion
⑦ Flexor pollicis longus	Radius (midanterior surface) and adjacent interosseous membrane	Distal phalanx of thumb (palmar surface)	Median n. (C8, T1)	Wrist: flexion and abduction (radial deviation) of hand Carpometacarpal joint of thumb: flexion MCP and IP joints of thumb: flexion
⑧ Pronator quadratus	Distal quarter of ulna (anterior surface)	Distal quarter of radius (anterior surface)		Hand: pronation Distal radioulnar joint: stabilization

DIP, distal interphalangeal; IP, interphalangeal; MCP, metacarpophalangeal; PIP, proximal interphalangeal.

A. Anterior (Flexor–Pronator) Compartment of the Forearm: The muscles of the anterior osseofascial compartment are arranged in three groups: superficial, intermediate, and deep. Note that the superficial group muscles possess a common tendon of origin that is attached to the medial epicondyle of the humerus.

Boundaries

- Anterior:** Deep fascia
- Posterior:** Radius, ulna, and interosseous membrane

Muscle Layers

- Superficial:** Flexor carpi ulnaris, palmaris longus, flexor carpi radialis, and pronator teres
- Intermediate:** Flexor digitorum superficialis
- Deep:** Flexor digitorum profundus, flexor pollicis longus, and pronator quadratus

Nerve Supply

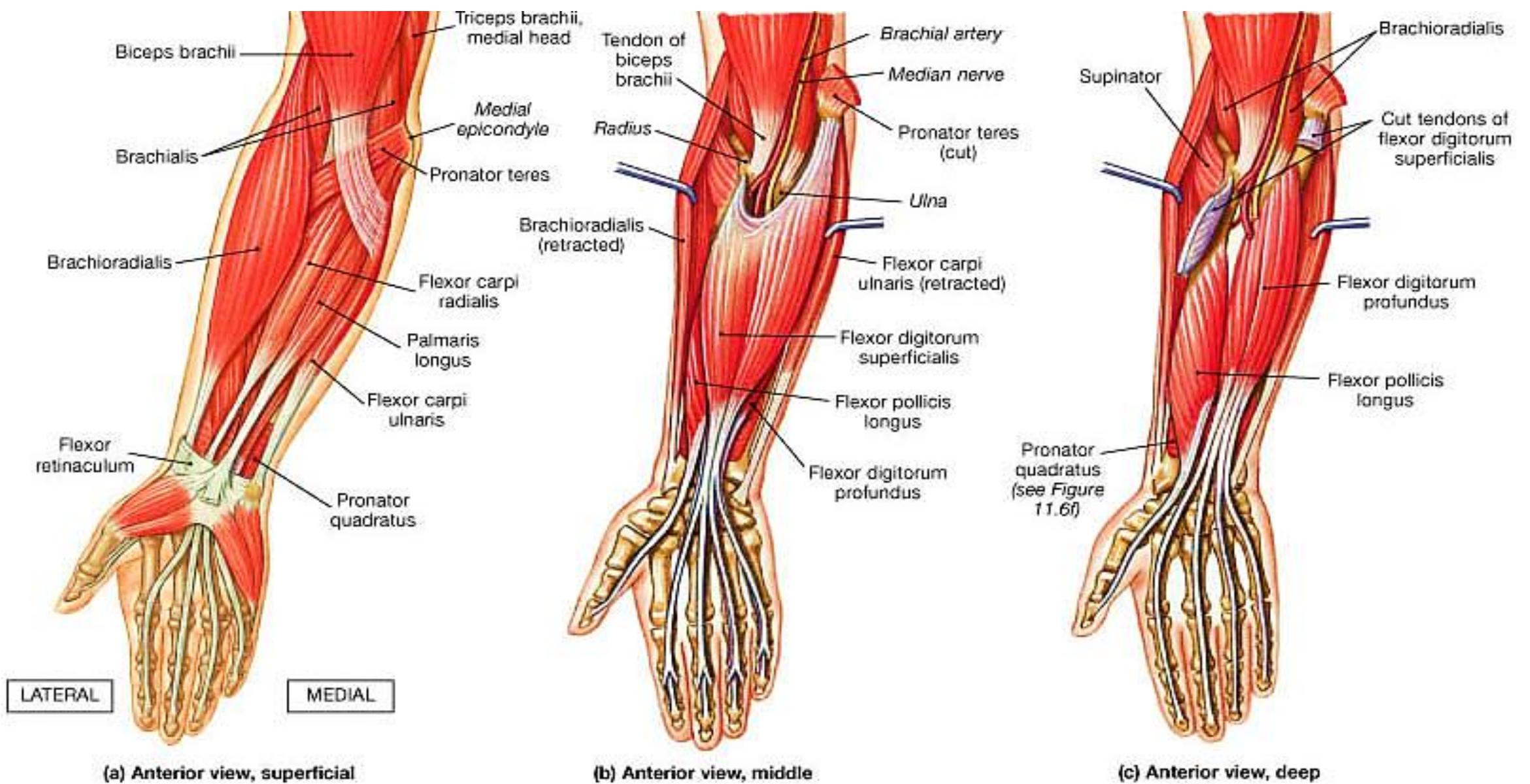
- Median nerve**
- Ulnar nerve** (FCU and medial half of FDP)

Blood Supply

- Ulnar artery**
- Radial artery**

Function

- Flexion of wrist and fingers
- Pronation of forearm



Muscles of Anterior Compartment of Forearm – superficial, intermediate and deep

B. Posterior (Extensor–Supinator) Compartment of the Forearm: The muscles of the posterior osseofascial compartment are arranged in two groups: superficial and deep. The superficial group muscles possess a common tendon of origin that is attached to the lateral epicondyle of the humerus.

Boundaries

- Anterior:** Radius, ulna, interosseous membrane
- Posterior:** Deep fascia

Muscle Layers

- Superficial:** Extensor carpi radialis brevis, extensor digitorum, extensor digiti minimi, extensor carpi ulnaris, and anconeus
- Deep:** Supinator, abductor pollicis longus, extensor pollicis brevis, extensor pollicis longus, and extensor indicis

Nerve Supply

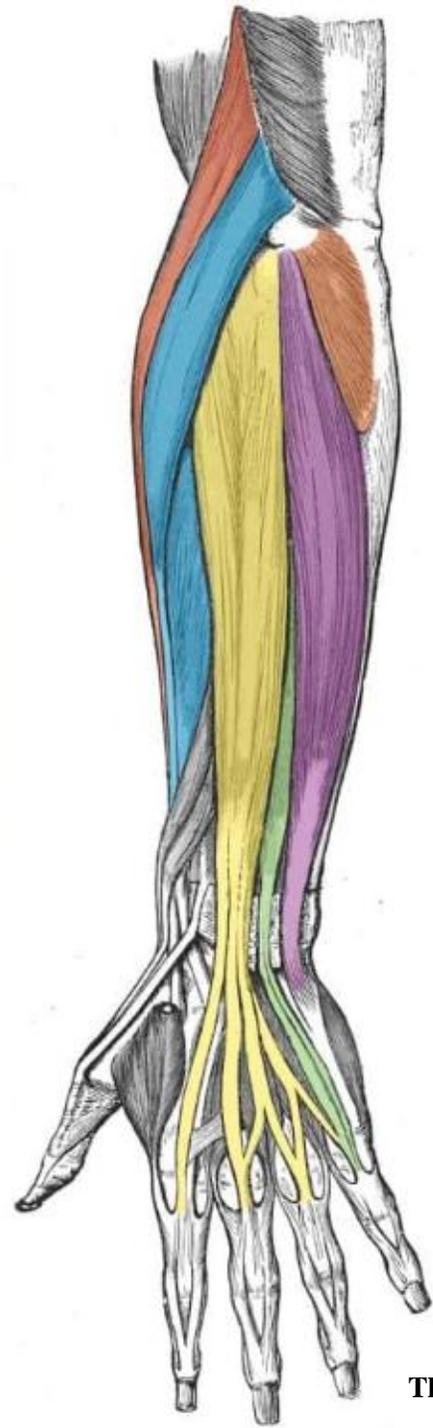
- Radial nerve** (posterior interosseous nerve)

Blood Supply

- Posterior interosseous artery**

Function

- Extension of wrist and fingers
- Supination of forearm



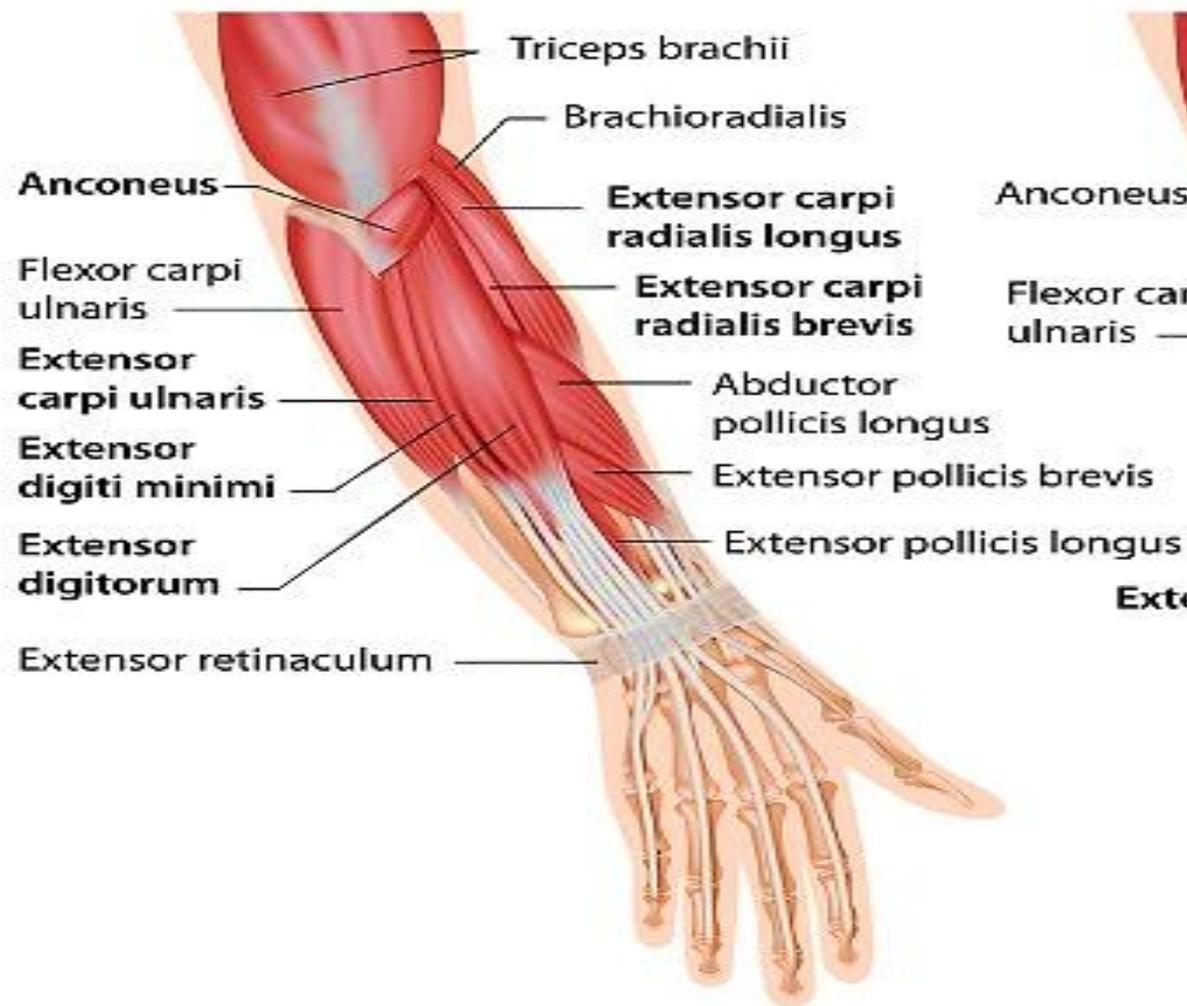
-  Brachioradialis
-  Extensor carpi radialis longus and brevis
-  Extensor digitorum
-  Extensor digit minimi
-  Extensor carpi ulnaris
-  Anconeus

The muscles in the superficial layer of the posterior forearm

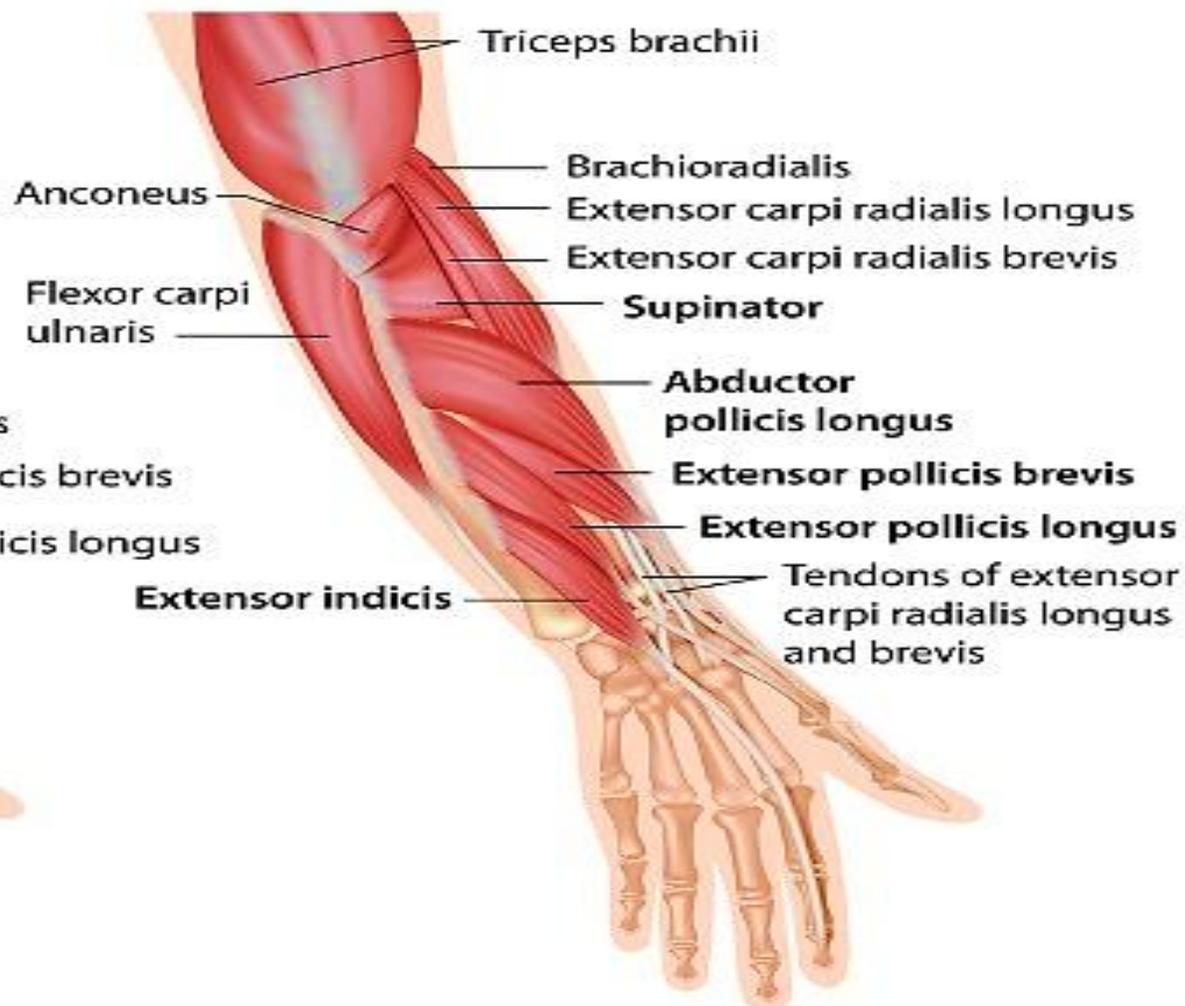
Muscles of the Forearm

(right arm, posterior compartment)

Superficial



Deep



Posterior compartment of the forearm

Muscle	Origin	Insertion	Innervation	Action
Superficial muscles				
① Extensor digitorum	Common head (lateral epicondyle of humerus)	Dorsal digital expansion of 2nd to 5th digits	Radial n. (C7, C8)	Wrist: extension MCP, PIP, and DIP joints of 2nd to 5th digits: extension/abduction of fingers
② Extensor digiti minimi		Dorsal digital expansion of 5th digit		Wrist: extension, ulnar abduction of hand MCP, PIP, and DIP joints of 5th digit: extension and abduction of 5th digit
③ Extensor carpi ulnaris		Ulnar head (dorsal surface)		Base of 5th metacarpal
Deep muscles				
④ Supinator	Olecranon, lateral epicondyle of humerus, radial collateral ligament, annular ligament of radius	Radius (between radial tuberosity and insertion of pronator teres)	Radial n. (C6, C7)	Radioulnar joints: supination
⑤ Abductor pollicis longus	Radius and ulna (dorsal surfaces, interosseous membrane)	Base of 1st metacarpal	Radial n. (C7, C8)	Radiocarpal joint: abduction of the hand Carpometacarpal joint of thumb: abduction
⑥ Extensor pollicis brevis	Radius (posterior surface) and interosseous membrane	Base of proximal phalanx of thumb		Radiocarpal joint: abduction (radial deviation) of hand Carpometacarpal and MCP joints of thumb: extension
⑦ Extensor pollicis longus	Ulna (posterior surface) and interosseous membrane	Base of distal phalanx of thumb		Wrist: extension and abduction (radial deviation) of hand Carpometacarpal joint of thumb: adduction MCP and IP joints of thumb: extension
⑧ Extensor indicis	Ulna (posterior surface) and interosseous membrane	Posterior digital extension of 2nd digit		Wrist: extension MCP, PIP, and DIP joints of 2nd digit: extension

DIP, distal interphalangeal; IP, interphalangeal; MCP, metacarpophalangeal; PIP, proximal interphalangeal.

C. Lateral Compartment (Mobile Wad of Henry): Some authors regard this group as part of the posterior osseofascial compartment. **Note** that the brachioradialis is an exception to the general functional theme of the lateral and posterior forearm compartments in that it is a significant flexor of the elbow rather than an extensor.

Muscles

- Brachioradialis
- Extensor carpi radialis longus
- Extensor carpi radialis brevis

Nerve Supply

- Radial nerve

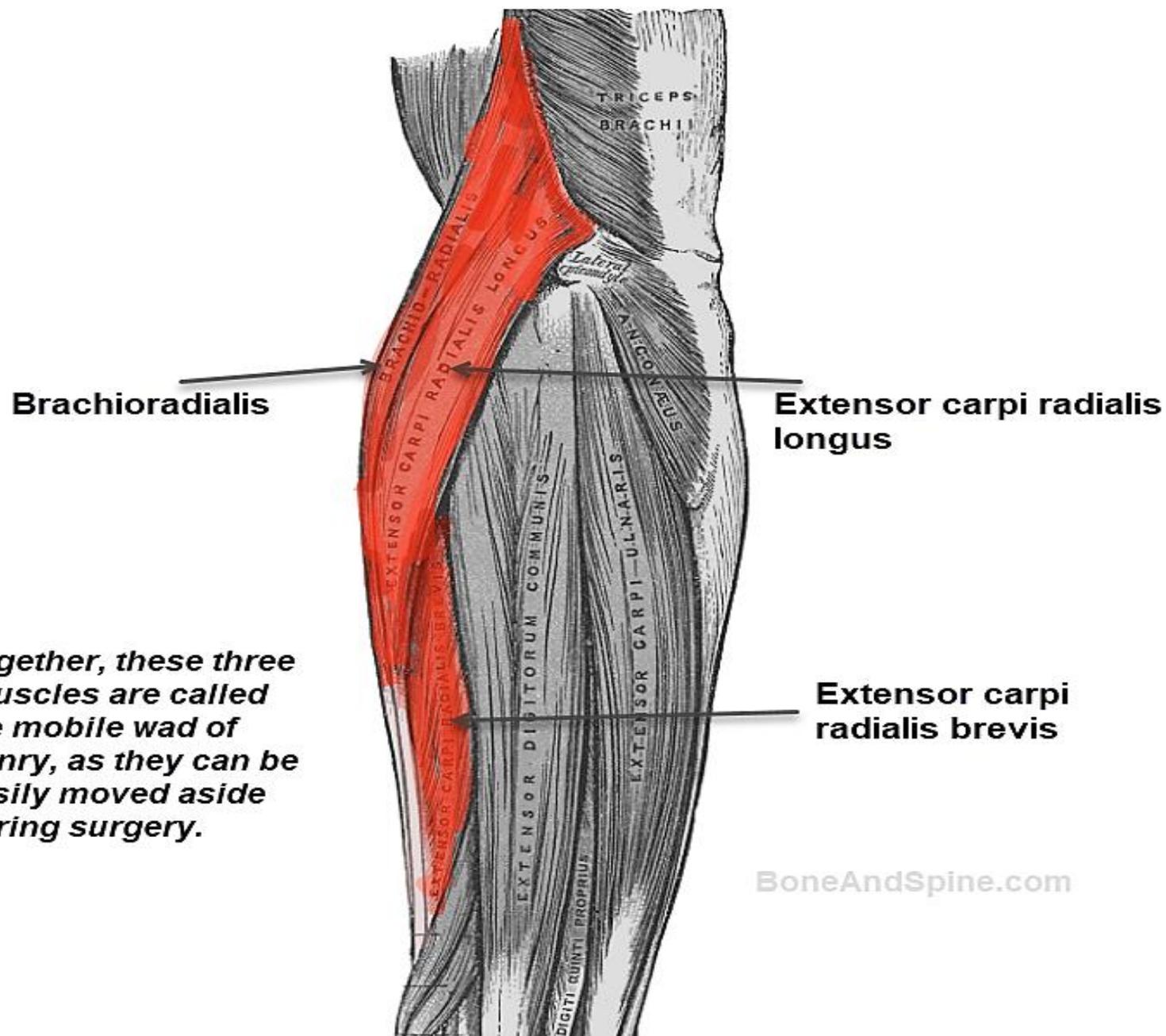
Function

- Flexion of elbow (brachioradialis)
- Wrist extension

Posterior compartment of the forearm: Radialis muscles

Muscle	Origin	Insertion	Innervation	Action
① Brachioradialis	Distal humerus (lateral surface), lateral intermuscular septum	Styloid process of the radius	Radial n. (C5, C6)	Elbow: flexion Forearm: semipronation
② Extensor carpi radialis longus	Lateral supracondylar ridge of distal humerus, lateral intermuscular septum	2nd metacarpal (base)	Radial n. (C6, C7)	Elbow: weak flexion Wrist: extension and abduction
③ Extensor carpi radialis brevis	Lateral epicondyle of humerus	3rd metacarpal (base)	Radial n. (C7, C8)	

Mobile Wad Compartment Muscles

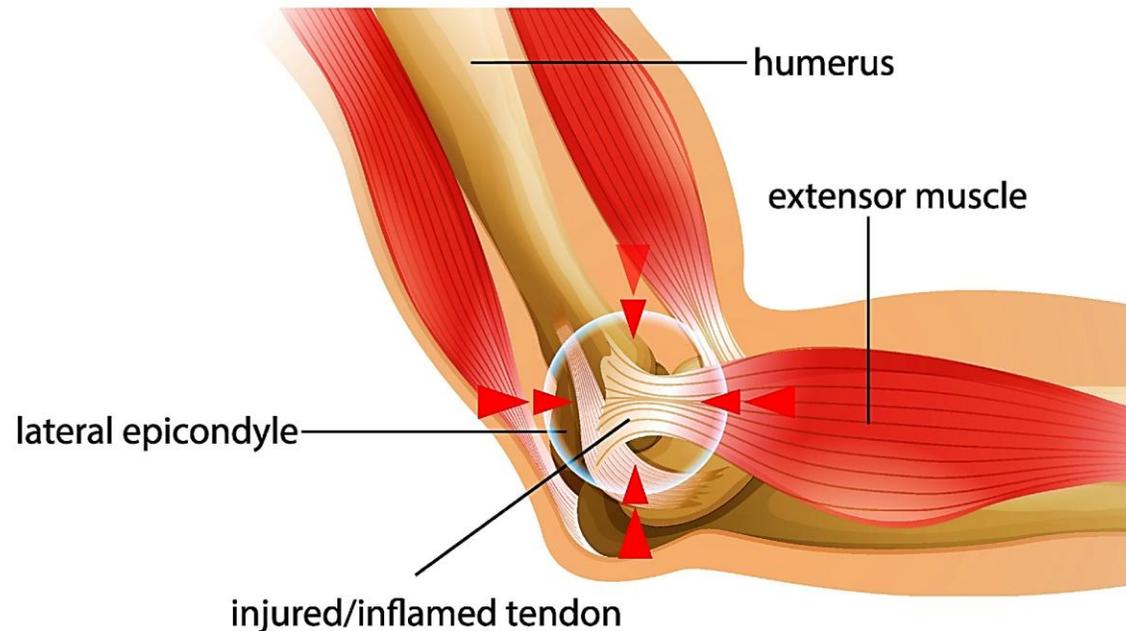


Together, these three muscles are called the mobile wad of Henry, as they can be easily moved aside during surgery.

Lateral epicondylitis (or tennis elbow)

A partial tearing or degeneration of the origin of the superficial extensor muscles from the lateral epicondyle of the humerus causes tennis elbow. It is characterized by pain and tenderness over the lateral epicondyle of the humerus, with pain radiating down the lateral side of the forearm; it is common in tennis players and violinists. The peak age of onset is 40-50 years old. It is caused by repeated use of the superficial extensor muscles, which strains their common tendinous attachment to the lateral epicondyle.

Lateral Epicondylitis (Tennis Elbow)



4. Hand

The hand contains **multiple small osseofascial compartments** formed by palmar aponeurosis, fibrous septa, and metacarpal bones. **The palmar aponeurosis** is a specialized, triangular-shaped thickening of the deep fascia of the palm. It is a critical structure that provides the hand with its unique ability to grip firmly while protecting delicate internal components like nerves and blood vessels. It is located just beneath the skin of the palm

Osseofascial Compartments

The muscles of the hand can be described as either extrinsic or intrinsic muscles. **Extrinsic muscles** are those that originate outside of the hand proper (in the forearm) and insert within the hand via long tendons. **Intrinsic muscles** (small muscles) of the hand are those that both originate and insert within the hand. Both the extrinsic and intrinsic muscles are organized in five osseofascial compartments within the hand. Four compartments (thenar, hypothenar, central [midpalmar], and interosseous) are located in the palmar aspect of the hand. One compartment (dorsal/extensor) is related to the dorsum of the hand.

Hand Muscles

Thenar Muscles

These muscles are located at the base of the thumb and collectively make up the thenar eminence. The following are thenar muscles and are responsible for fine movements of the thumb:

1. Opponens Pollicis

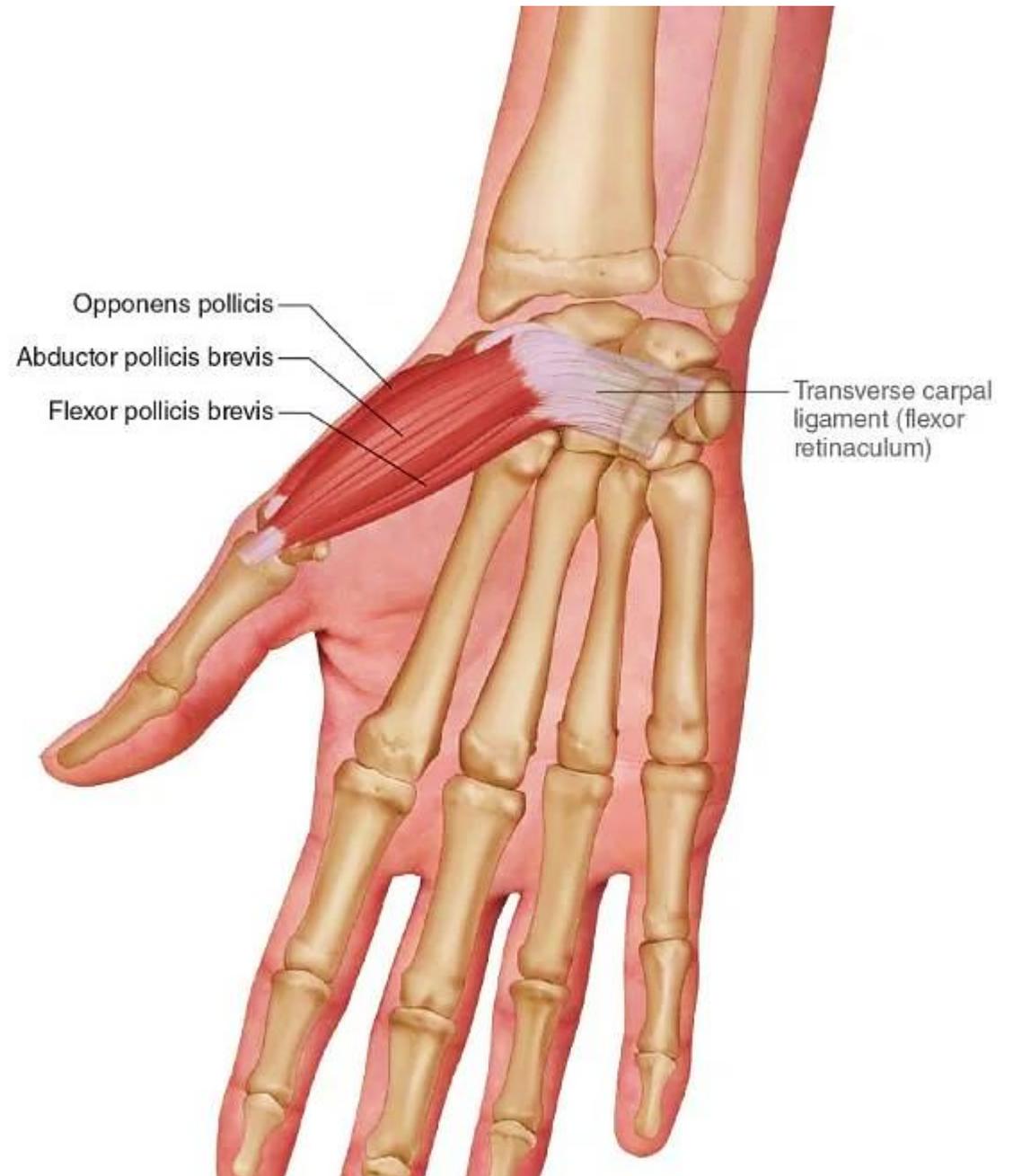
1. This muscle originates from the tubercle of the trapezium and attaches to the lateral margin of the first metacarpal.
2. This muscle acts to oppose the thumb by medially rotating and flexing the metacarpal on the trapezium.
3. This muscle is innervated by the **median nerve**.

2. Abductor Pollicis Brevis

1. This muscle originates from the tubercle of the scaphoid and trapezium and attaches to the lateral margin of the proximal phalanx of the thumb.
2. This muscle acts to abduct the thumb.
3. This muscle is innervated by the **median nerve**.

3. Flexor Pollicis Brevis

1. This muscle originates from the tubercle of the trapezium and attaches to the proximal phalanx of the thumb.
2. This muscle acts to flex the metacarpophalangeal joint of the thumb.
3. This muscle is innervated by the **median nerve**.



Hypothenar Muscles

These muscles are located on the medial side of the palm at the base of the little finger collectively make up the hypothenar eminence. The following are hypothenar muscles and are responsible for fine movements of the thumb:

1. Opponense Digiti Minimi

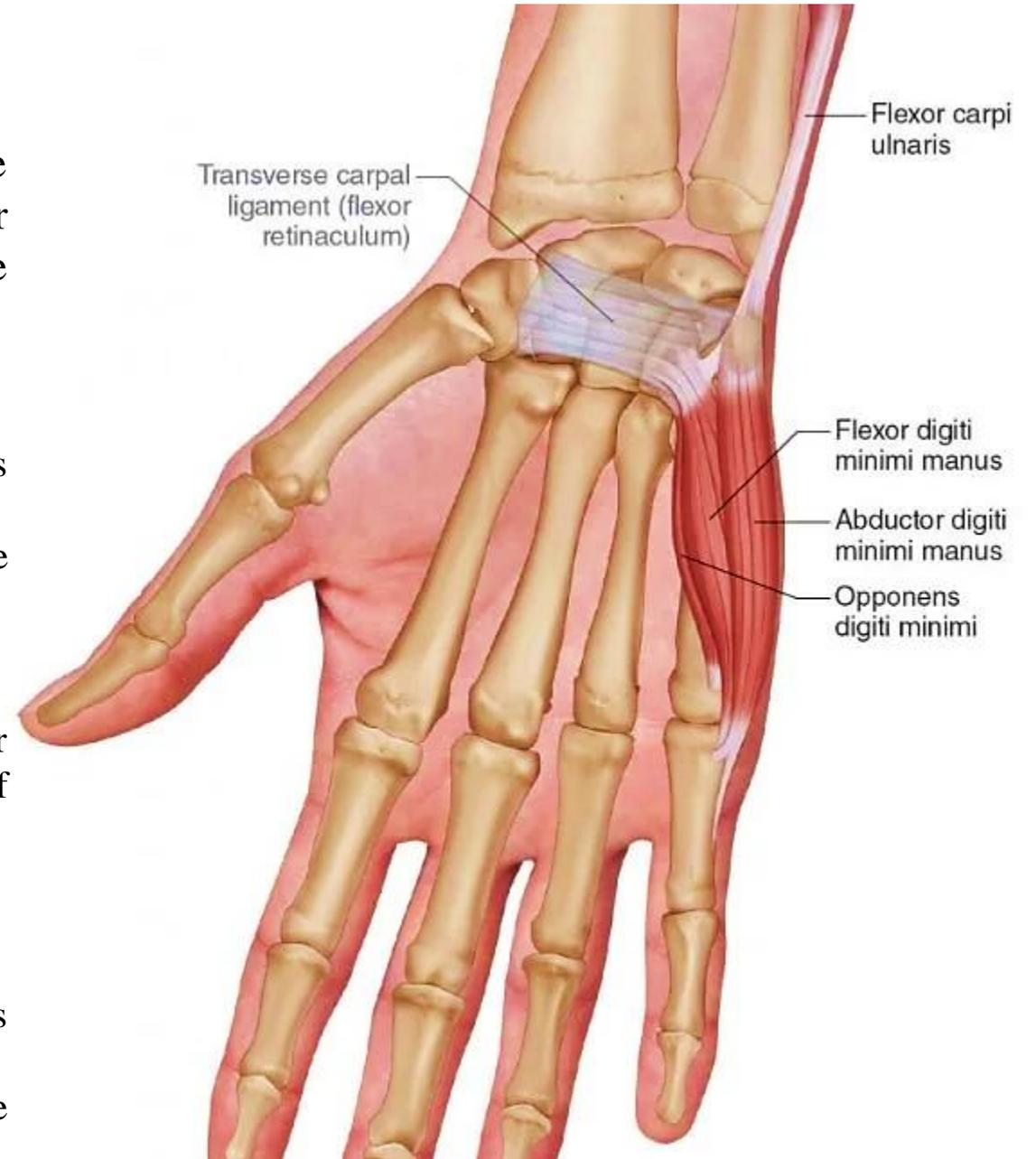
1. This muscle originates from the hook of hamate and attaches to the medial margin of the fifth metacarpal.
2. This muscle acts to allow for opposition by rotating the metacarpal of the little finger towards the palm.
3. This muscle is innervated by the **ulnar nerve**.

2. Abductor Digiti Minimi

1. This muscle originates from pisiform and the tendon of flexor carpi ulnaris muscle and attaches to the proximal phalanx of the little finger.
2. This muscle acts to abduct the little finger.
3. This muscle is innervated by the **ulnar nerve**.

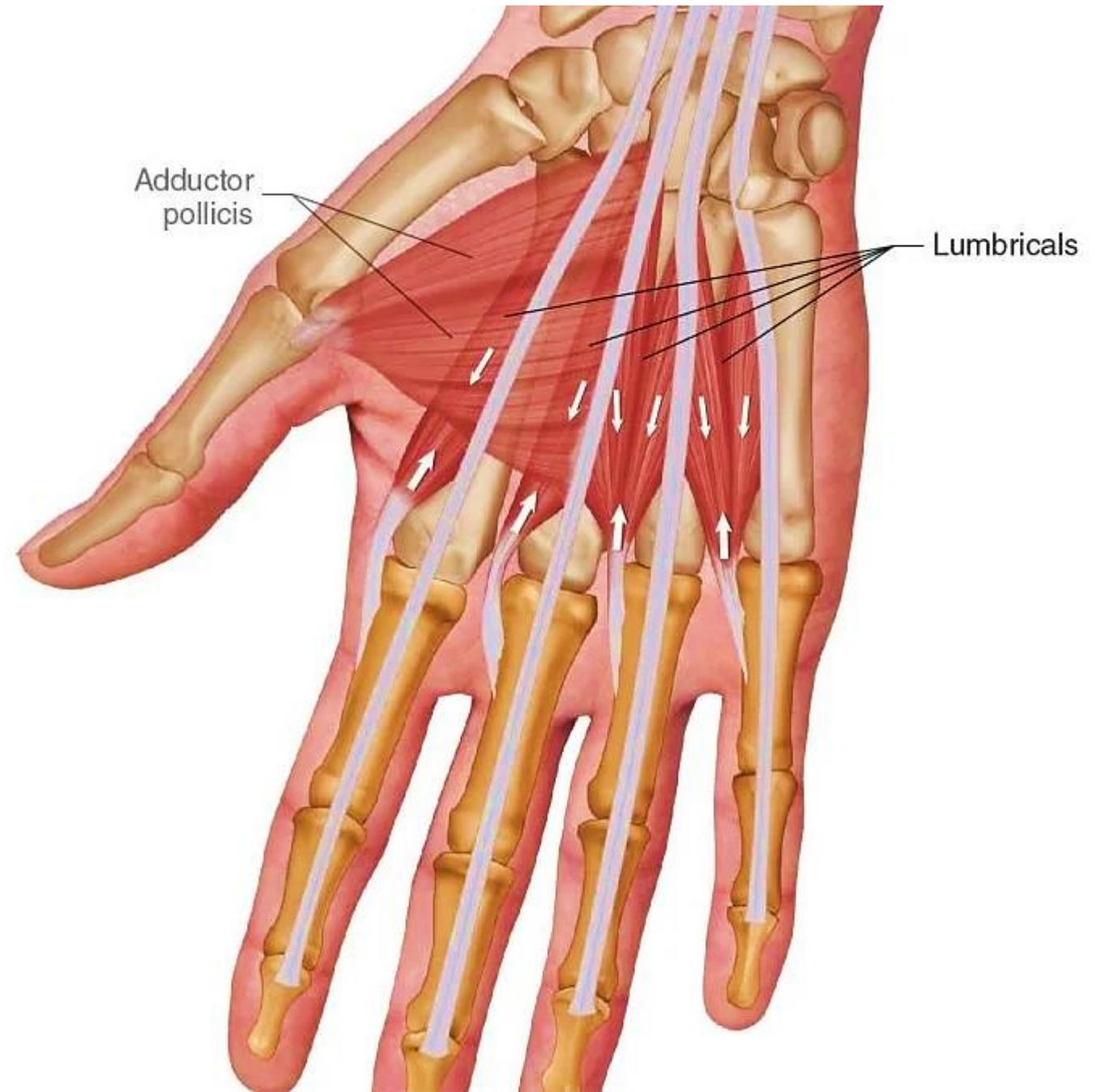
3. Flexor Digiti Minimi Brevis

1. This muscle originates from the hook of hamate and attaches to the proximal phalanx of the little finger.
2. This muscle acts to flex the metacarpophalangeal joint of the little finger.
3. This muscle is innervated by the **ulnar nerve**

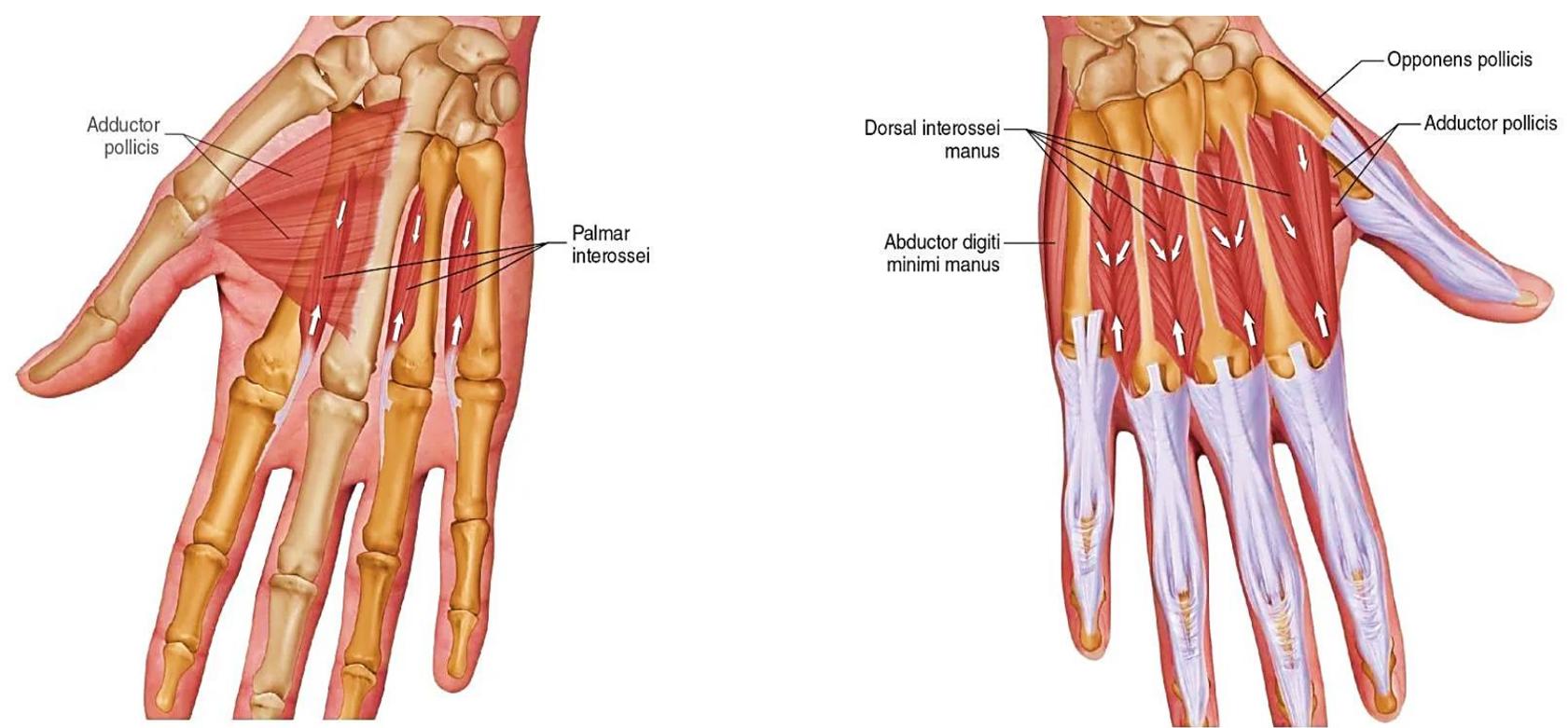


Lumbricals

These muscles are each associated with a digit and there are a total of **four lumbricals** in each hand. The lumbricals originate from a tendon of the flexor digitorum profundus and attach to the extensor hood of each digit by passing dorsally and laterally around each digit. The lumbricals act to produce flexion at the **metacarpophalangeal joint** and extension at the **interphalangeal joint of each digit**. The medial two lumbricals (ring and little fingers) are innervated by the **ulnar nerve** while the lateral two lumbricals (index and middle fingers) are innervated by the **median nerve**



Interossei



These muscles are located between the metacarpals and can be categorized as:

1. Dorsal Interossei

1. These four muscles are the most superficial and can be palpated on the dorsum of the hand. They each originate from the lateral and medial surfaces of their associated metacarpals and attach to the extensor hood and proximal phalanx of each digit.
2. They act to abduct the digits at the metacarpophalangeal joint.
3. They are innervated by the **ulnar nerve**.

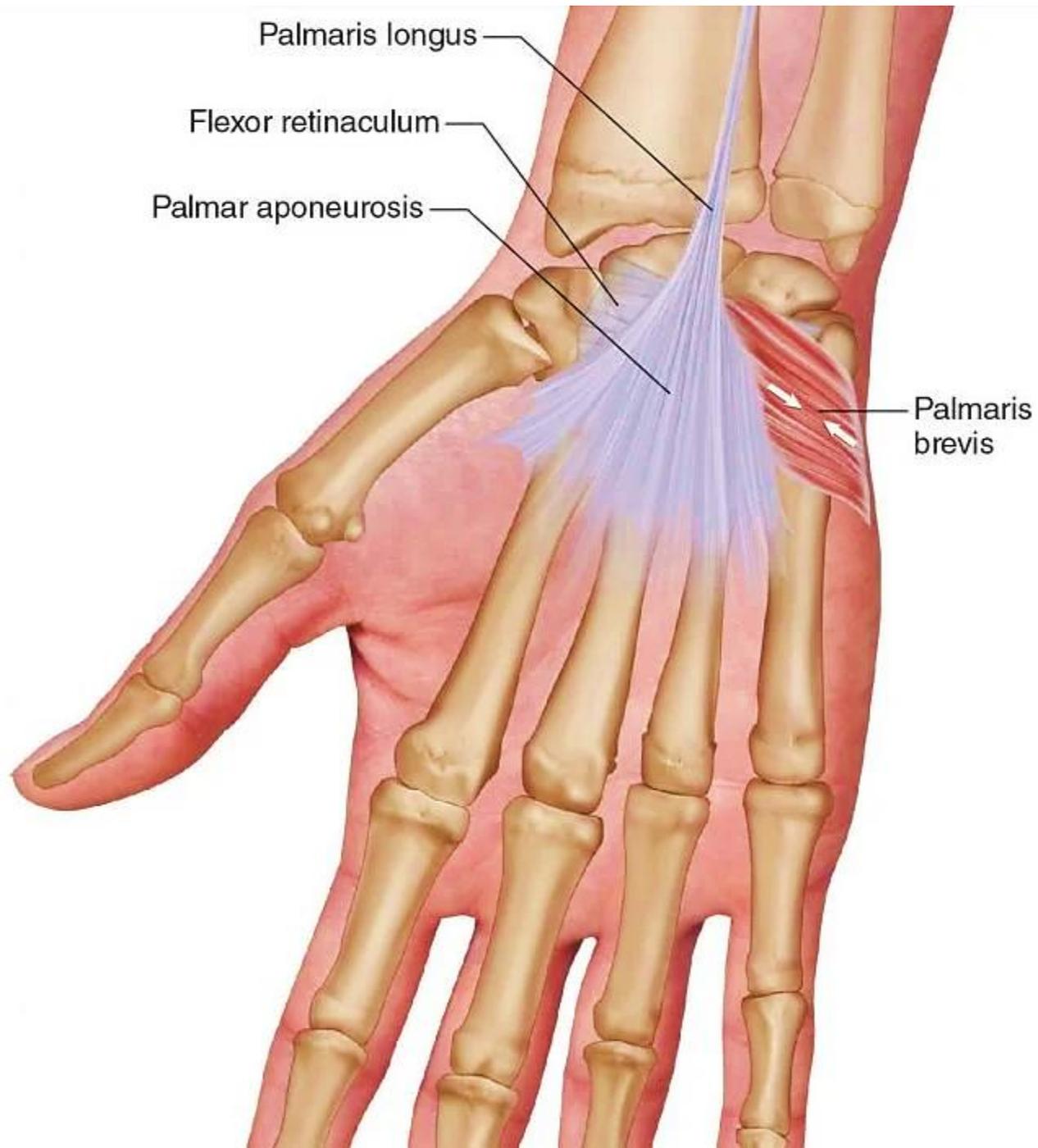
2. Palmar Interossei

1. These three muscles are located on the palmar surface of the hand and originate from the medial or lateral surface of an associated metacarpal and attach to the extensor hood and proximal phalanx of the same digit.
2. These muscles act to adduct the digits at the metacarpophalangeal joint.
3. These muscles are innervated by the **ulnar nerve**.

Palmaris Brevis

This muscle is also located in the palm and it is a small and thin muscle found in the subcutaneous tissue of the hypothenar eminence.

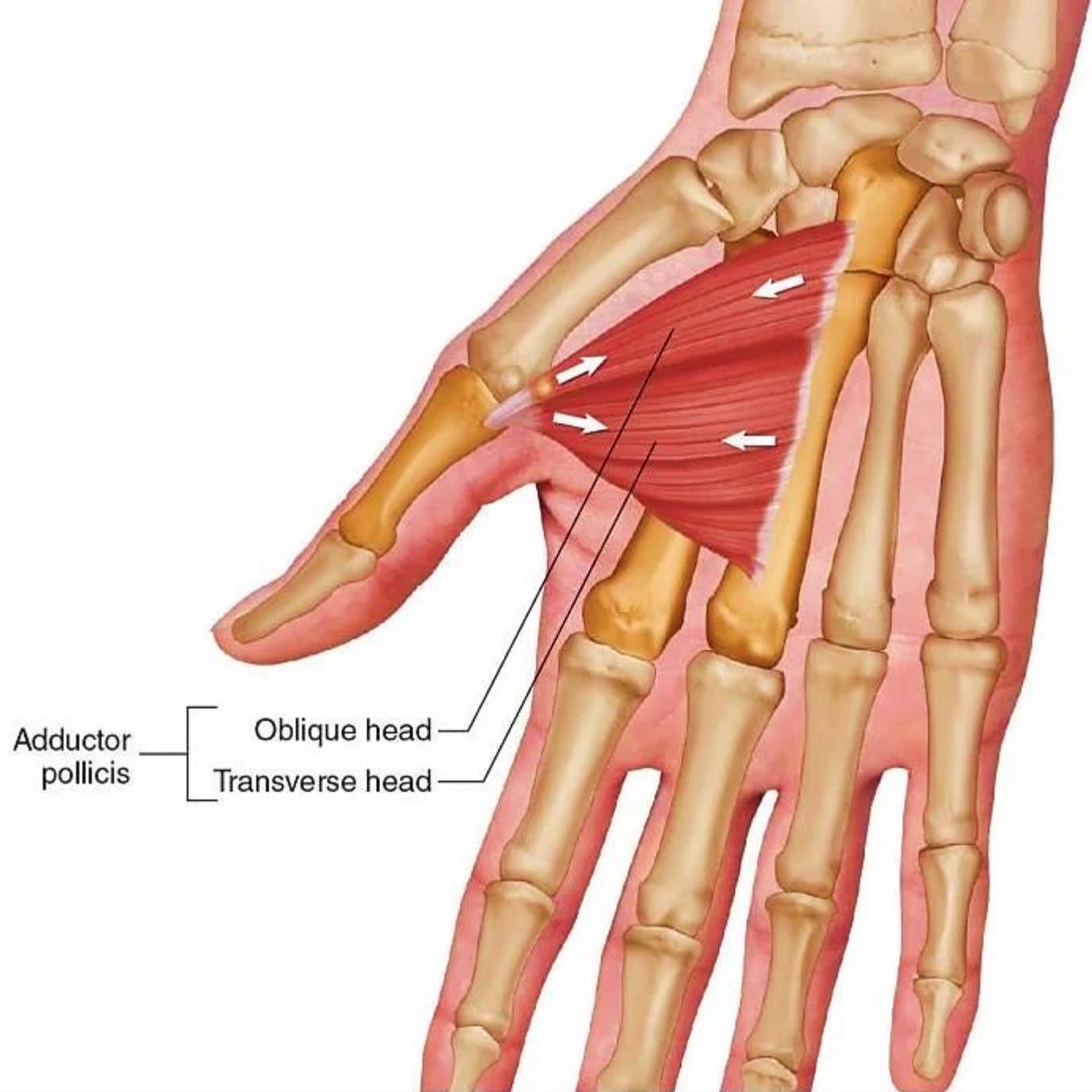
This muscle originates from the palmar aponeurosis and flexor retinaculum and attaches to the dermis of the skin on the medial margin of the hand. It acts to improve grip and is innervated by the **ulnar nerve**.



Adductor Pollicis

This muscle is triangular in shape with two muscle heads through which the radial artery passes to form the deep palmar arch.

This muscle originates from the third metacarpal (first head) and from capitate and adjacent areas of the second and third metacarpals (second head) and attaches to the base of the proximal phalanx of the thumb. It acts to adduct the thumb and is innervated by the **ulnar nerve**.

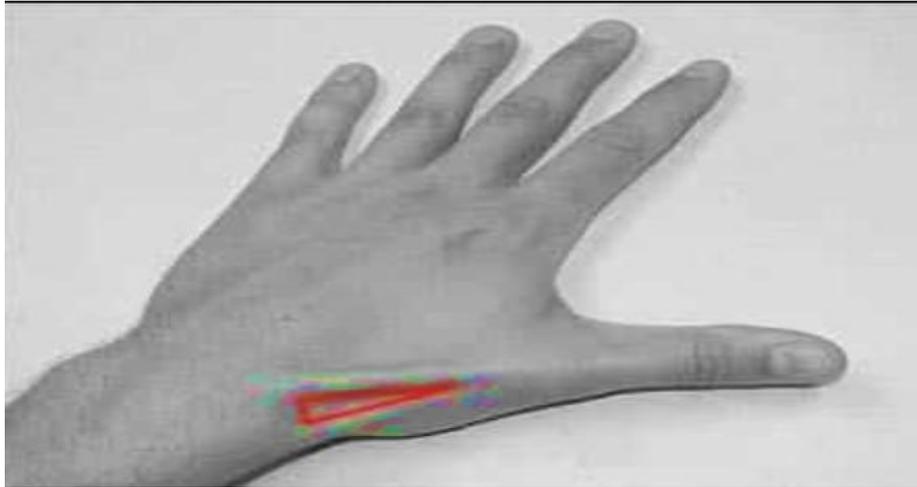


Intrinsic Hand Muscles

MUSCLE	PROXIMAL ATTACHMENT (ORIGIN)	DISTAL ATTACHMENT (INSERTION)	INNERVATION	MAIN ACTIONS
Abductor pollicis brevis	Flexor retinaculum and tubercles of scaphoid and trapezium	Base of proximal phalanx of thumb	Median nerve (recurrent branch) (C8-T1)	Abducts thumb
Flexor pollicis brevis	Flexor retinaculum and tubercle of trapezium	Lateral side of base of proximal phalanx of thumb	Median nerve (recurrent branch) (C8-T1)	Flexes proximal phalanx of thumb
Opponens pollicis	Flexor retinaculum and tubercle of trapezium	Lateral side of 1st metacarpal bone	Median nerve (recurrent branch) (C8-T1)	Opposes thumb toward center of palm and rotates it medially
Adductor pollicis	<i>Oblique head:</i> bases of 2nd and 3rd metacarpals and capitate <i>Transverse head:</i> anterior surface of body of 3rd metacarpal	Medial side of base of proximal phalanx of thumb	Ulnar nerve (deep branch) (C8-T1)	Adducts thumb toward middle digit
Abductor digiti minimi	Pisiform and tendon of flexor carpi ulnaris	Medial side of base of proximal phalanx of 5th digit	Ulnar nerve (deep branch) (C8-T1)	Abducts 5th digit
Flexor digiti minimi brevis	Hook of hamate and flexor retinaculum	Medial side of base of proximal phalanx of 5th digit	Ulnar nerve (deep branch) (C8-T1)	Flexes proximal phalanx of 5th digit
Opponens digiti minimi	Hook of hamate and flexor retinaculum	Palmar surface of 5th metacarpal	Ulnar nerve (deep branch) (C8-T1)	Draws 5th metacarpal anteriorly and rotates it, bringing 5th digit into opposition with thumb
Lumbricals 1 and 2	Lateral two tendons of flexor digitorum profundus	Lateral sides of extensor expansions of 2nd and 3rd digits	Median nerve (C8-T1)	Flex digits at MCP joints and extend IP joints
Lumbricals 3 and 4	Medial three tendons of flexor digitorum profundus	Lateral sides of extensor expansions of 4th and 5th digits	Ulnar nerve (deep branch) (C8-T1)	Flex digits at MCP joints and extend IP joints
Dorsal interossei	Adjacent sides of two metacarpals	Extensor expansions and bases of proximal phalanges of 2nd to 4th digits	Ulnar nerve (deep branch) (C8-T1)	Abduct digits; flex digits at MCP joints and extend IP joints
Palmar interossei	Sides of 2nd, 4th, and 5th metacarpal bones	Extensor expansions of digits and bases of proximal phalanges of 2nd, 4th, and 5th digits	Ulnar nerve (deep branch) (C8-T1)	Adduct digits; flex digits at MCP joints and extend IP joints

The Anatomical Snuffbox

The **anatomical snuffbox** (also known as the radial fossa), is a triangular depression found on the lateral aspect of the dorsum of the hand. It is located at the level of the [carpal bones](#), and best seen when the thumb is extended. In the past, this depression was used to hold snuff (ground tobacco) before inhaling via the nose – hence it was given the name ‘snuffbox’.



Borders

As the snuffbox is triangularly shaped, it has three borders, a floor, and a roof:

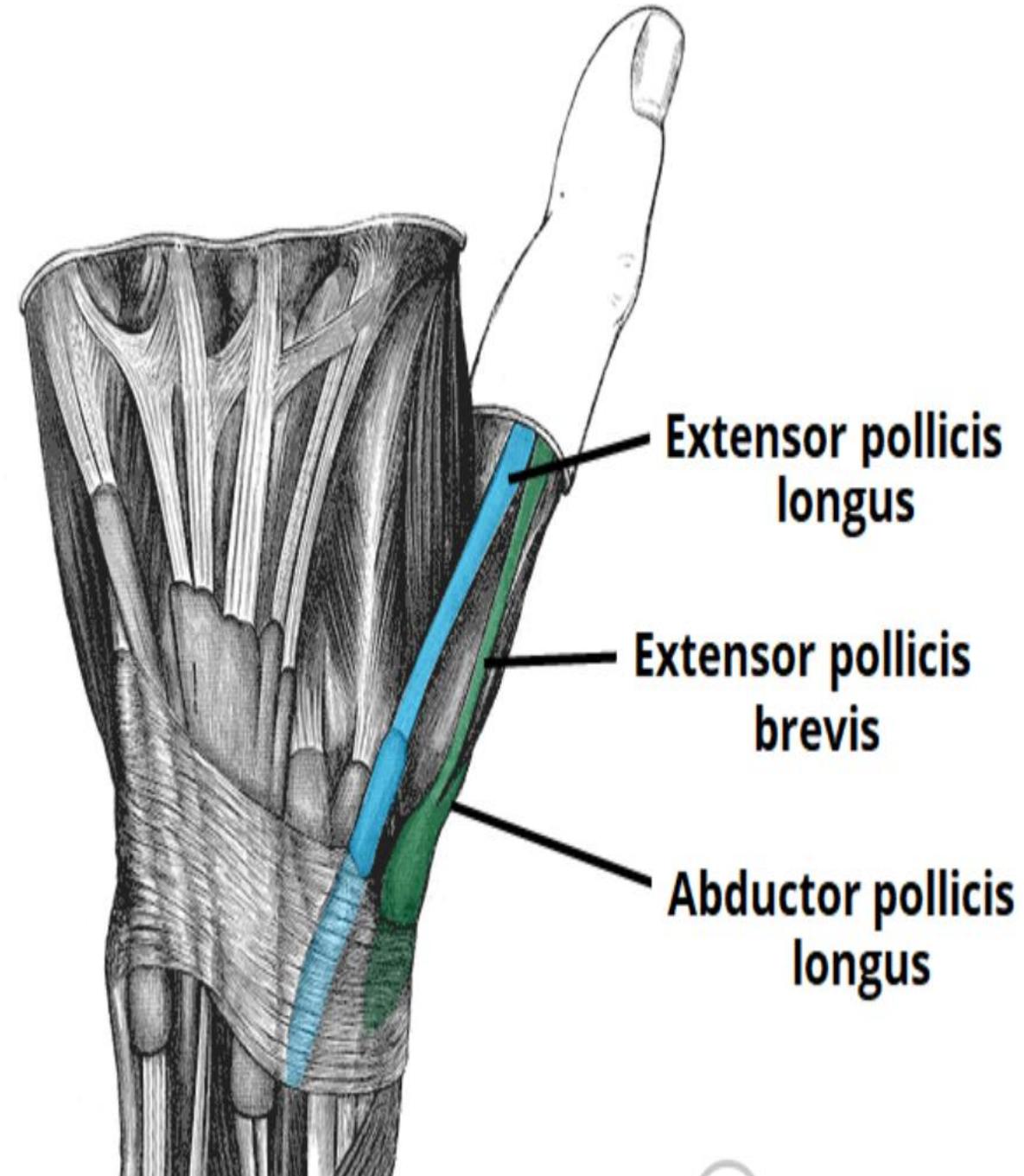
- **Ulnar (medial) border:** Tendon of the extensor pollicis longus.
- **Radial (lateral) border:** Tendons of the extensor pollicis brevis and abductor pollicis longus.
- **Proximal border:** Styloid process of the [radius](#).
- **Floor:** Carpal bones; scaphoid and trapezium.
- **Roof:** Skin.

(Note: The terms medial and lateral are used in the context of the [anatomical position](#). It is important to note that the tendons of the muscles form the borders, not the muscles themselves)

Contents

The main contents of the **anatomical snuffbox** are the radial artery, a branch of the [radial nerve](#), and the cephalic vein:

- **Radial artery** – crosses the floor of the [anatomical snuffbox](#), then turns medially and travels between the heads of the adductor pollicis muscle.
 - The radial pulse can be palpated in some individuals by placing two fingers on the proximal portion of the anatomical snuffbox.
- **Superficial branch of the radial nerve** – found in the skin and subcutaneous tissue of the anatomical snuffbox. It innervates the dorsal surface of the lateral three and half digits, and the associated area on the back of the hand.
- **Cephalic vein** – arises from the dorsal venous network of the hand and crosses the anatomical snuffbox to travel up the anterolateral aspect of the forearm.



The Carpal Tunnel is a narrow, osteofascial passageway located on the anterior (palmar) aspect of the wrist. It serves as a conduit for the long flexor tendons and the median nerve to pass from the forearm into the hand.

Anatomical Boundaries

The tunnel is formed by a rigid bony arch covered by a tough ligamentous roof.

Floor and Walls (Carpal Arch): Formed by the deep, concave arrangement of the carpal bones.

Roof (Flexor Retinaculum): Also known as the transverse carpal ligament. This is a strong, fibrous band that stretches between the hook of the hamate and pisiform medially, and the tubercles of the scaphoid and trapezium laterally.

Contents of the Carpal Tunnel: Ten key structures travel through this tight space:

The Median Nerve: The most superficial and sensitive structure in the tunnel. It provides motor supply to the thenar muscles and sensory supply to the lateral three and a half digits.

Flexor Digitorum Superficialis (4 tendons): These tendons flex the intermediate phalanges of the fingers.

Flexor Digitorum Profundus (4 tendons): These deep tendons flex the distal phalanges of the fingers.

Flexor Pollicis Longus (1 tendon): The specific flexor tendon for the thumb.

Carpal Tunnel Syndrome (CTS)

Carpal tunnel syndrome is a type of **entrapment neuropathy** or **compartment syndrome**

Pathophysiology

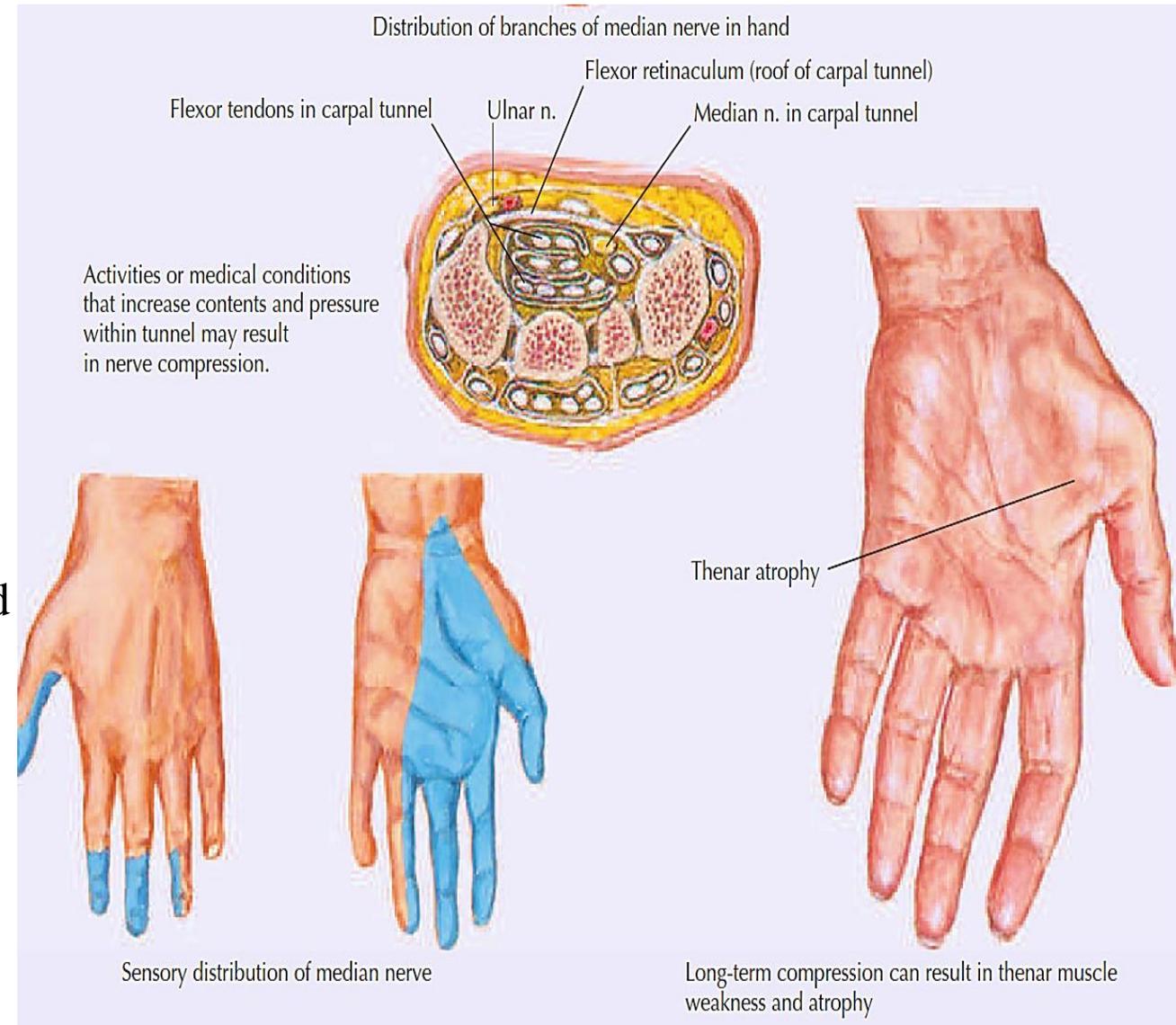
Because the boundaries of the carpal tunnel are rigid (bone and tough ligament), any increase in the volume of the contents—such as inflammation or swelling of the tendon sheaths—leads to a significant **increase in pressure** within the space. Since the **median nerve** is the softest structure among the rigid tendons, it is compressed against the flexor retinaculum.

Clinical Presentation

•**Sensory Symptoms:** Numbness, tingling, or "pins and needles" in the distribution of the median nerve (the thumb, index, middle, and half of the ring finger).

•**Motor Symptoms:** In advanced cases, compression can lead to **thenar wasting** (atrophy of the muscles at the base of the thumb) and weakness in thumb opposition, making it difficult to perform fine motor tasks.

•**Pain:** Often worse at night or during repetitive wrist activities



Scaphoid Fracture

The scaphoid bone of the hand is the most commonly fractured **carpal bone** – typically by falling on an outstretched hand (FOOSH).

In a fracture of the scaphoid, the characteristic clinical feature is pain and tenderness in the **anatomical snuffbox**.

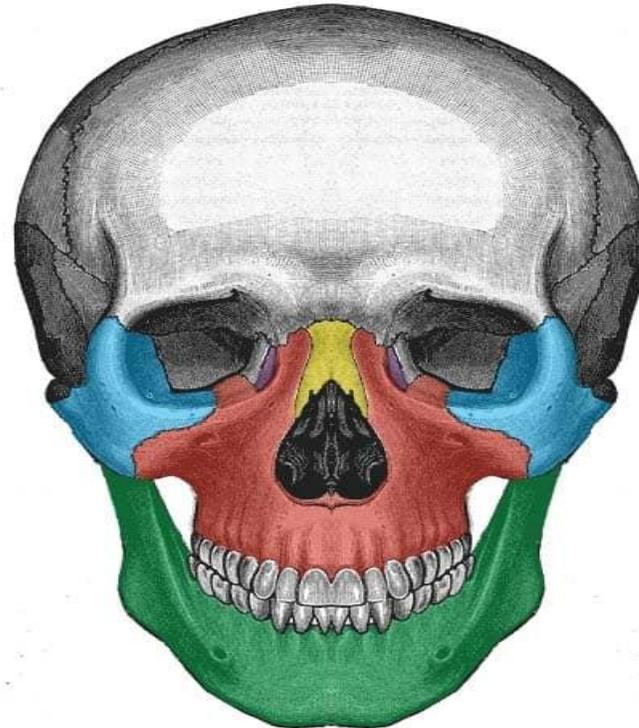
The scaphoid is at particular risk of **avascular necrosis** after fracture because of its so-called ‘retrograde blood supply’ which enters at its distal end. This means that a fracture to the middle (or ‘waist’) of the scaphoid may interrupt the blood supply to the proximal part of the scaphoid bone rendering it avascular.

Patients with a missed scaphoid fracture are likely to develop **osteoarthritis** of the wrist in later life.





THANK YOU!



-  Zygomatic
-  Maxilla
-  Nasal
-  Lacrimal
-  Mandible