



The cubital fossa

It is a triangular depression in front of the elbow.

Boundaries:

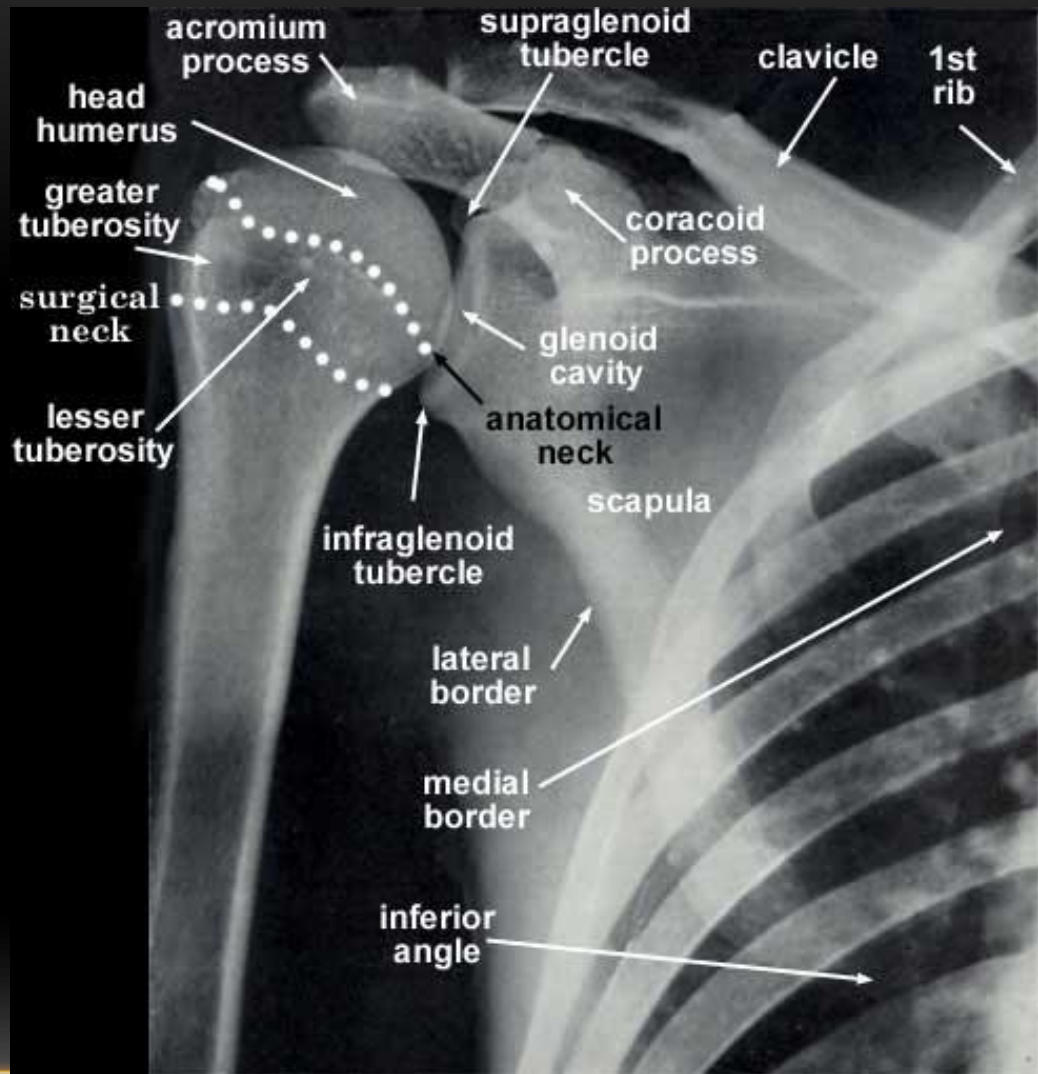
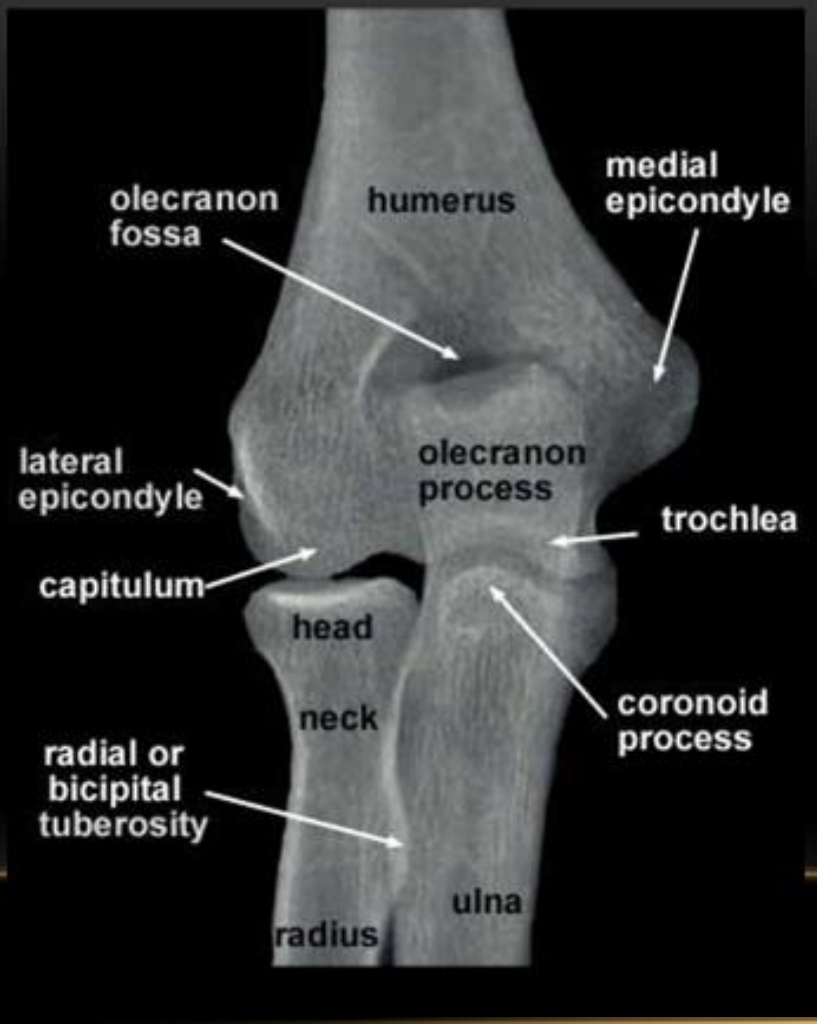
- Roof: skin, fascia, reinforced by bicipital aponeurosis
- Medially: pronator teres
- Laterally: brachioradialis
- Floor: supinator laterally and brachialis medially
- Base: an imaginary line connecting the two humeral epicondyles.
- Apex: brachioradialis overlapping the pronator teres



Contents of the Cubital Fossa:

- Median nerve.
- End of the brachial artery and its 2 terminal branches.
- Biceps tendon.
- Radial nerve (most lateral).
- Variable amounts of fat and lymphatics.





Carrying angle



When the arm is extended, with the palm facing forward or up (supination), the upper arm is not in straight alignment with the forearm. The deviation from a straight line (generally on the order of 5-10°) occurs in the direction of the thumb (in supination), and is referred to as the carrying angle (visible in the right half of the picture of x-ray above). In females the carrying angle is usually greater than the carrying angle in males.

The carrying angle can influence how objects are held by individuals and may decrease efficiency of elbow flexion and elbow flexion force production. Increased carrying angle causes increased valgus stress on the medial structures of the elbow.

The Forearm

General considerations

The skin of the anterior aspect is thinner than the that on the posterior aspect.

Hairs on the posterior aspect are directed medially (in anatomical position).

Fascia surrounds the forearm and is thicker in the posterior aspect.

Fascia is thickened along the posterior border of the ulna forming the ulnar aponeurosis.

Fascia is thickened near the wrist joint anteriorly and posteriorly forming the flexor and extensor retinaculae respectively.

The deep fascia is attached to the posterior border of the ulna.

Fibres of the interosseous membrane between the radius and ulna run obliquely downwards and medially.

Fibres of the interosseous membrane are strong (collagen type I).

Some muscles originate from the interosseous membrane.

The forearm is divided into:

- Anterior compartment contains the flexor muscles
- Lateral compartment contains the brachioradialis and the extensor pollicis longus.
- Posterior compartment: contains the extensor muscles.

Nerves entering the forearm pass between two parts (heads) of a muscle:

- Radial nerve → supinator
- Ulnar nerve → flexor carpi ulnaris
- Median nerve → pronator teres

Muscles of the front of the forearm

Divided into 2 groups:

Superficial (5 muscles):

Pronator teres

Flexor carpi radialis

Palmaris longus

Flexor digitorum superficialis

Flexor carpi ulnaris

Deep group (3 muscles):

Flexor digitorum profundus

Flexor pollicis longus

Pronator quadratus

All superficial muscles of the forearm are innervated by the median nerve **EXCEPT** the flexor carpi ulnaris which is innervated by the ulnar nerve.

The front of the medial epicondyle gives origin to several muscles and is known as the *common flexor origin.*

Pronator teres

Origin:

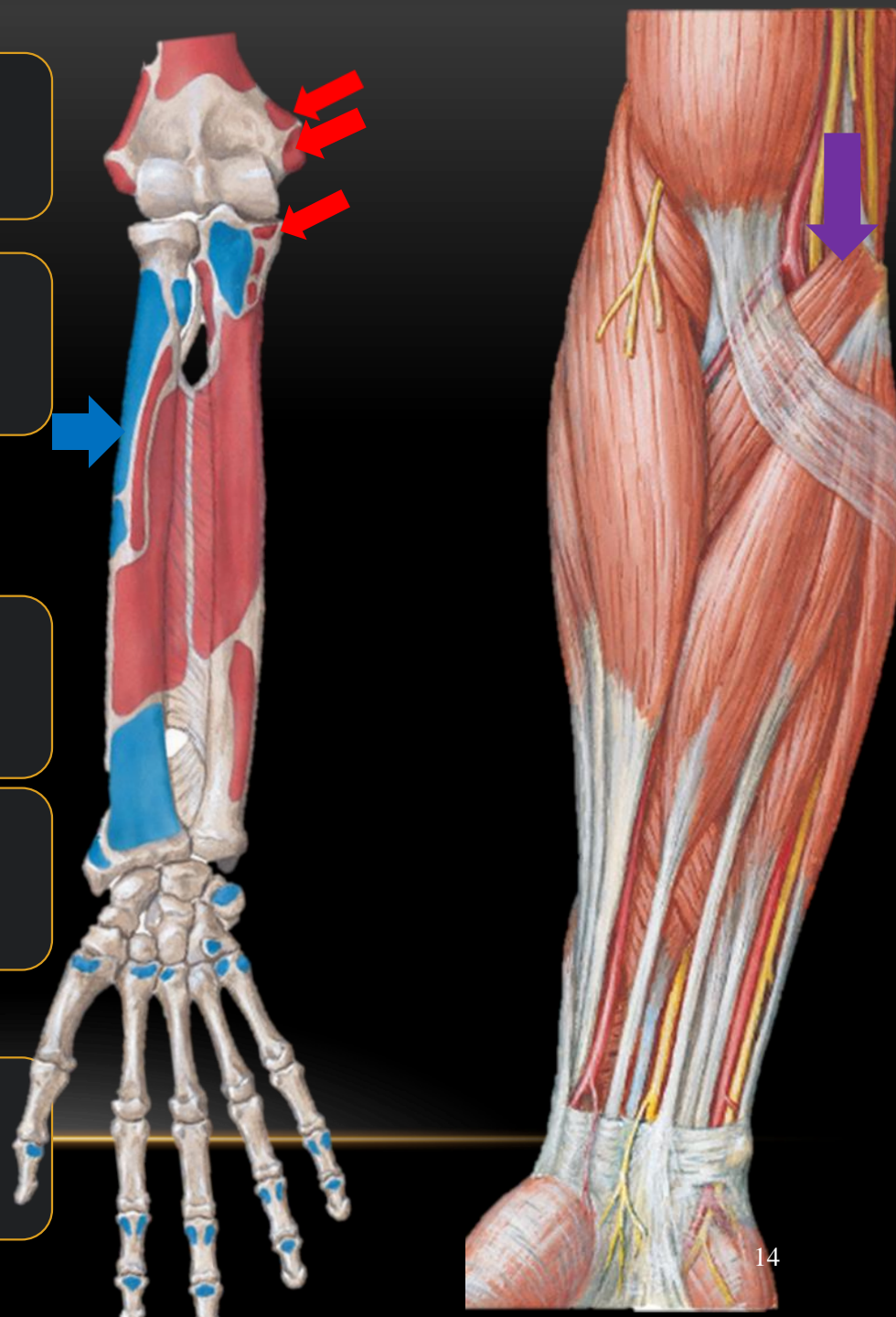
- **Humeral head:** from the common flexor origin and lower part of the medial supracondylar ridge.
- **Ulnar head:** from the medial border of the coronoid process

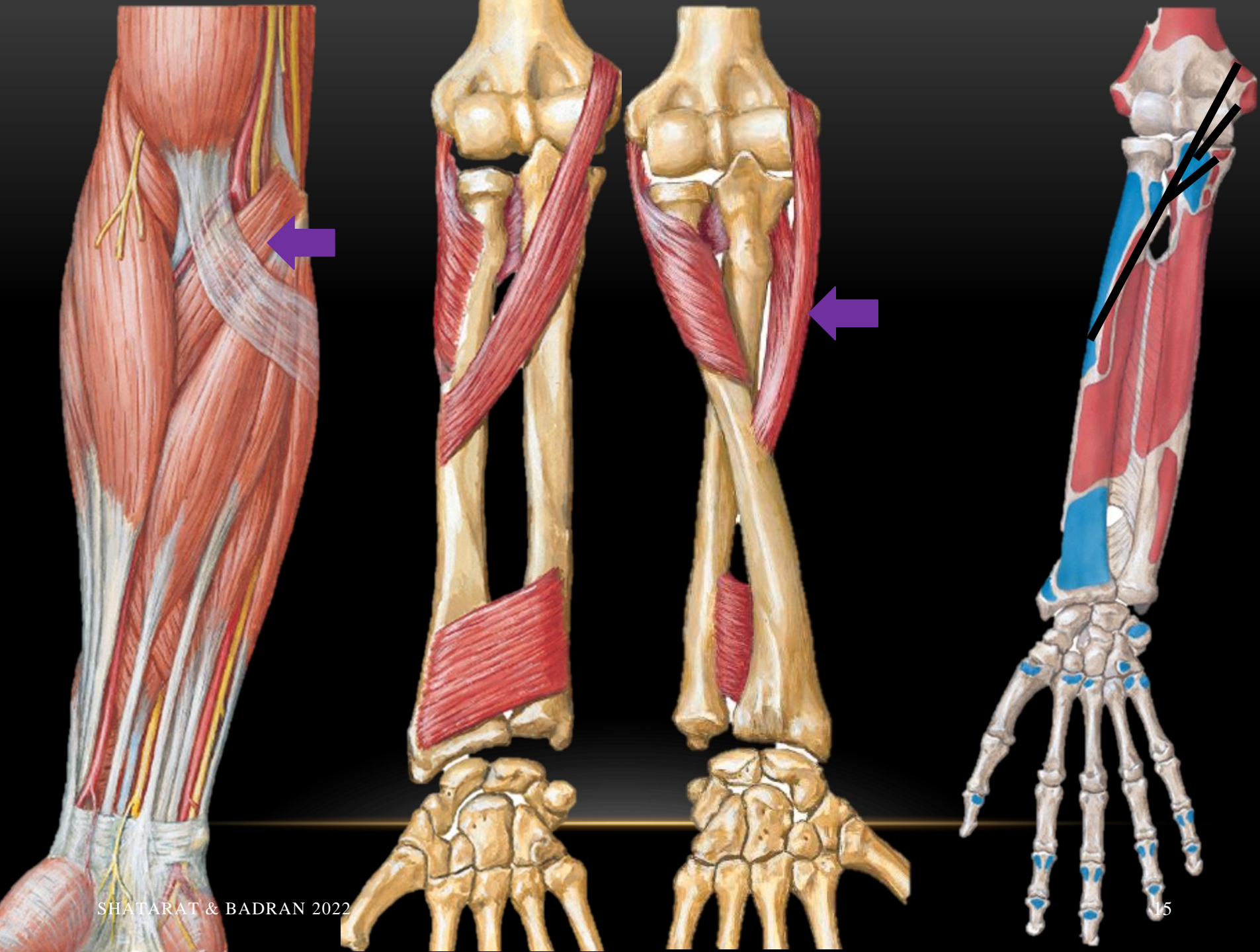
Insertion: Into the rough area at the middle of the lateral surface of the radius.

Action:

- Pronation of the forearm
- Weak flexion of the elbow

The median nerve passes between the two heads of the of the muscle.





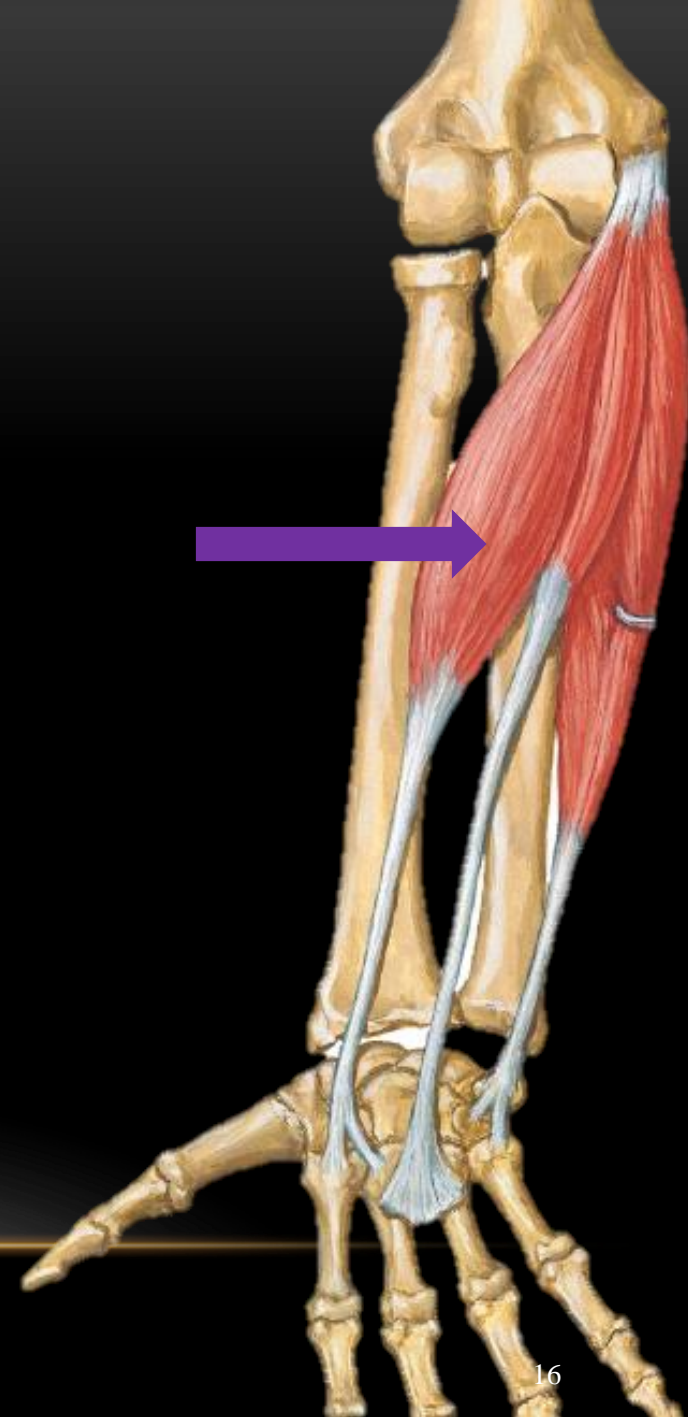
Flexor carpi radialis

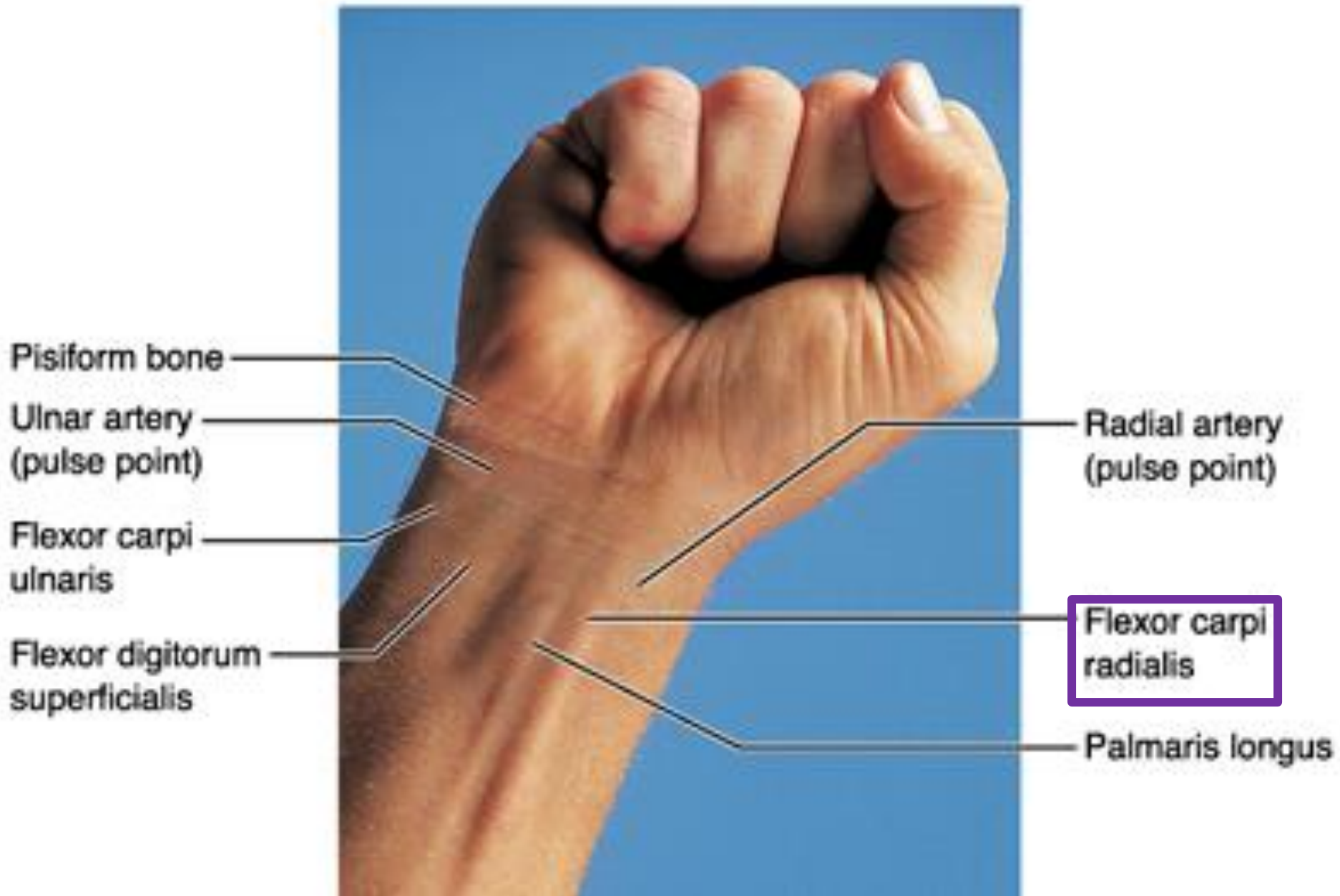
Origin: common flexor origin

Insertion: front of the bases of the 2nd and 3rd metacarpal bones.

Action:

- Flexion and abduction of the wrist
- Weak flexion of the wrist





Palmaris longus

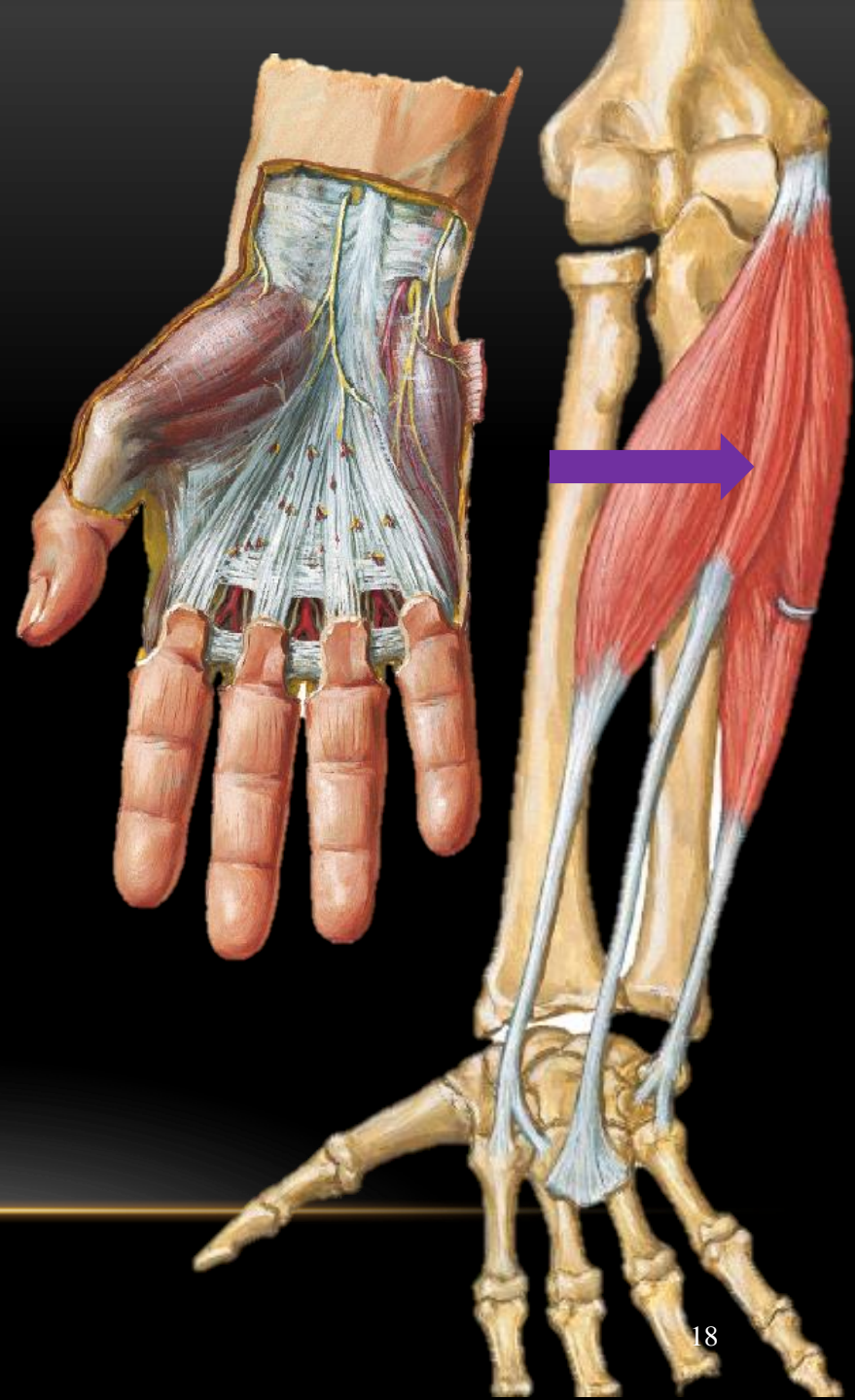
Origin: Common flexor origin.

Insertion: its tendon passes in front of the flexor retinaculum to be inserted into the apex of the palmar aponeurosis.

Action:

- Tenses the palmar aponeurosis
- Flexion of the wrist

This muscle may be absent in one or both forearms in ~ 15% of population.



The tendon of the palmaris longus muscle can be used as a tendon graft without causing any deformity or dysfunction of the forearm

Tendon of Palmaris longus Muscle



Flexor carpi ulnaris

Origin:

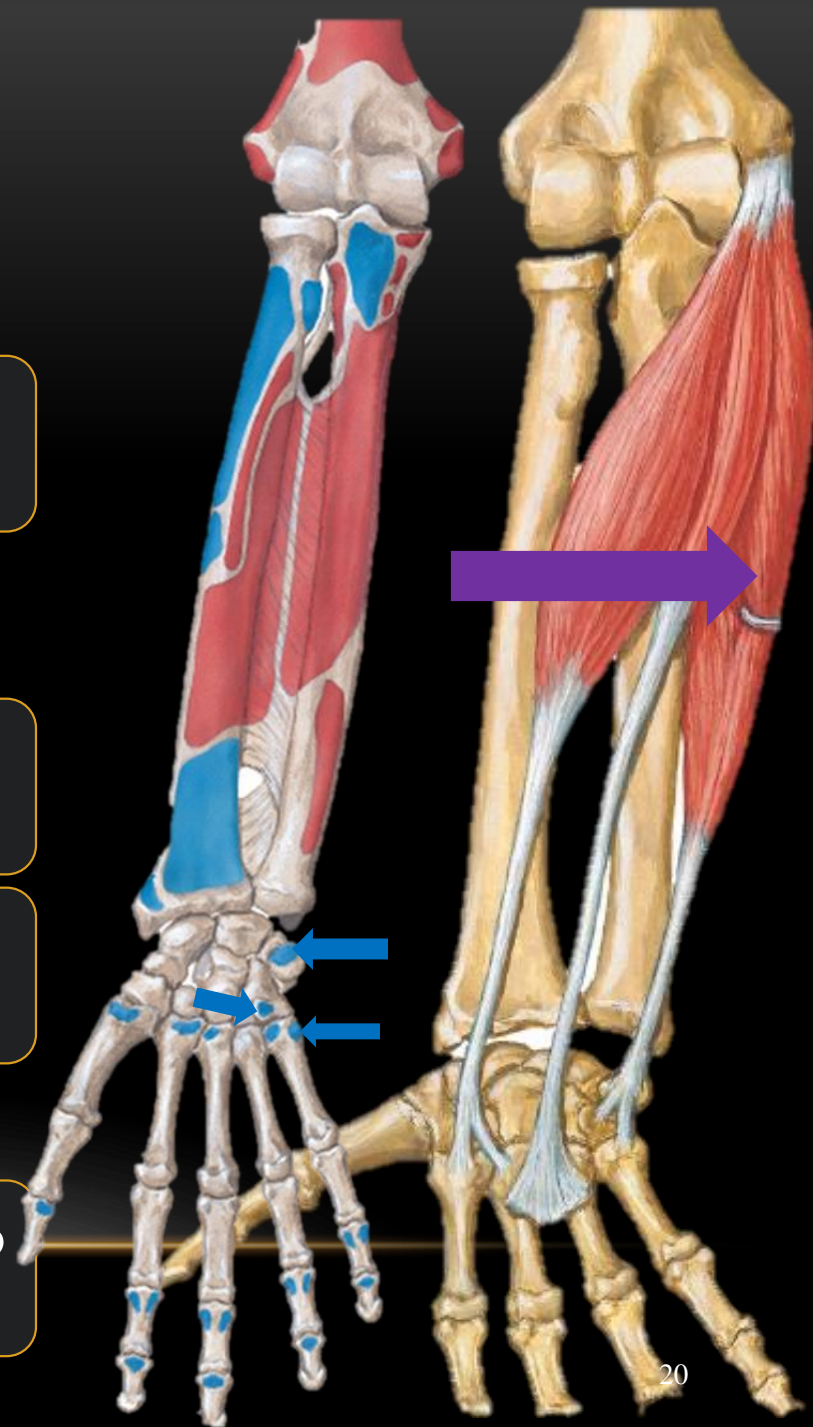
- **Humeral head:** Common flexor origin
- **Ulnar head:** ulnar aponeurosis and medial side of the olecranon process.

Insertion: Into the pisiform bone, hook of the hamate and 5th metacarpal bone.

Action:

- Flexion and adduction of the wrist
- Weak flexion of the elbow

The ulnar nerve passes between the two heads of the muscle.



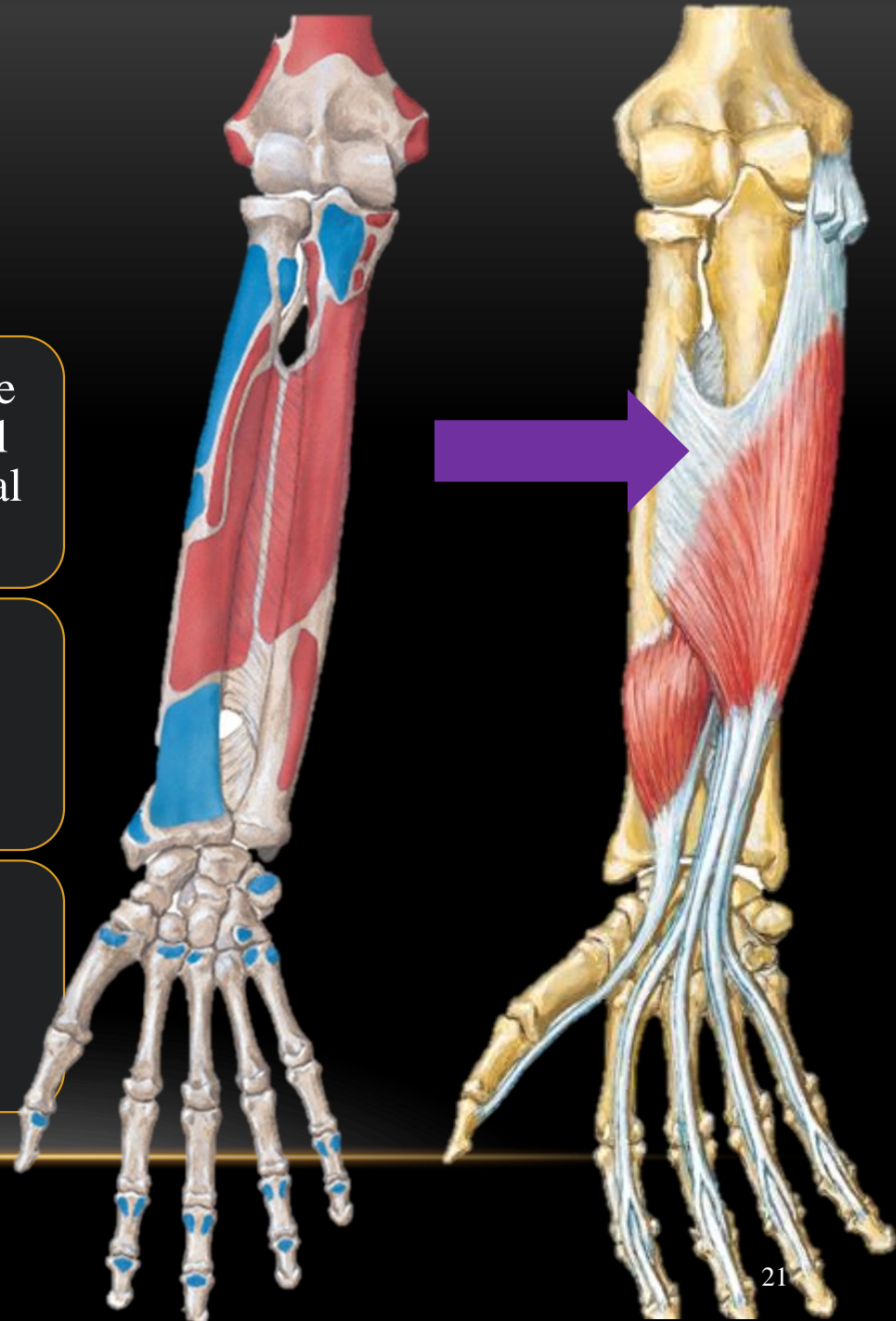
Flexor digitorum superficialis

Origin: A humero-ulnar head from the common flexor origin, ulnar collateral ligament and upper facet on the medial border of the coronoid process.

Insertion: 2 slips of each tendon are inserted into the sides of the middle phalanges of the medial 4 fingers.

Action:

- flexion of middle and proximal phalanges
- Flexion of the wrist
- Helps in flexion of the elbow



Deep Compartment

All muscles of the deep compartment of the forearm are innervated by the anterior interosseous nerve (median) Except the medial $\frac{1}{2}$ of the flexor digitorum profundus which is innervated by the ulnar nerve.

Flexor pollicis longus

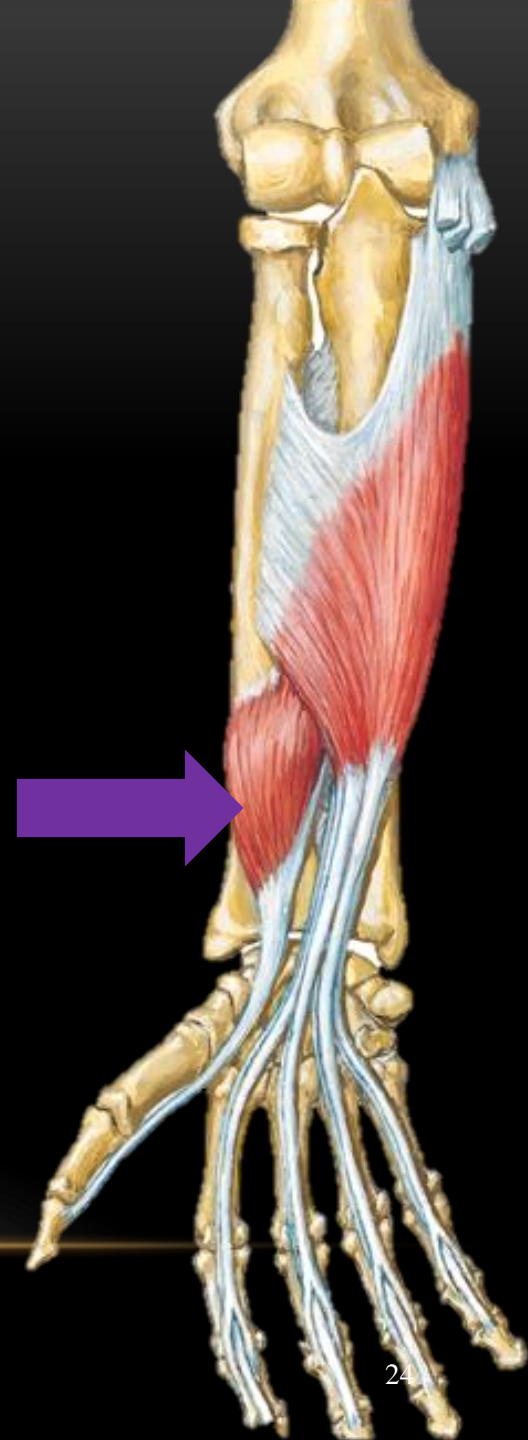
Origin:

- Upper 2/3 of the anterior surface of the radius
- Anterior surface of the interosseous membrane
- Occasionally from the medial border of the coronoid process

Insertion: Palmar surface of the base of the terminal phalanx of the thumb.

Action:

- Flexion of all joints of the thumb
- Flexion of the wrist



Flexor digitorum profundus

Origin:

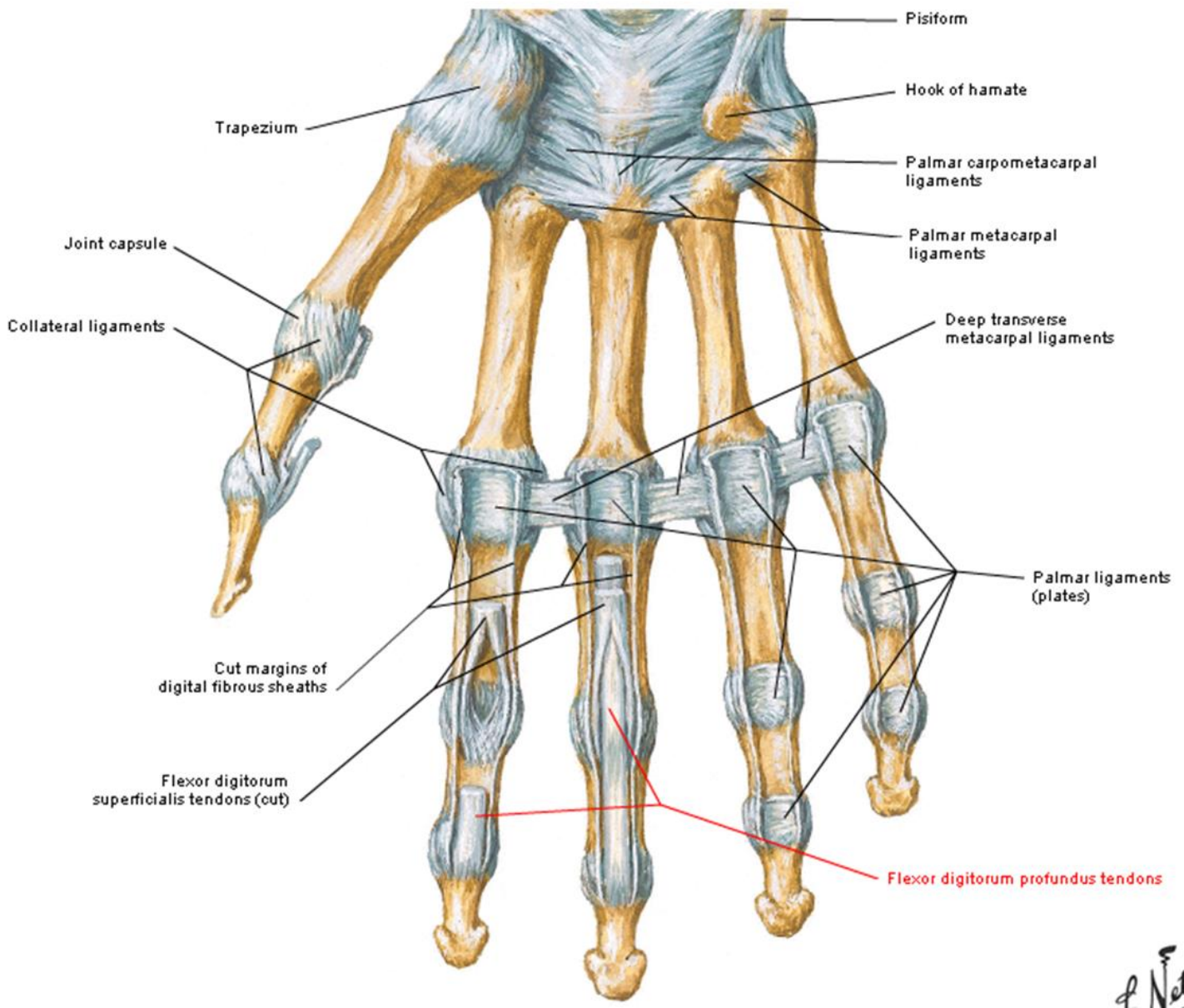
- Upper $\frac{3}{4}$ of anterior and medial surfaces of the ulna
- Upper $\frac{2}{3}$ of posterior border of the ulna
- Anterior surface of the interosseous membrane

Insertion: Into the bases of the terminal phalanges of the medial 4 fingers

Action:

- Flexion of all joints of the medial 4 fingers
- Flexion of the wrist





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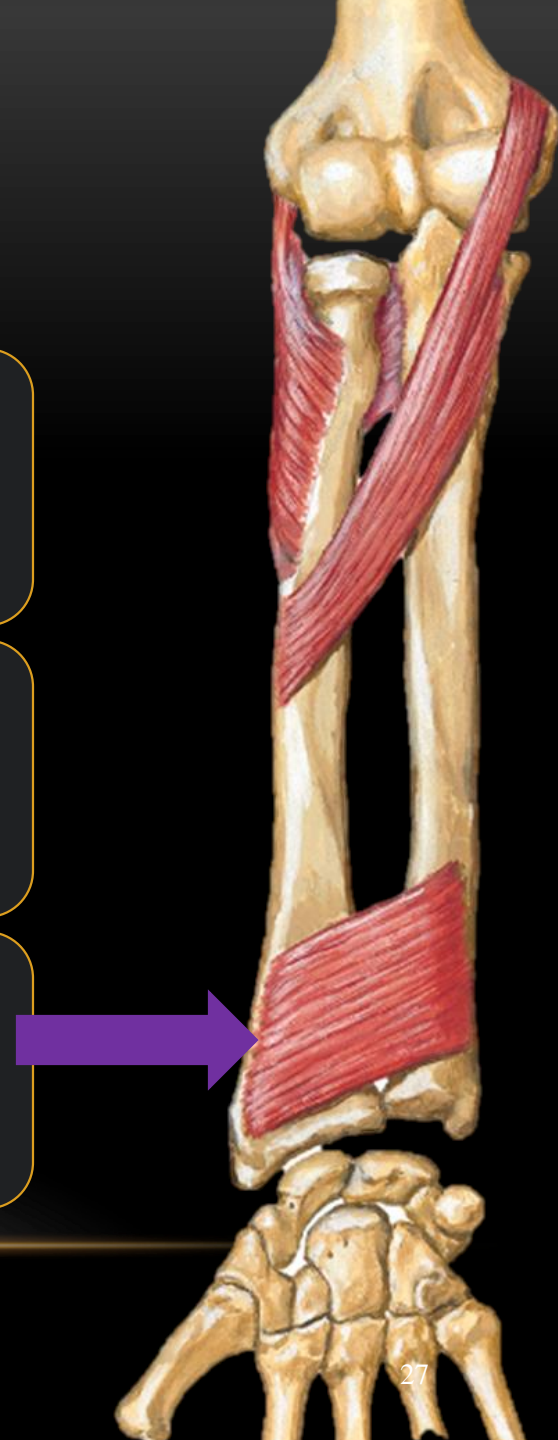
Pronator quadratus

Origin: From the oblique ridge on the anterior surface of the lower $\frac{1}{4}$ of the shaft of the ulna

Insertion: Into the front and the medial surface of the lower $\frac{1}{4}$ of the radius.

Action:

- Pronation of the forearm
- Fixes radius to ulna

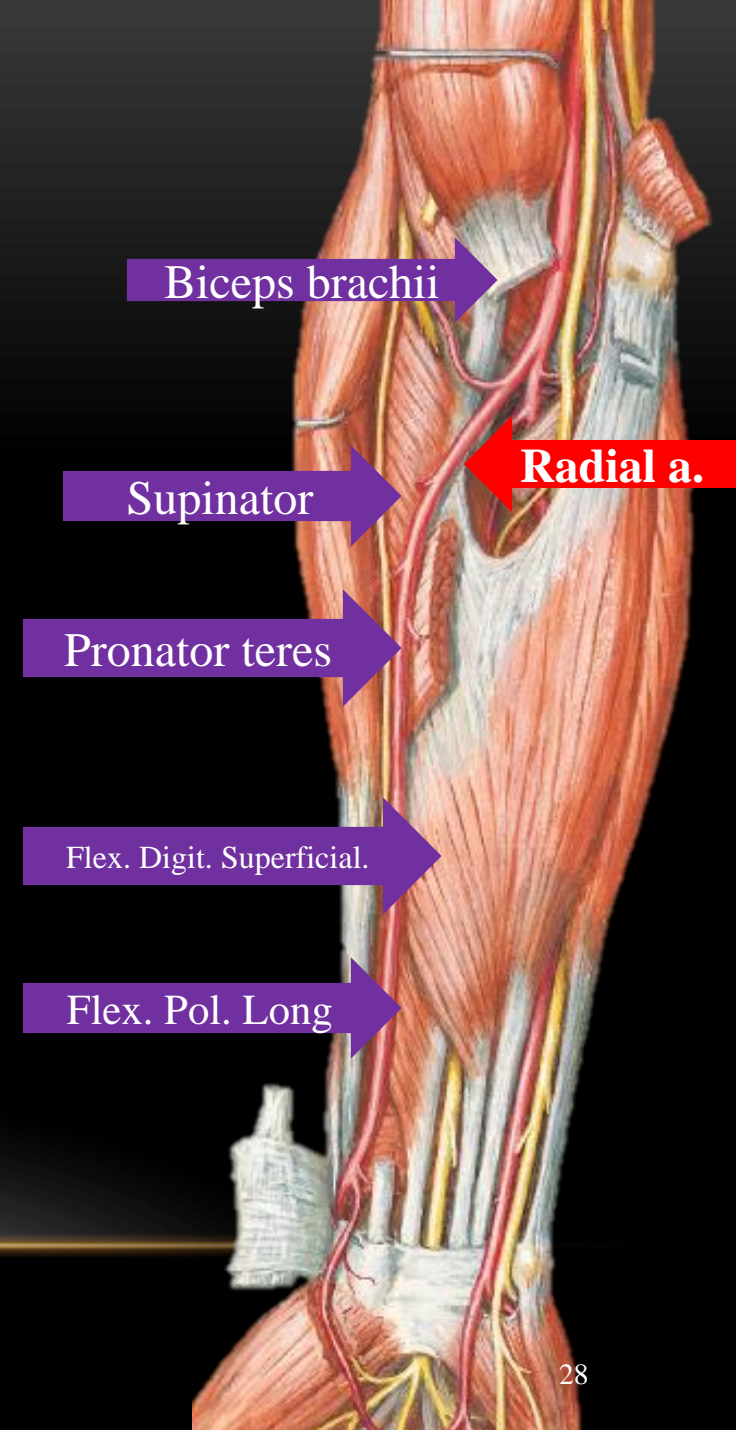


Radial artery ..1/5

The smaller of the two terminal branches of the brachial artery.

Begins at the level of the neck of the radius, accompanied by 2 vena comitantes and lies successively on the following structures:

- Tendon of biceps
- Supinator muscle
- Pronator teres
- Radial origin of flexor digitorum superficialis
- Flexor pollicis longus
- Anterior surface of the lower end of the radius

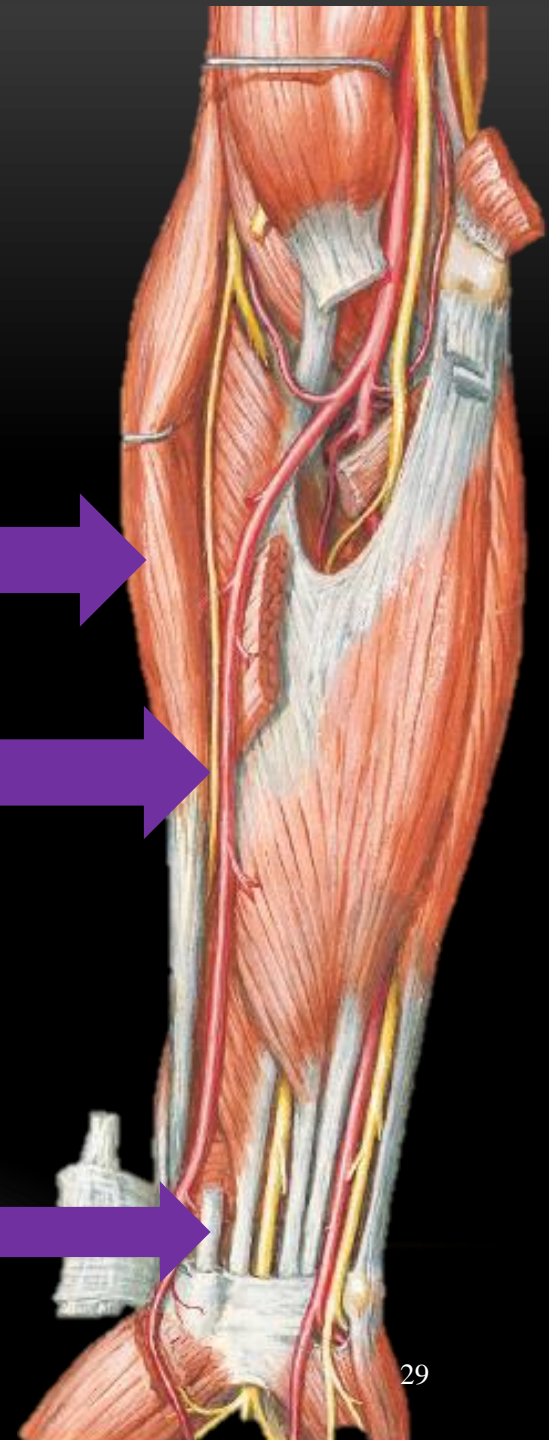


Radial artery ..2/5

Covered by brachioradialis above and becomes superficial in the lower part of the forearm.

Accompanied by the superficial radial nerve on its lateral side.

The tendon of flexor carpi radialis lies on its medial side in the lower part of the forearm



Radial artery ..3/5

The artery make a curve laterally at the wrist.

Runs deep to the tendons of abductor pollicis longus and extensor pollicis brevis

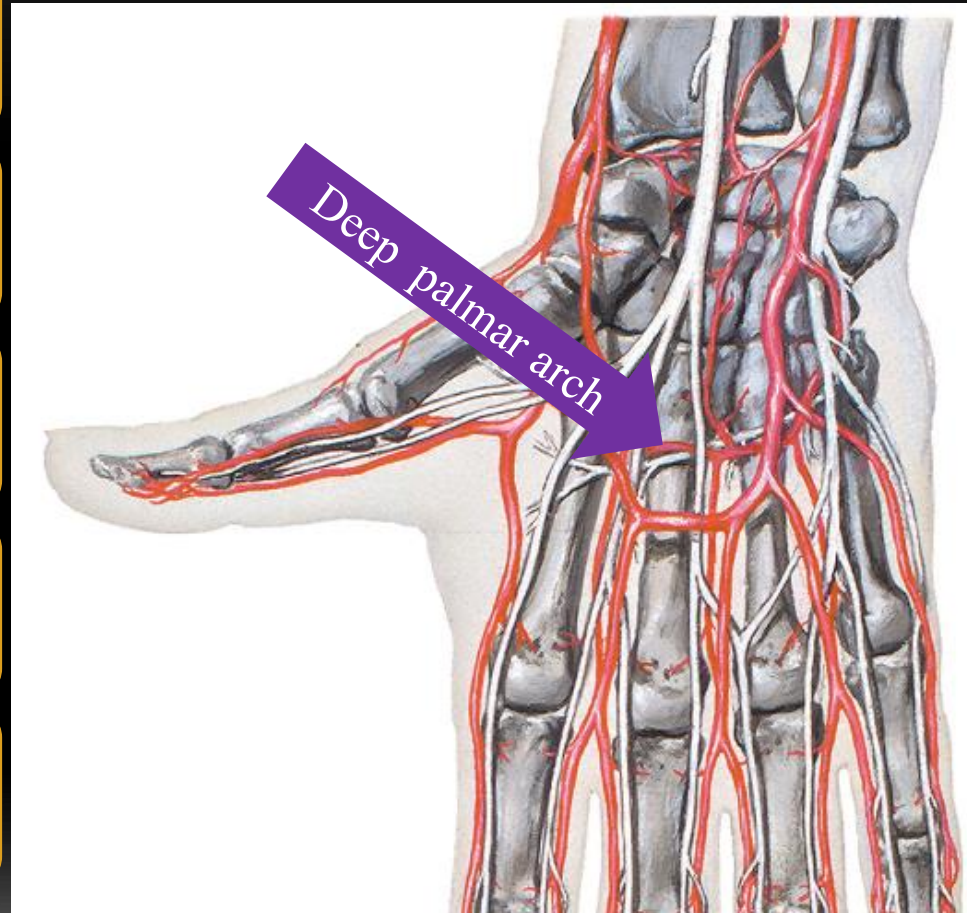
Enters the anatomical snuff box then passes deep to the tendon of extensor pollicis longus

Passes between the 2 heads of the 1st dorsal interosseous muscle.

Passes between the 2 heads of the adductor pollicis muscle

Curves medially and terminates as the deep palmar arch

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Radial artery ..4/5

Branches:

- Radial recurrent
- Muscular
- Anterior (palmar) carpal
- Superficial palmar
- Posterior (dorsal) carpal
- First dorsal metacarpal
- Dorsal digital
- Prinicipis pollicis
- Radialis indicis



Relations of the radial artery 5/5

Throughout its whole length the radial artery is closely accompanied by **venae comitantes**.

At first, it lies between the pronator teres and the brachioradialis, and is overlapped to a variable extent on the lateral side by the fleshy belly of the brachioradialis.

Lower down, the brachioradialis is on its lateral side, and the flexor carpi-radialis on its medial side; and so they remain as far as the wrist.

The radial nerve lies along its lateral side in the middle third of the forearm; higher up, the nerve is separated from the vessel by a slight interval; and, distally, the nerve leaves the artery and turns round the lateral margin of the forearm, under cover of the tendon of the brachioradialis.



Ulnar artery

The larger of the two terminal branches of the brachial artery.

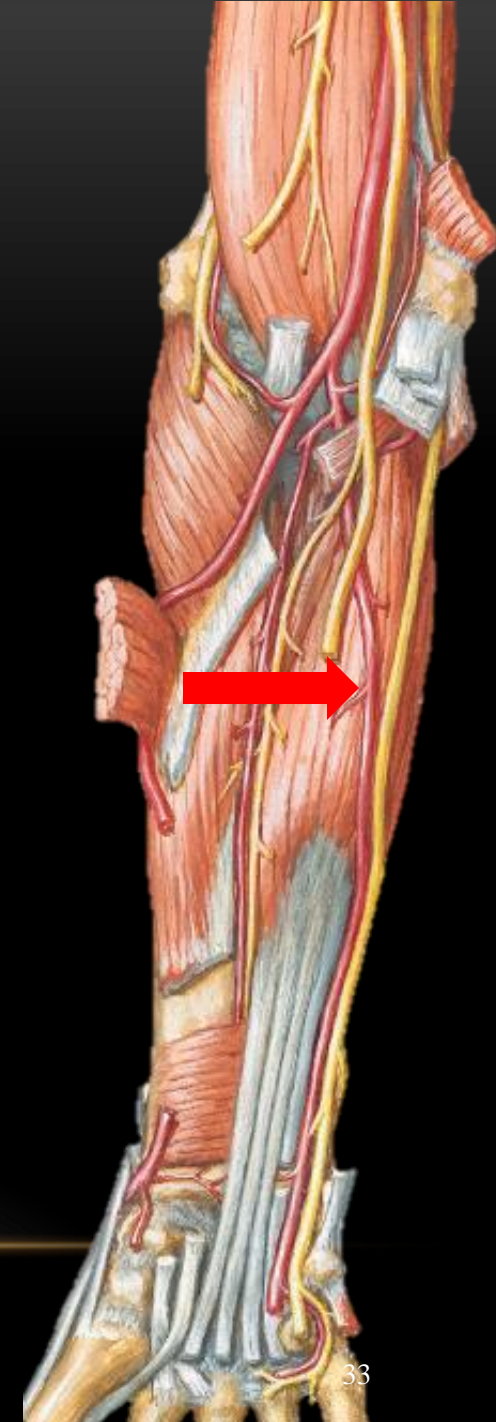
Its upper 1/3 passes obliquely downwards and medially on the brachialis and flexor digitorum profundus (covered by the 5 superficial muscles).

Its lower 2/3 is vertical running on the flexor digitorum profundus.

The last 5 cm in the forearm are superficial.

Passes over the flexor retinaculum deep to palmaris brevis.

Continues into the hand as the superficial palmar arch.



Branches of the ulnar artery.. 1

Anterior ulnar recurrent: arise just below the elbow and ascends between brachialis and pronator teres in front of the medial epicondyle. Anastomoses with ulnar collateral artery.

Posterior ulnar recurrent: arise just below the elbow and ascends behind the medial epicondyle. Anastomoses with ulnar collateral arteries.



Branches of the ulnar artery.. 3

Common interosseous artery: it is a small trunk that arises just below the radial tuberosity and passes backwards to the upper border of the interosseous membrane, it divides into:

- **Anterior interosseous**: descends between the flexor pollicis longus and flexor digitorum profundus. It pierces the lower end of the interosseous membrane and passes backwards to anastomose with the posterior interosseous artery.
- **Posterior interosseous**: it's a small artery that supplies (partially) muscles of the posterior compartment.



Ulnar nerve

Enters the forearm between the 2 heads of the flexor carpi ulnaris.

Runs between the flexor carpi ulnaris and flexor digitorum profundus.

In the lower part of the forearm it lies between the ulnar artery and flexor carpi ulnaris.

Passes in front of the flexor retinaculum lateral to the pisiform bone.

It divides into superficial and deep branches.



Ulnar nerve branches:

Muscular to the:

- Flexor carpi ulnaris
- Medial ½ of flexor digitorum profundus

Articular: to the elbow

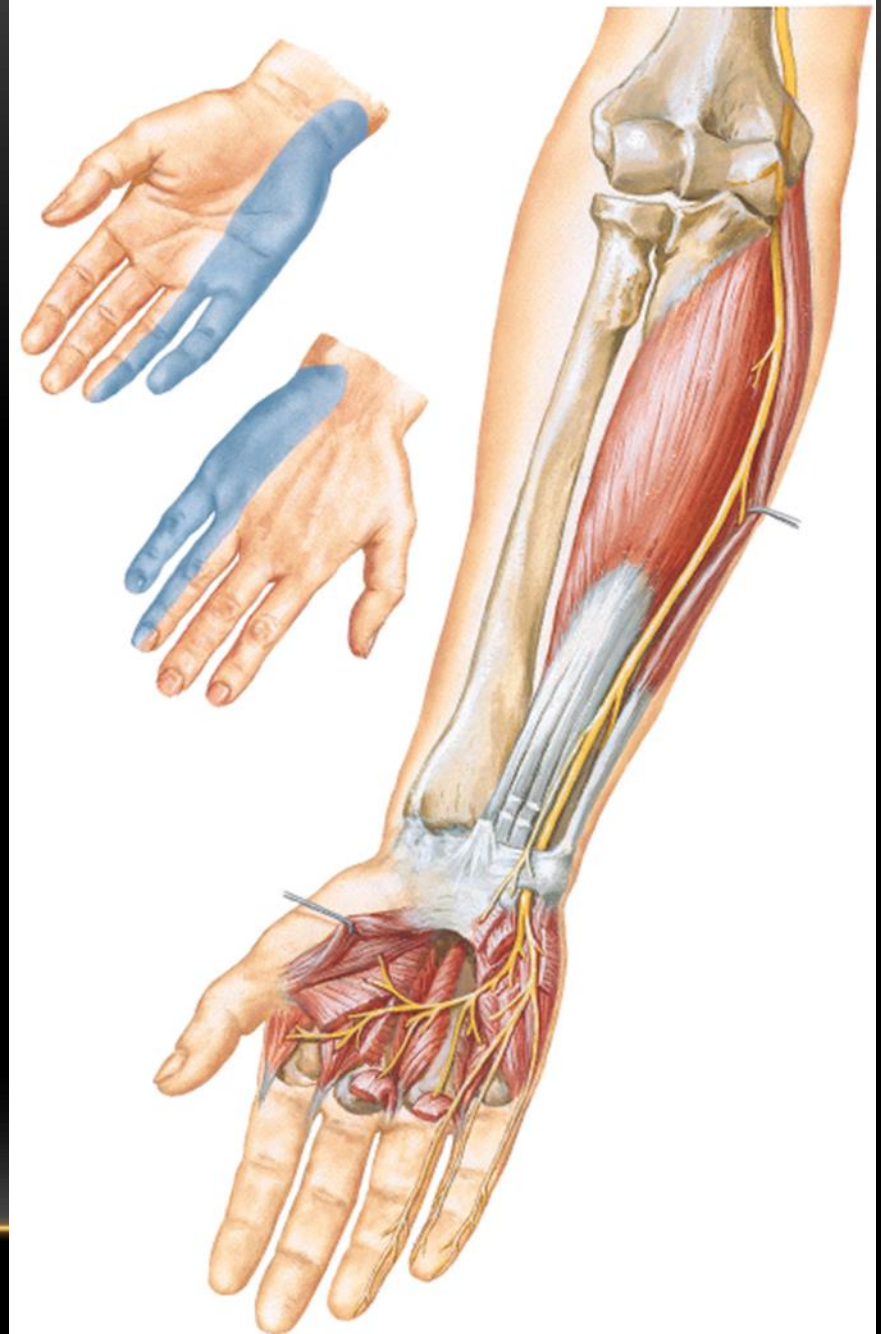
Palmar cutaneous branch: supplies the skin on the medial 1/3 of the palm.

Dorsal cutaneous branch: arises 5 cm above the elbow and supplies:

- Skin on the medial 1/3 of the dorsum of the hand
- Skin on the dorsum of the medial 1 ½ fingers.



Cutaneous innervation of the ulnar nerve in the hand



Median nerve

Enters the forearm between the 2 heads of pronator teres.

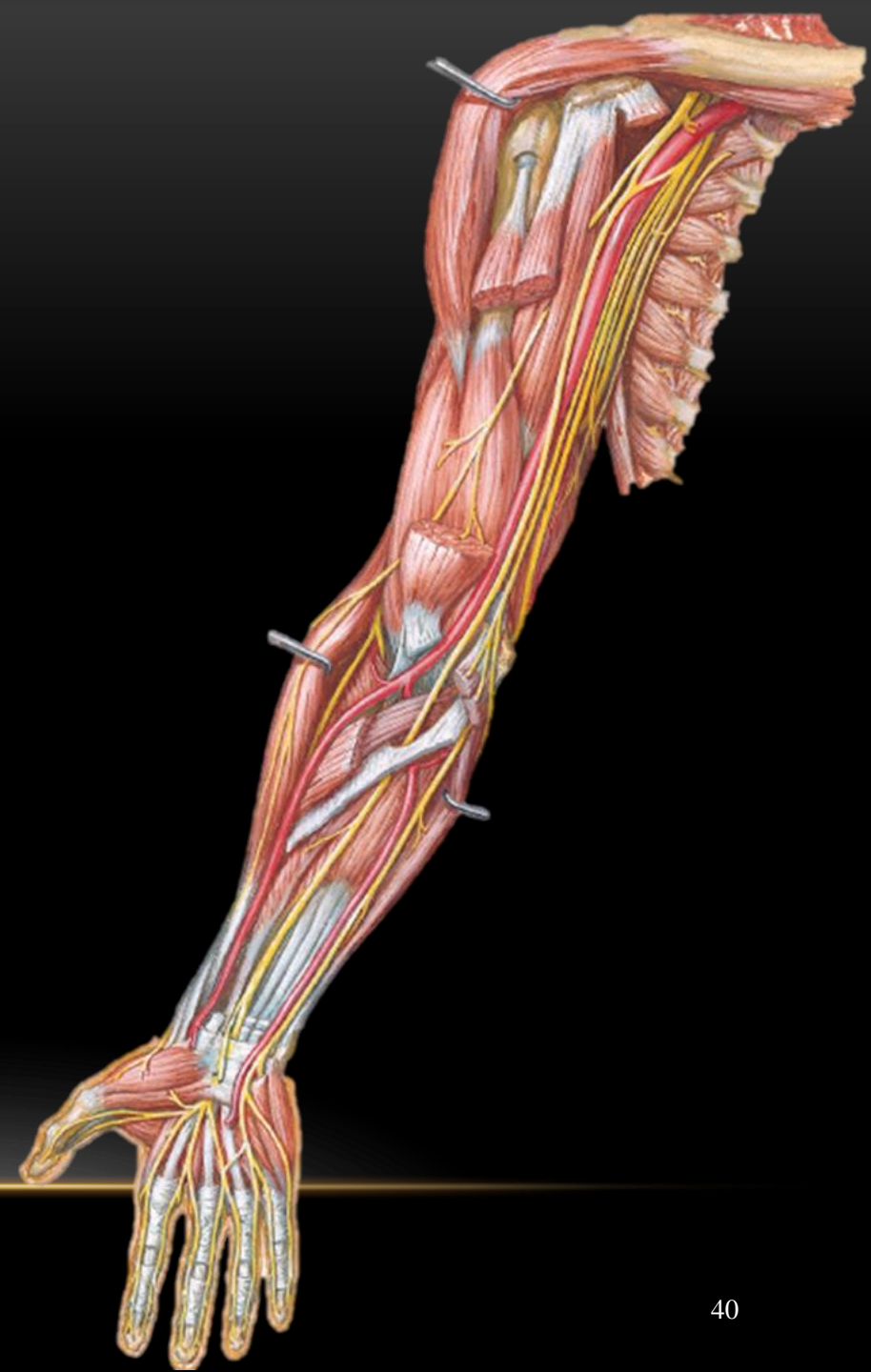
The ulnar head of the muscle separates the nerve from the ulnar artery.

Descends in the forearm between the 2 digitorum muscles.

5 cm above the wrist it becomes superficial; between the tendons of flexor carpi radialis and palmaris longus (dangerous area).

Passes to the hand deep to the flexor retinaculum.





Branches of the median nerve

Muscular:

- Pronator teres
- Flexor carpi radialis
- Flexor digitorum superficialis
- Palmaris longus

Articular: to the elbow and radio-ulnar joints

Anterior interosseous nerve:

- Muscular branches:
 - Lateral ½ of flexor digitorum profundus
 - Flexor pollicis longus
 - Pronator quadratus
- Articular to the distal radio-ulnar, wrist and carpal joints.

Palmar cutaneous branch



Flexor retinaculum (transverse carpal ligament)

It is a strong fibrous band in front of the carpal bones converting their concavity into a tunnel (carpal tunnel)

It is 3 X 3 cm.

It protects and maintains the flexor tendons in position

Flexor retinaculum (Transverse carpal ligament)

Proximally: it is continuous with the antebrachial fascia.

Distally: it is continuous with the palmar aponeurosis.

Medially: attached to the pisiform and hook of hamate.

Laterally: splits into 2 layers:

- Superficial: attached to the scaphoid tubercle and scaphoid crest.
- Deep: attached to the margin of groove on the trapezium.



Structures superficial to the flexor retinaculum

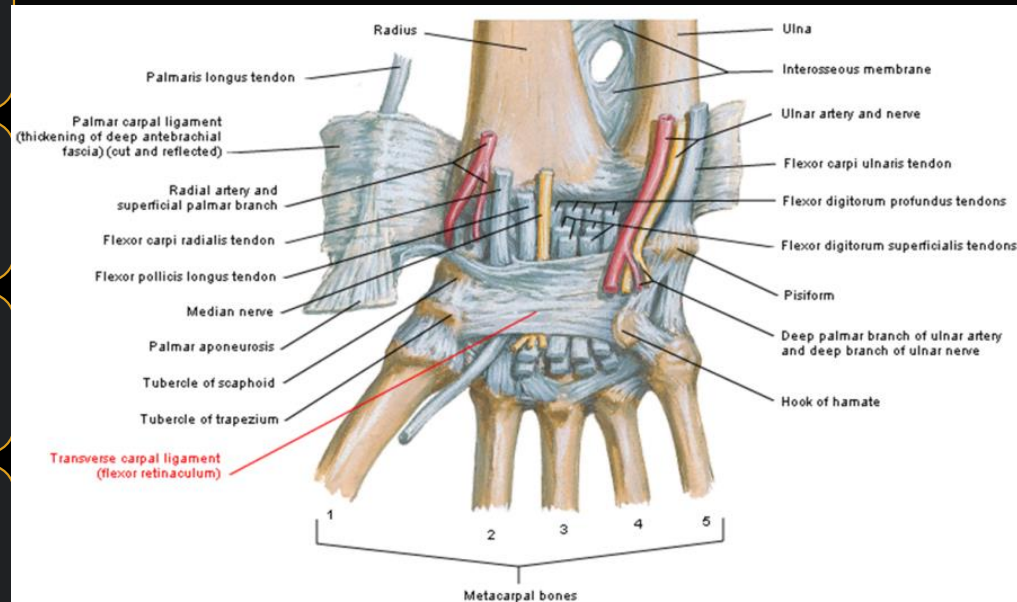
Ulnar nerve

Ulnar artery

Palmar cutaneous branch of the ulnar nerve

Tendon of palmaris longus

Palmar cutaneous branch of the median nerve



Structures deep to the flexor retinaculum

Median nerve (most superficial) (1)

Tendons of flexor digitorum superficialis and profundus in a common synovial sheath (2)

Tendon of flexor pollicis longus (most lateral) (3)

Recurrent branch from the deep palmar arch



