



ARM REGION

Subject : Anatomy
Department: B.P.T
Batch : 2021

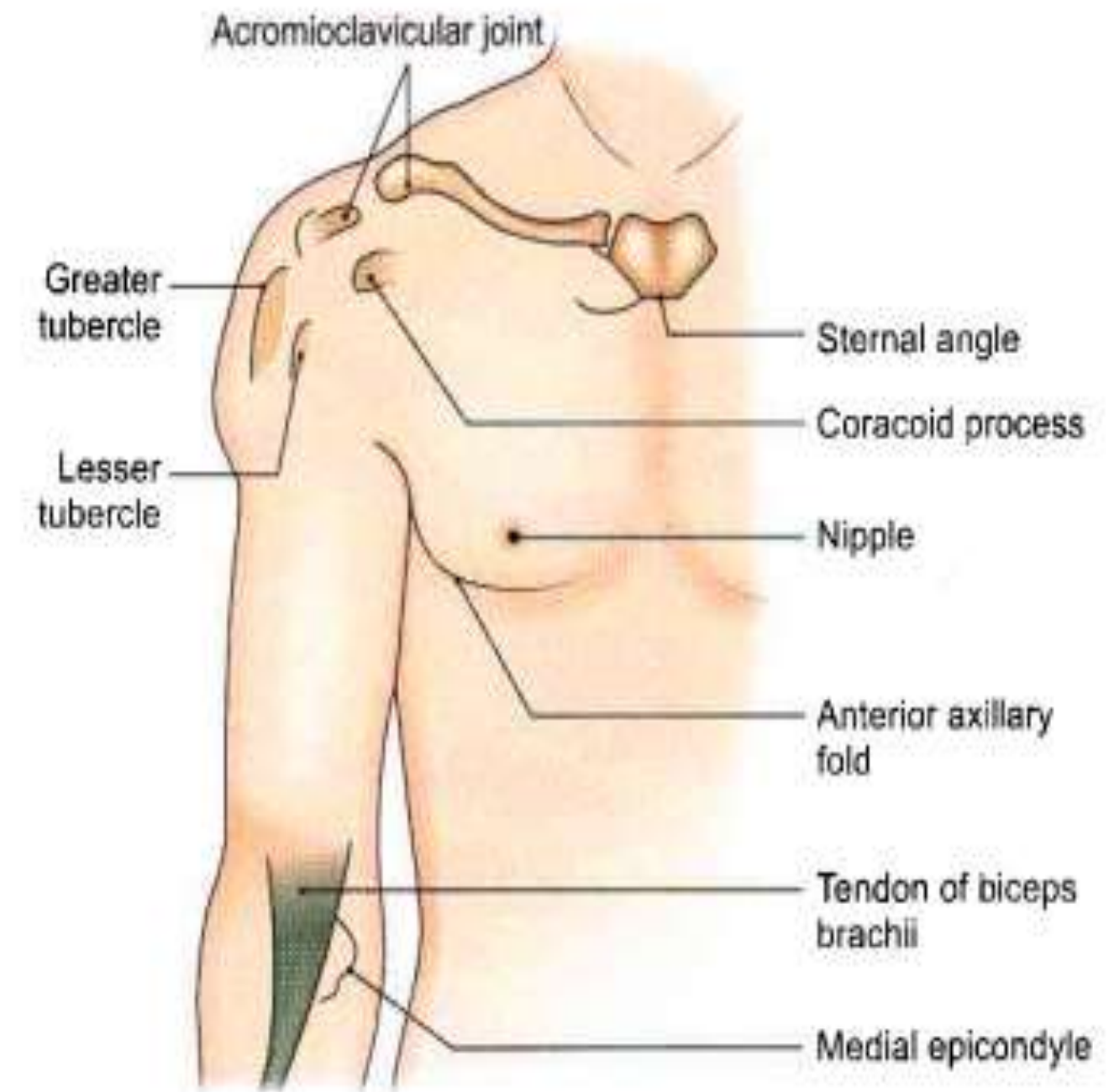
Forms the proximal lever of upper limb

Region where the muscle connects the arm and forearm



Surface Landmarks

- Greater tubercle of the humerus
- Shaft of the humerus
- Lateral epicondyle of the humerus
- Medial and lateral supracondylar ridges
- Deltoid muscle
- Biceps muscle
- Brachial artery pulsations
- Ulnar nerve
- The superficial veins in front of elbow
- Head of radius
- Olecranon process of ulna



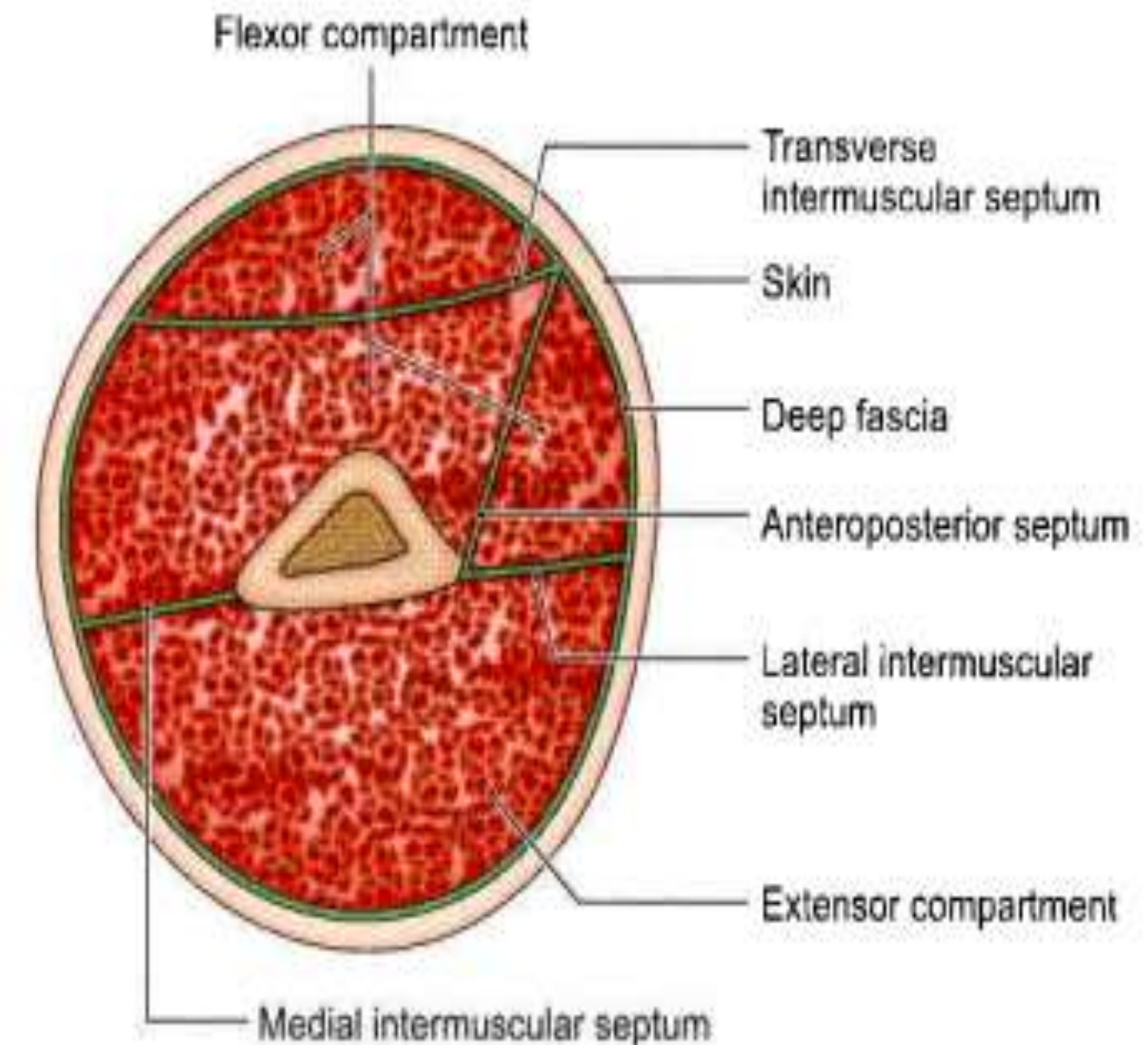
Compartments of arm

- Anterior compartment
- Posterior compartment

Separated by medial and lateral intermuscular septa

- Medial septum is pierced by the **ulnar nerve** and the **superior ulnar collateral artery**
- Lateral septum is pierced by the **radial nerve** and **anterior descending branch of the profunda brachii artery**.

Note: Septa serves as additional surface for the attachment of muscles and platform for nerve and vessels





Anterior Compartment



- **Muscles:** Biceps brachii, coracobrachialis, and brachialis.
- **Nerve:** Musculocutaneous nerve.
- **Artery:** Brachial artery.

Along with other structures these will travel:

- Median nerve.
- Ulnar nerve.
- Radial nerve

Biceps Brachii

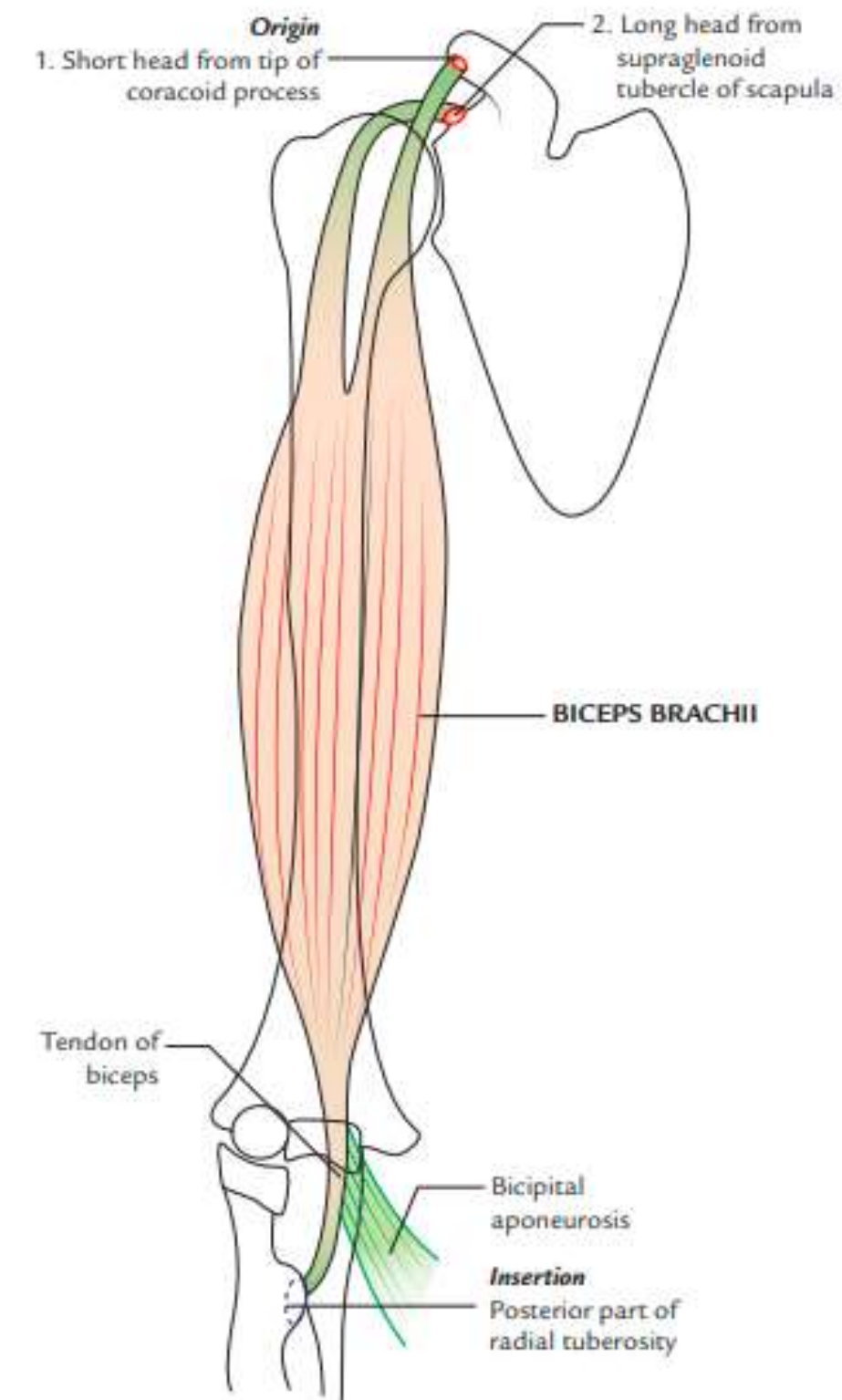
Origin:

Arises from scapula by two heads: long and short:

1. Long head – supraglenoid tubercle (intracapsular)
2. Short head - the tip of the coracoid process.

Insertion :

- the posterior part of the radial tuberosity
- the deep fascia on the medial aspect of forearm by its aponeurosis



Note: The aponeurosis protects the underlying brachial artery and median nerve.



Nerve supply:

Musculocutaneous nerve (C5, C6, and C7).

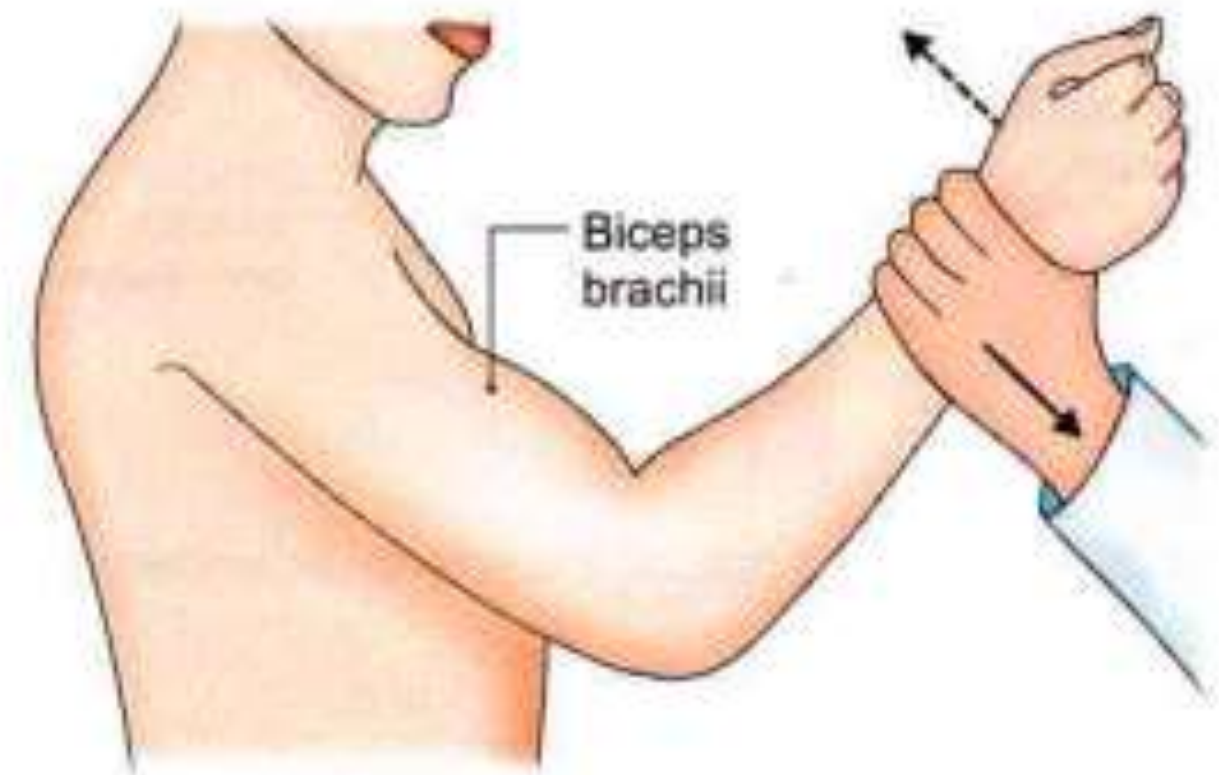
Actions :

1. It is strong supinator of the forearm, when elbow is flexed. (screwing movements)
2. It is a powerful flexor of the forearm, when elbow is extended.
3. It is also a weak flexor of the shoulder joint.

Clinical testing

Ask the patient to flex the elbow against resistance (forearm in supination).

During which, the muscle forms a prominent bulge on the front of the arm



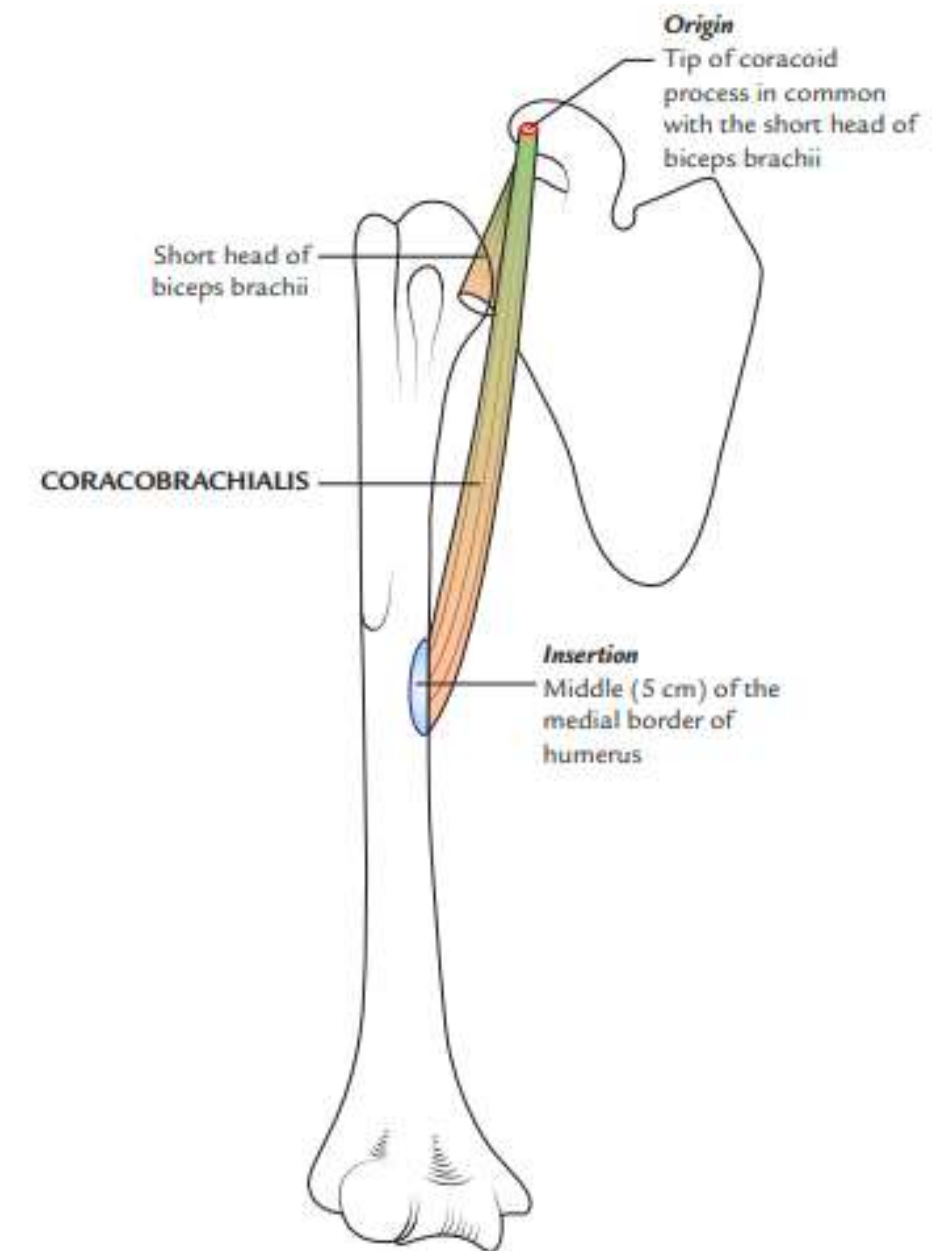
Coracobrachialis

Origin :

Tip of coracoid process of the scapula (along with short head of the biceps brachii).

Insertion :

Middle of the medial border of the shaft of the humerus.





Nerve supply:

Musculocutaneous nerve.

Actions :

- Flexes and adducts the arm at shoulder joint
- Stabilise the humeral head in the glenoid fossa when the arm is hanging freely by side.



Changes at the Level of Insertion of Coracobrachialis



Bone: The circular shaft becomes triangular below this level.

Fascial septa: septa become better defined

Muscles

- Deltoid and coracobrachialis are inserted
- Origin of :Upper end of origin of brachialis & medial head of triceps brachii.
-

Arteries

- Brachial artery passes from the medial side of the arm to its anterior aspect
- Profunda brachii artery runs in the spiral groove
- Superior ulnar collateral artery originates from the brachial artery

The nutrient artery of the humerus enters the bone.

Brachialis

Origin :

- Lower half of the front of the humerus (anteromedial and anterolateral surfaces) and the - anterior border
- Medial and lateral intermuscular septa

Insertion :

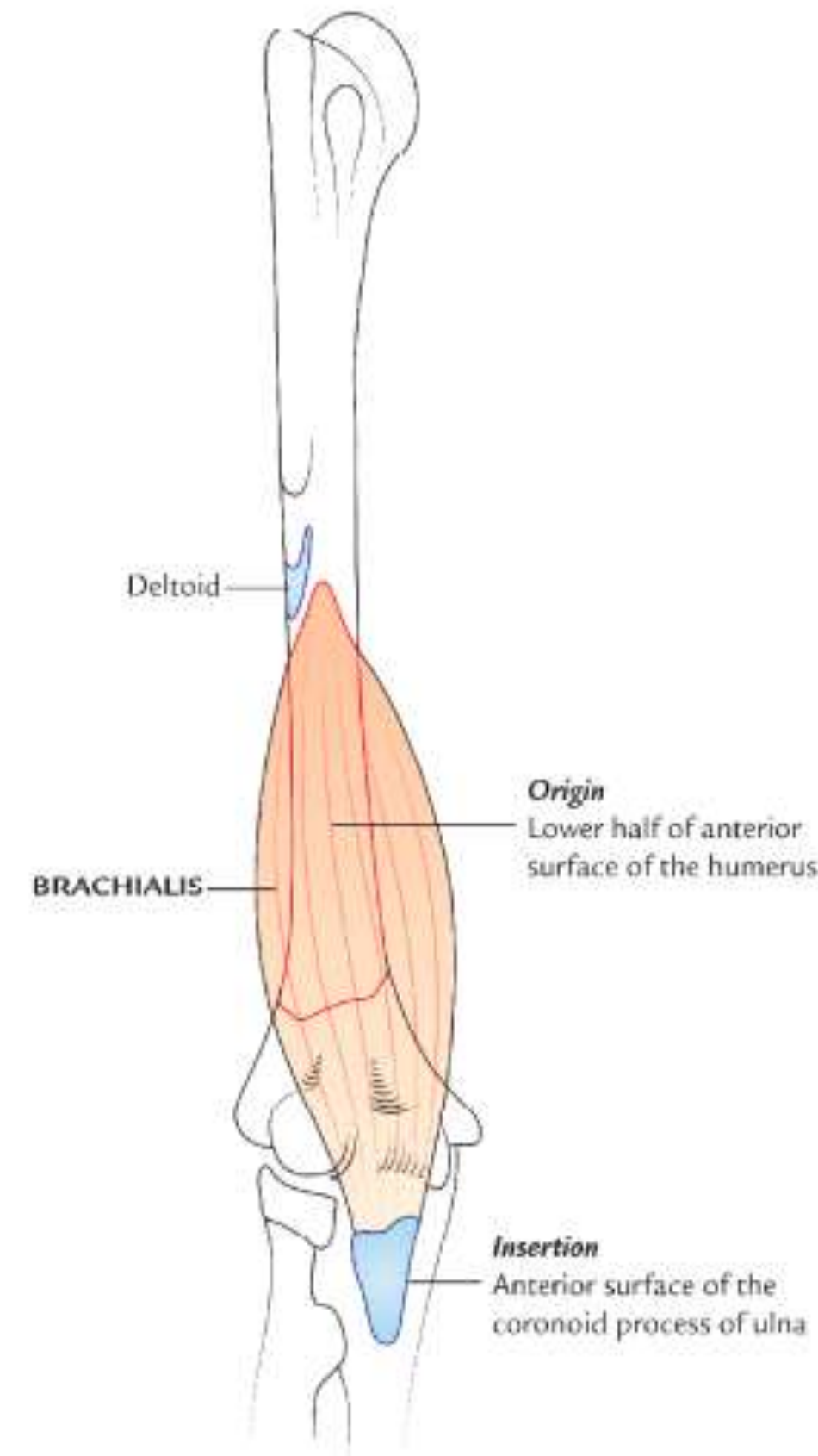
- Coronoid process and ulnar tuberosity .
- Rough anterior surface of the coronoid process of the ulna

Nerve supply :

- Musculocutaneous nerve is motor .
- Radial nerve is proprioceptive

Action :

Flexes forearm at the elbow joint



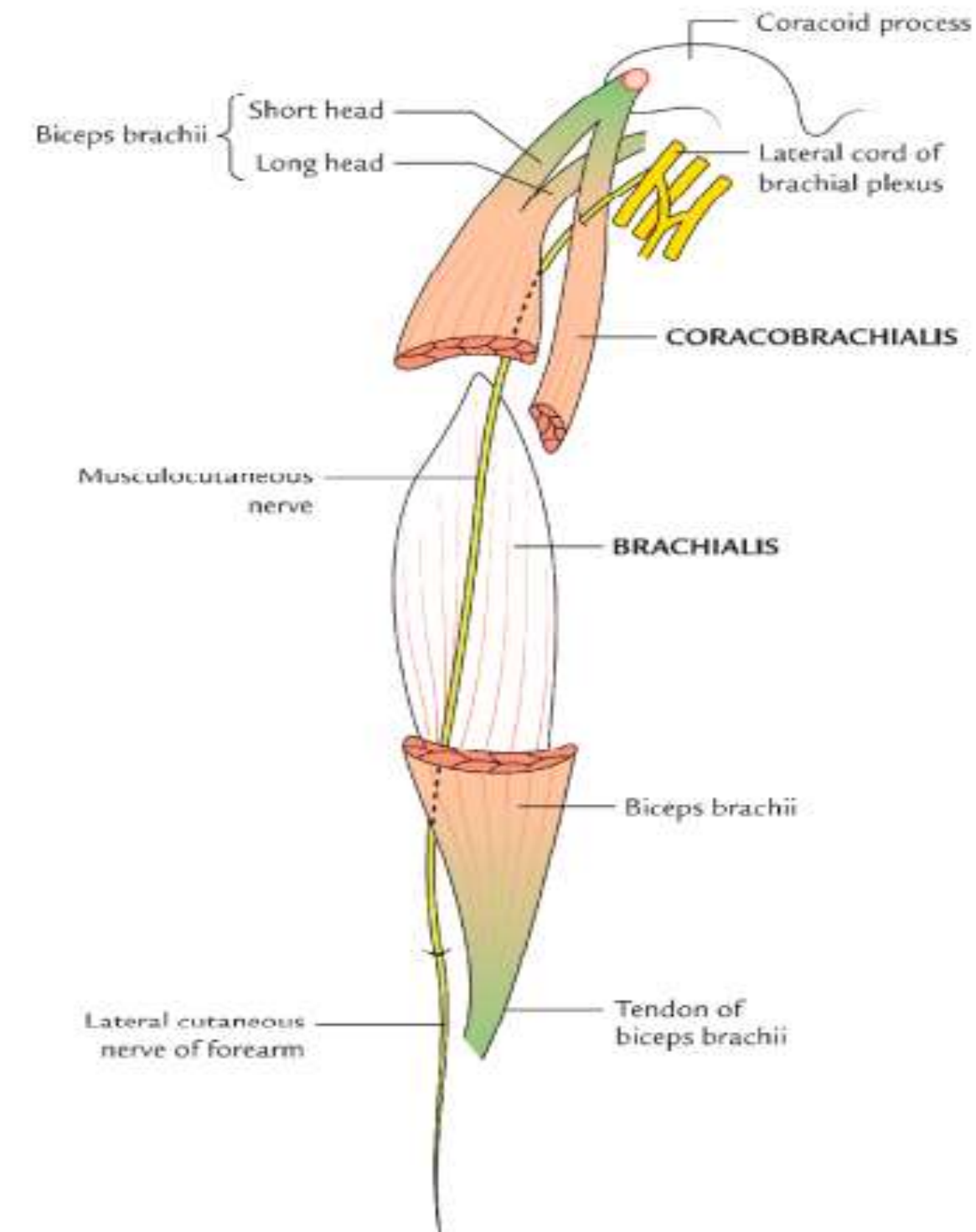
Musculocutaneous nerve

Largest branch of brachial plexus

Main nerve of the front of the arm, and continues below the elbow

Origin : Lateral cord of the brachial plexus,

Root value: Ventral rami of C5-C7



Course and Termination

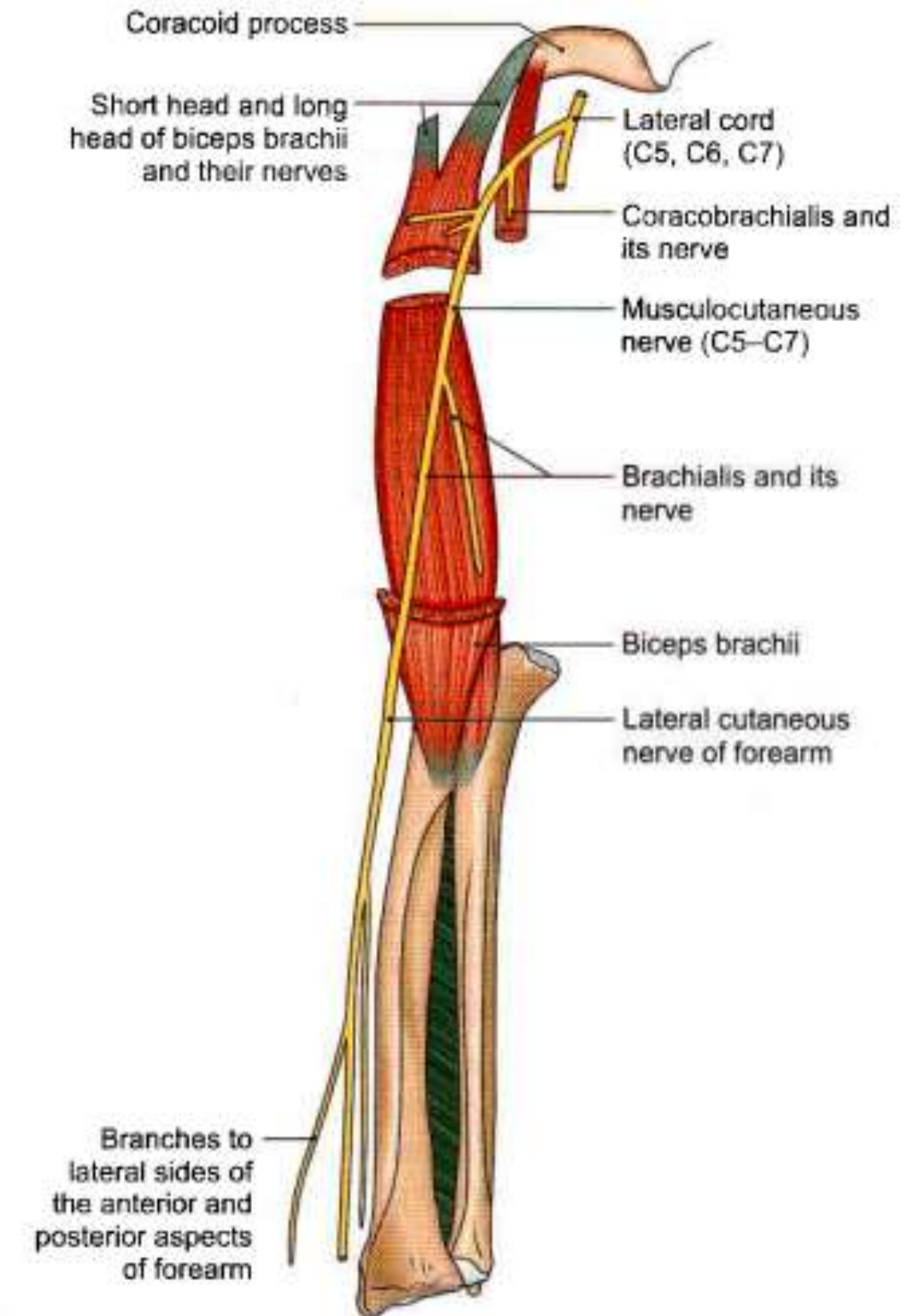
It then enters the front of arm, where it pierces coracobrachialis muscle.

In the arm :

- Runs downward and laterally between the biceps brachii and brachialis
- Reach the lateral side of the tendon of the biceps.
- It ends by piercing the fascia 2 cm above the bend of the forearm.

In the forearm :

- Enters the elbow by piercing deep fascia
- Terminates as the Lateral Cutaneous nerve of the forearm





Relations



In the lower part of the axilla: It accompanies the third part of the axillary artery

Anteriorly : Pectoralis major.

Posteriorly : Subscapularis.

Medially: Axillary artery and lateral root of the median nerve.

Laterally: Coracobrachialis.



Injury to Musculocutaneous Nerve



Rare condition.

Causes:

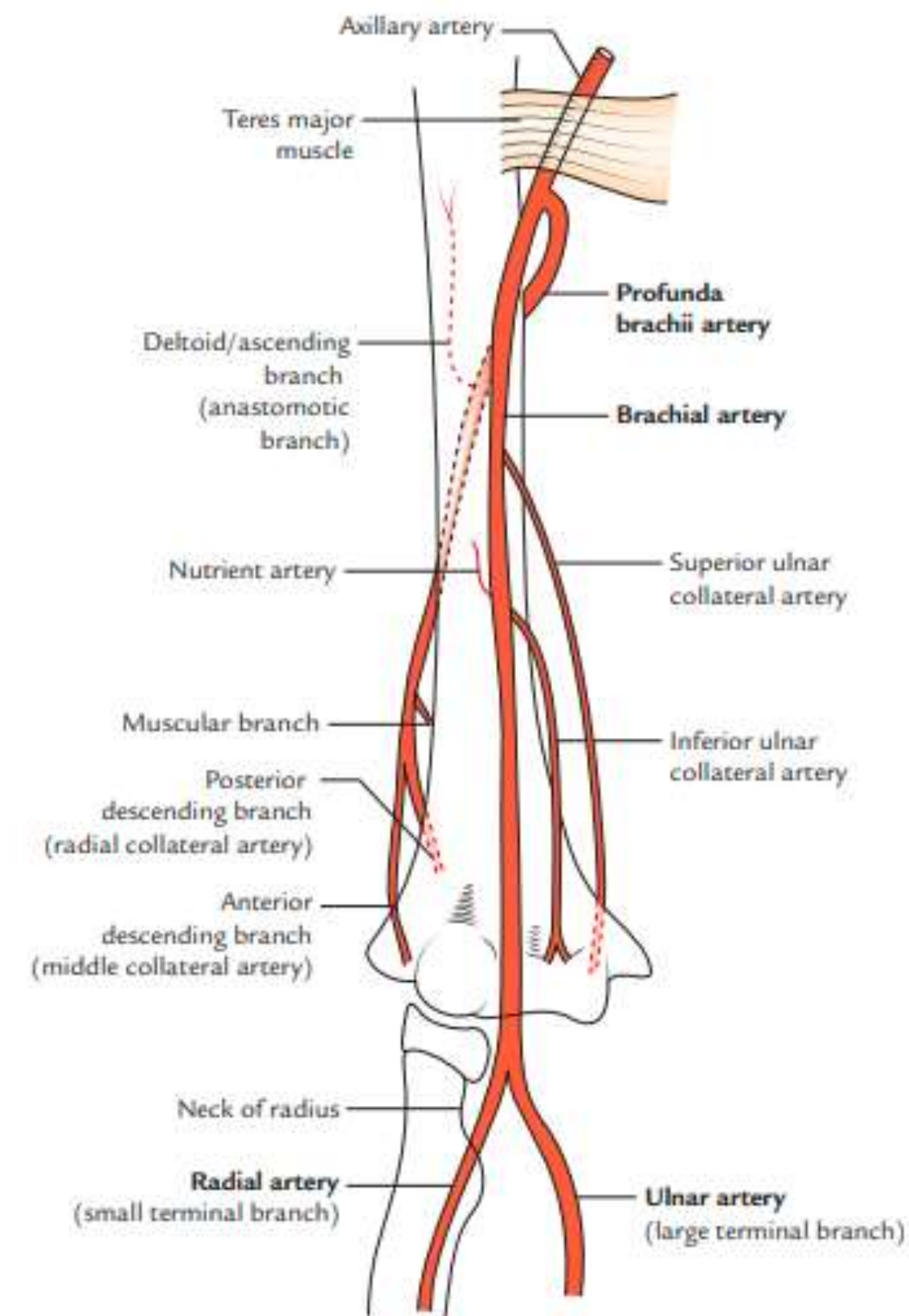
- Damage to shoulder / brachial plexus
- Impingement of nerve between biceps aponeurosis, fascia and brachialis
- Excessive extension

Produce following features:

- Loss of
 - strong flexion and supination
 - Biceps reflex (biceps jerk)
 - sensation over lateral aspect of forearm

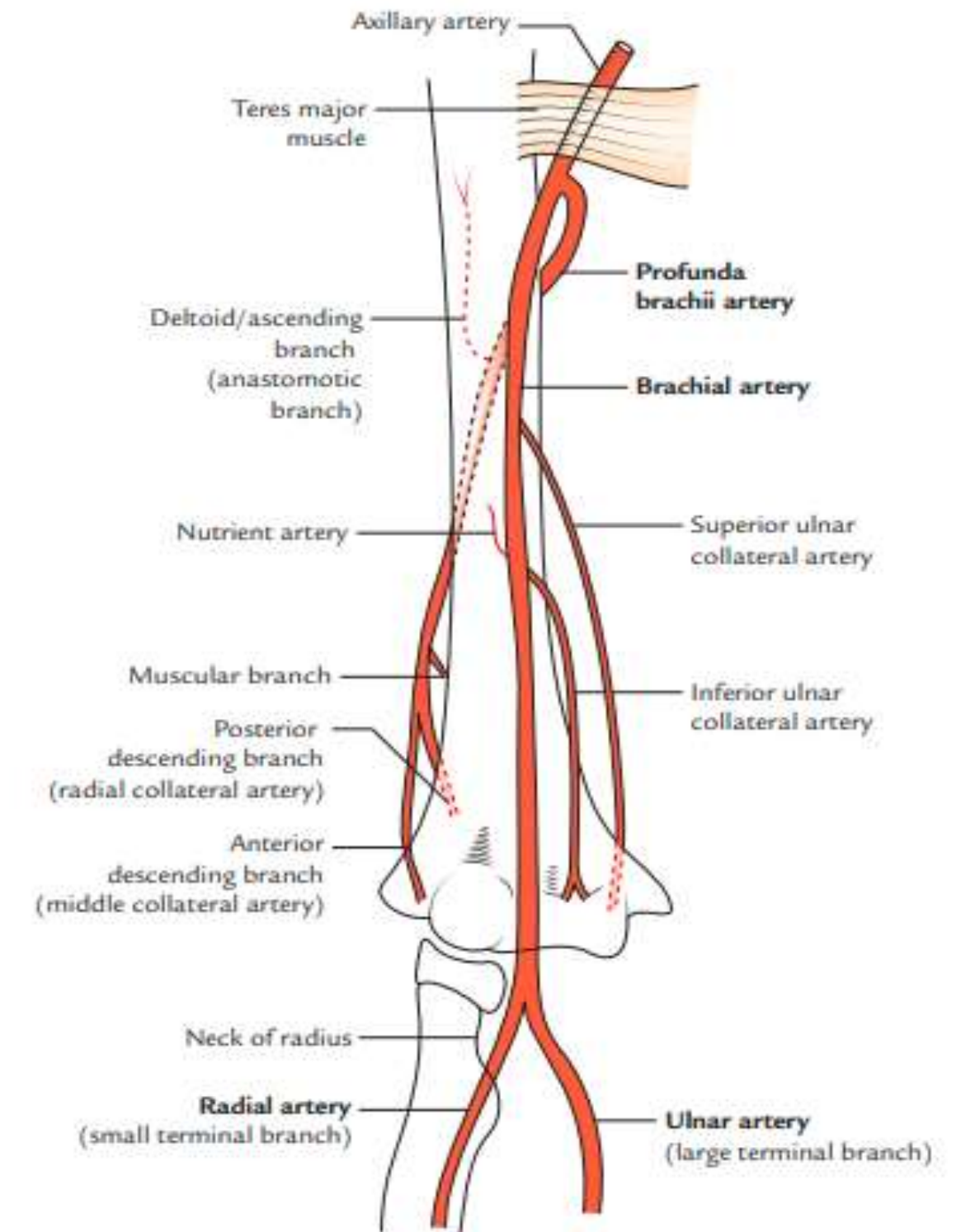
Brachial artery

- Major artery of arm
- Superficial throughout its course,
- Covered only by the skin and fasciae, hence easily accessible.
- Continuation of Axillary artery
- Ends at level of neck of radius by dividing into radial and ulnar arteries



Branches

- Muscular branches (Ant. Compartment muscles)
- Profunda brachii artery
- Nutrient artery to humerus
- Superior ulnar collateral artery
- Superior ulnar collateral artery / Superotrocheal artery
- Terminal branches
Radial and ulnar arteries



Clinical Correlation

Brachial pulse:

- Felt in the cubital fossa
- Medial to the tendon of biceps

During blood pressure monitoring →

pulsations are auscultated for recording the blood pressure.



Figure 2.1. Palpation of brachial pulse and auscultation of the brachial artery.

Compression of brachial artery

Compressed against the shaft of humerus

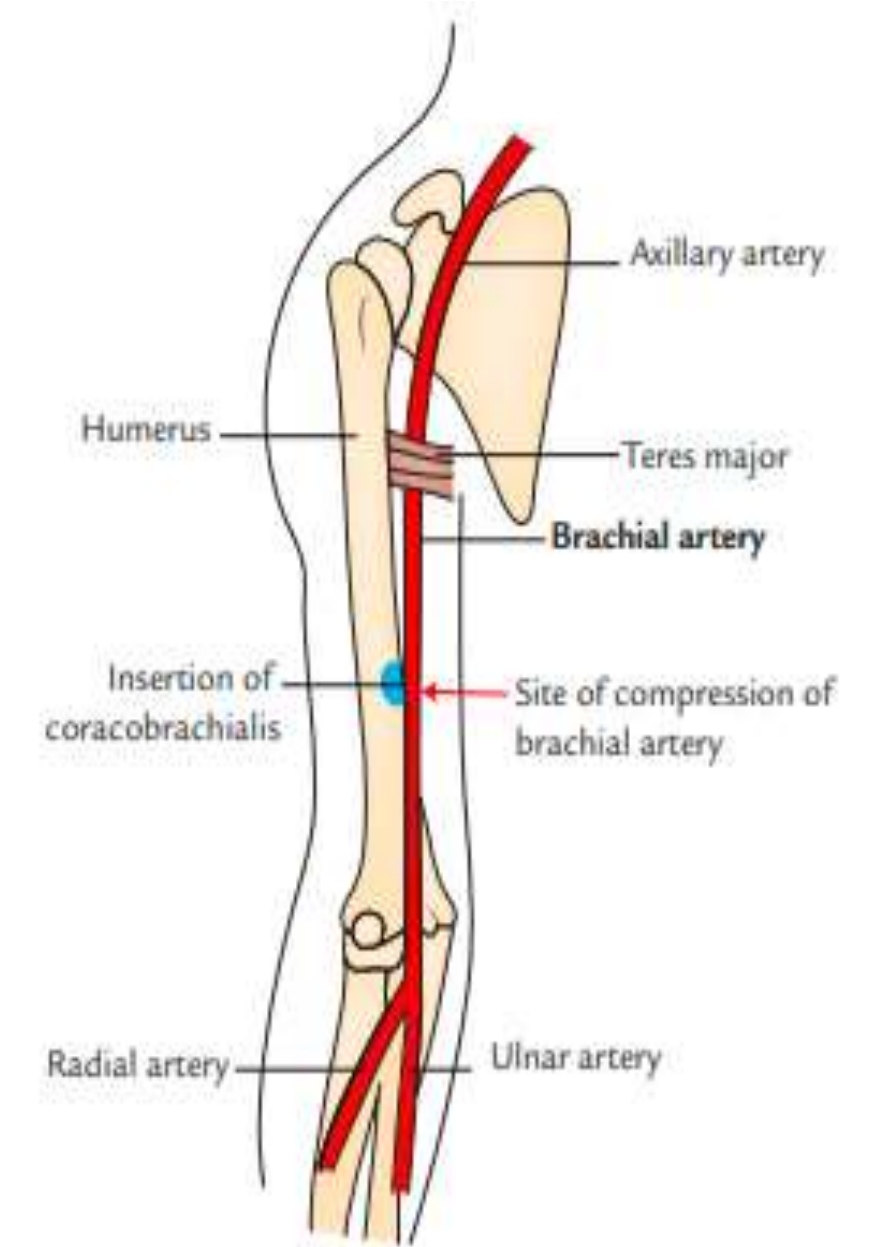
Site :

Insertion of coracobrachialis

Purpose :

Stop the hemorrhages in the upper limb from any artery distal to the brachial artery

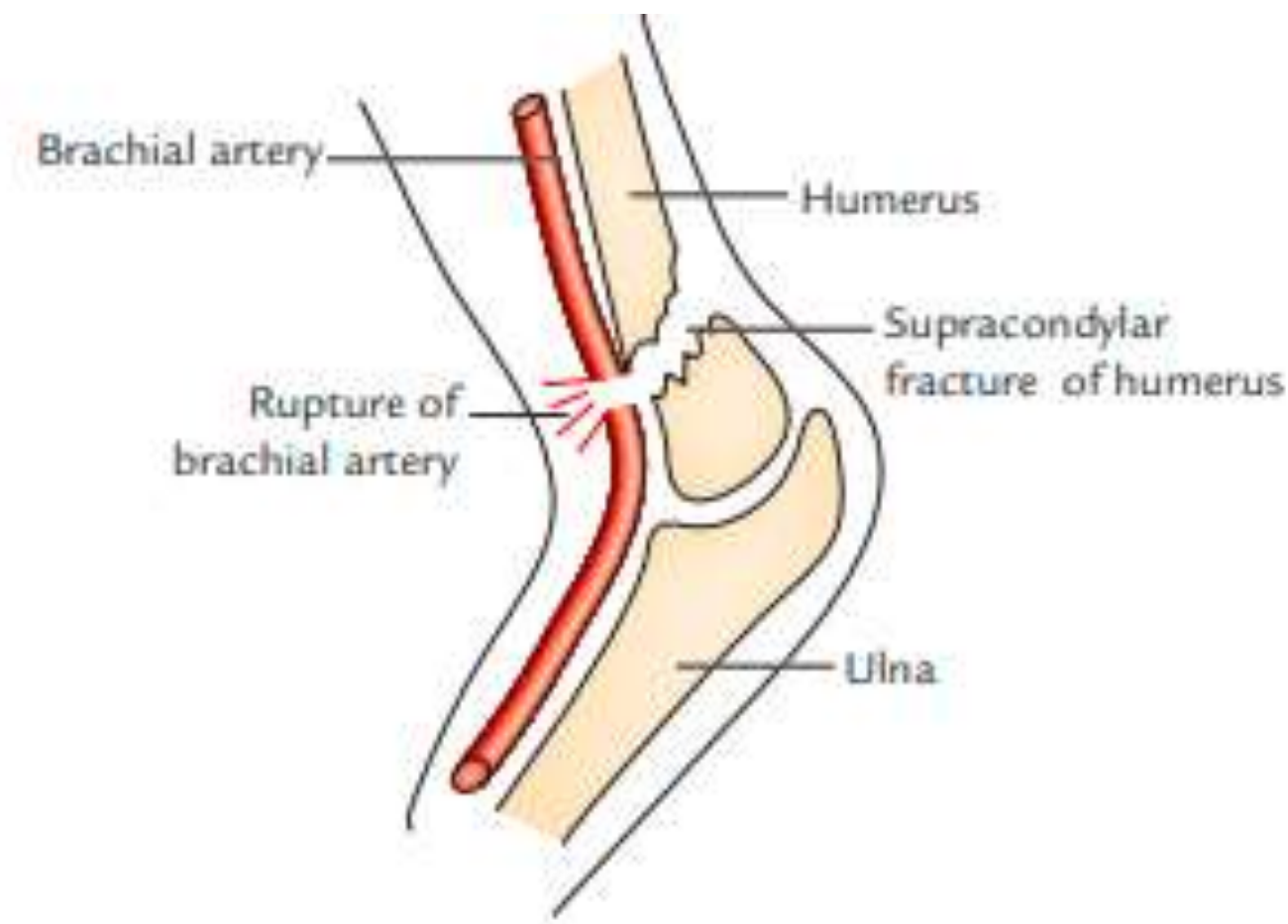
e.g., bleeding wounds of the palmar arterial arches



Rupture of the brachial artery

Cause : Supracondylar fracture of the humerus

Leads to Volkmann's ischemic contracture



Posterior Compartment of Arm

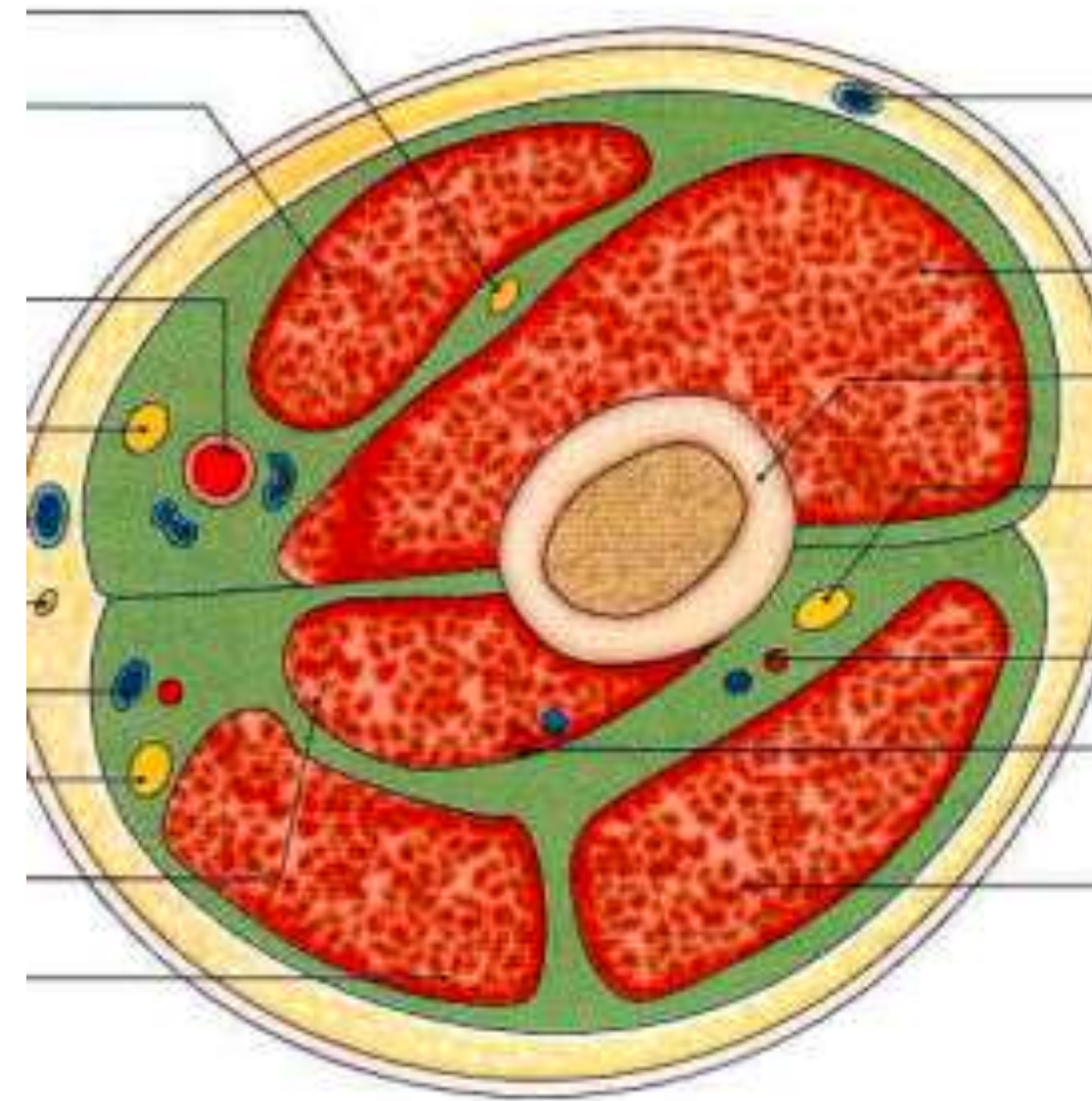
Muscle : Triceps brachii

Nerve : Radial nerve

Artery : Profunda brachii artery

Additionally

- Ulnar nerve
- Ulnar collateral arteries



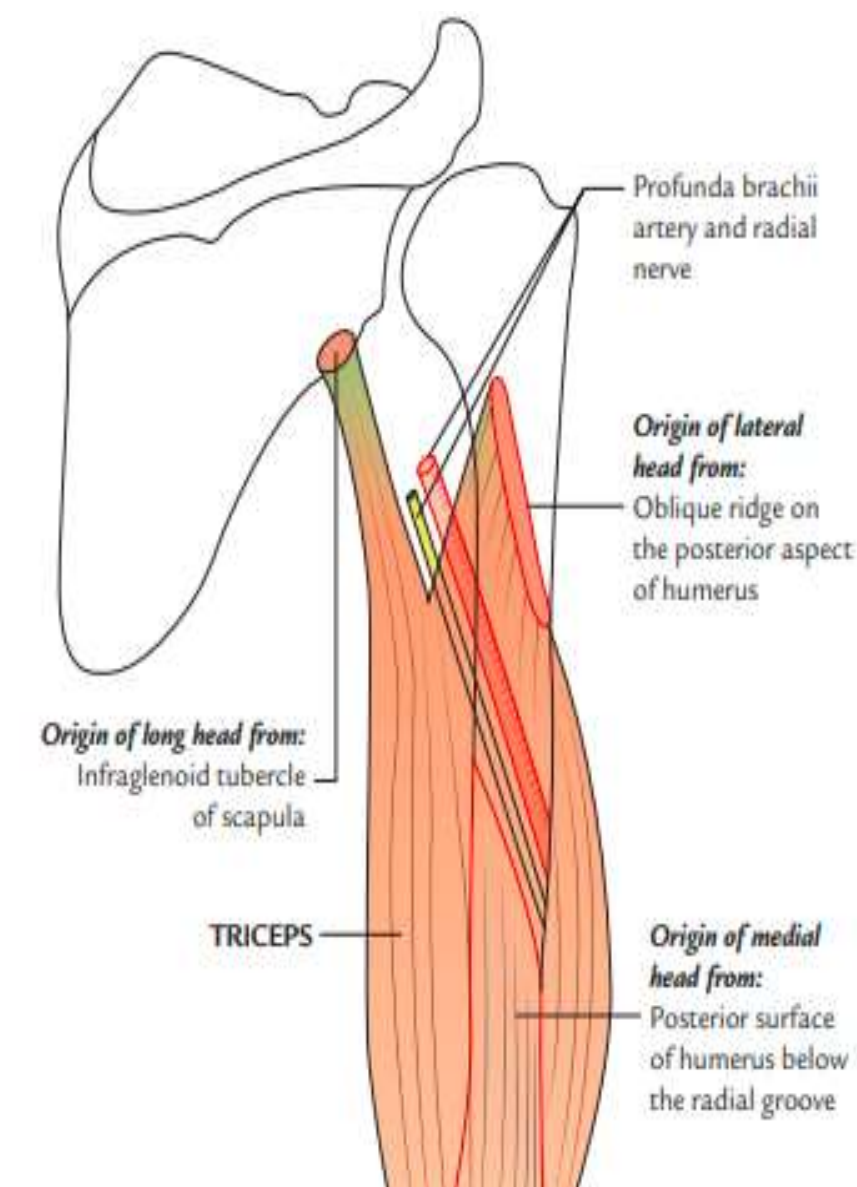
Triceps brachii

- Has three heads → hence the name
- Large muscle in arm
- Forms most of the bulk in the posterior compartment



Origin :

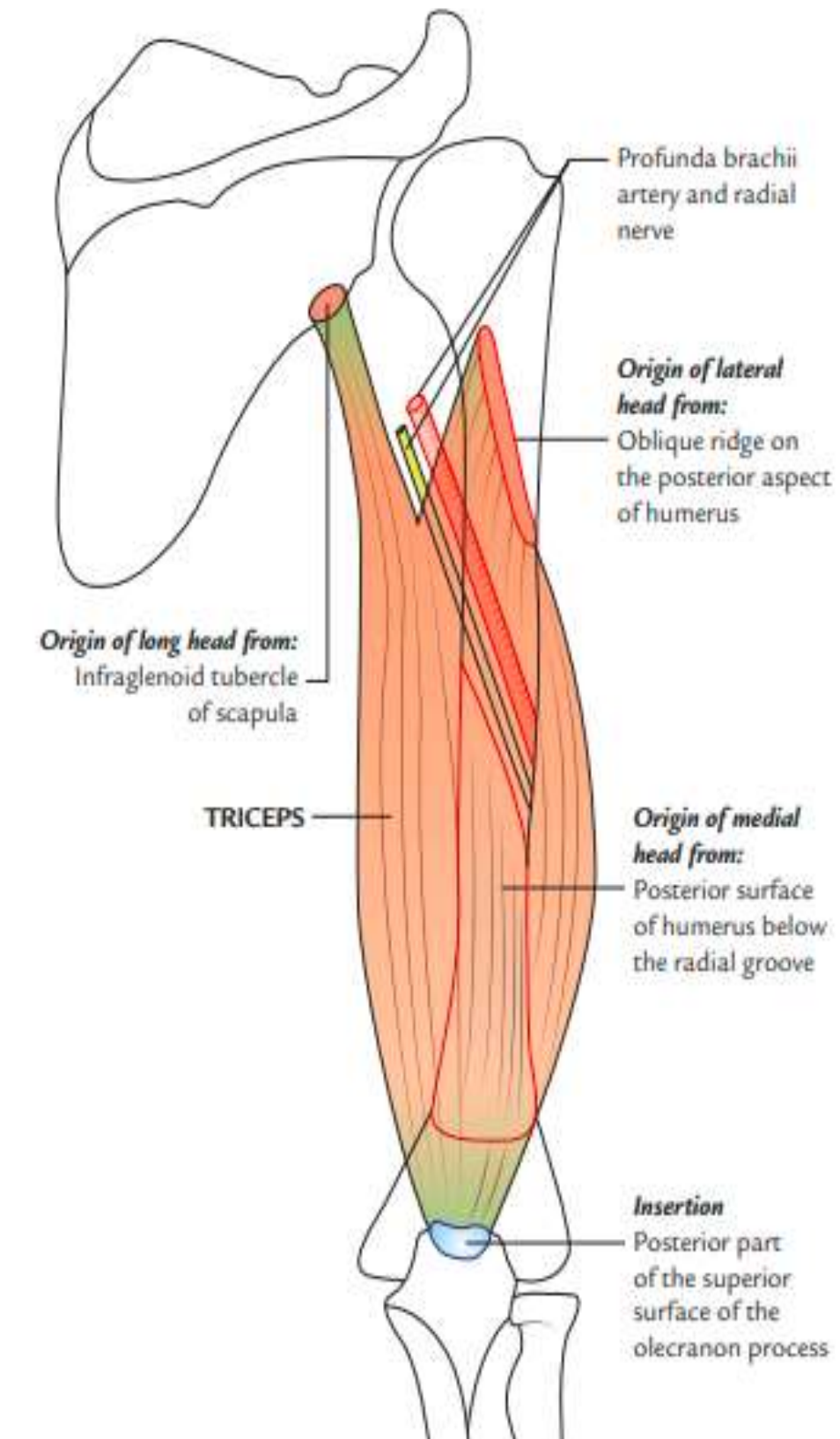
- **Long head** → infraglenoid tubercle of the scapula
longest of the three heads.
- **Lateral head** → oblique ridge above spiral groove on the upper part of the posterior surface of the humerus
- **Medial head** → posterior surface of the lower shaft of humerus below the radial groove (the medial and lateral intermuscular septa).



Tricipes brachii

Insertion

The common tendon is inserted into the **posterior part of the superior surface of the olecranon process of ulna**





Nerve supply :

Radial nerve (C7, C8).

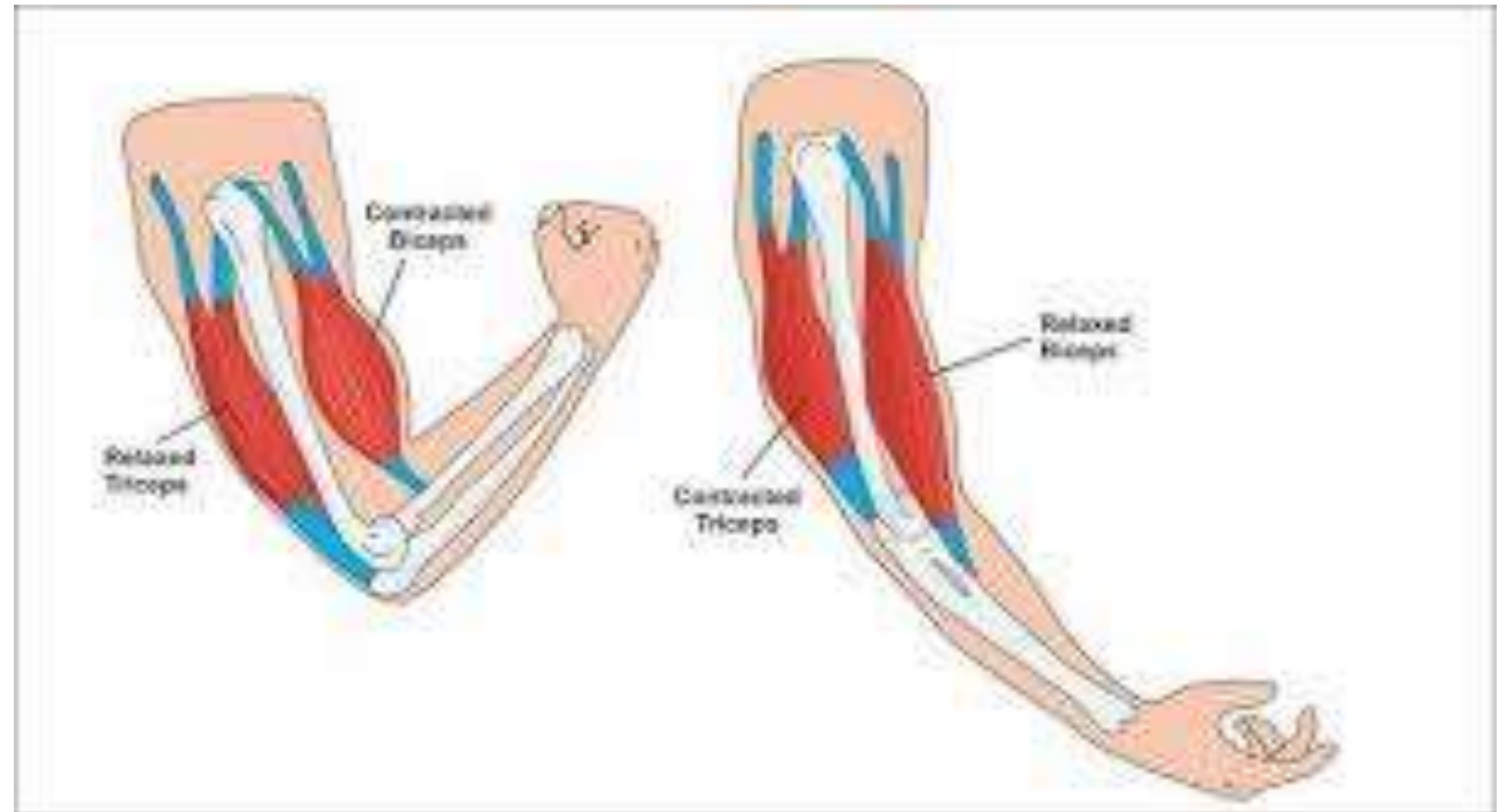
Each head receives a separate branch from radial nerve in the following manner:

- **Long head** arises from the radial nerve in **axilla**.
- **Lateral head** arises from the radial nerve in the **radial groove**.
- **Medial head** arises from the radial nerve in the **radial groove**

Tricipes brachii

Actions :

- Powerful extensor of the elbow joint.
- Supports the head of humerus during hyperabduction of the arm

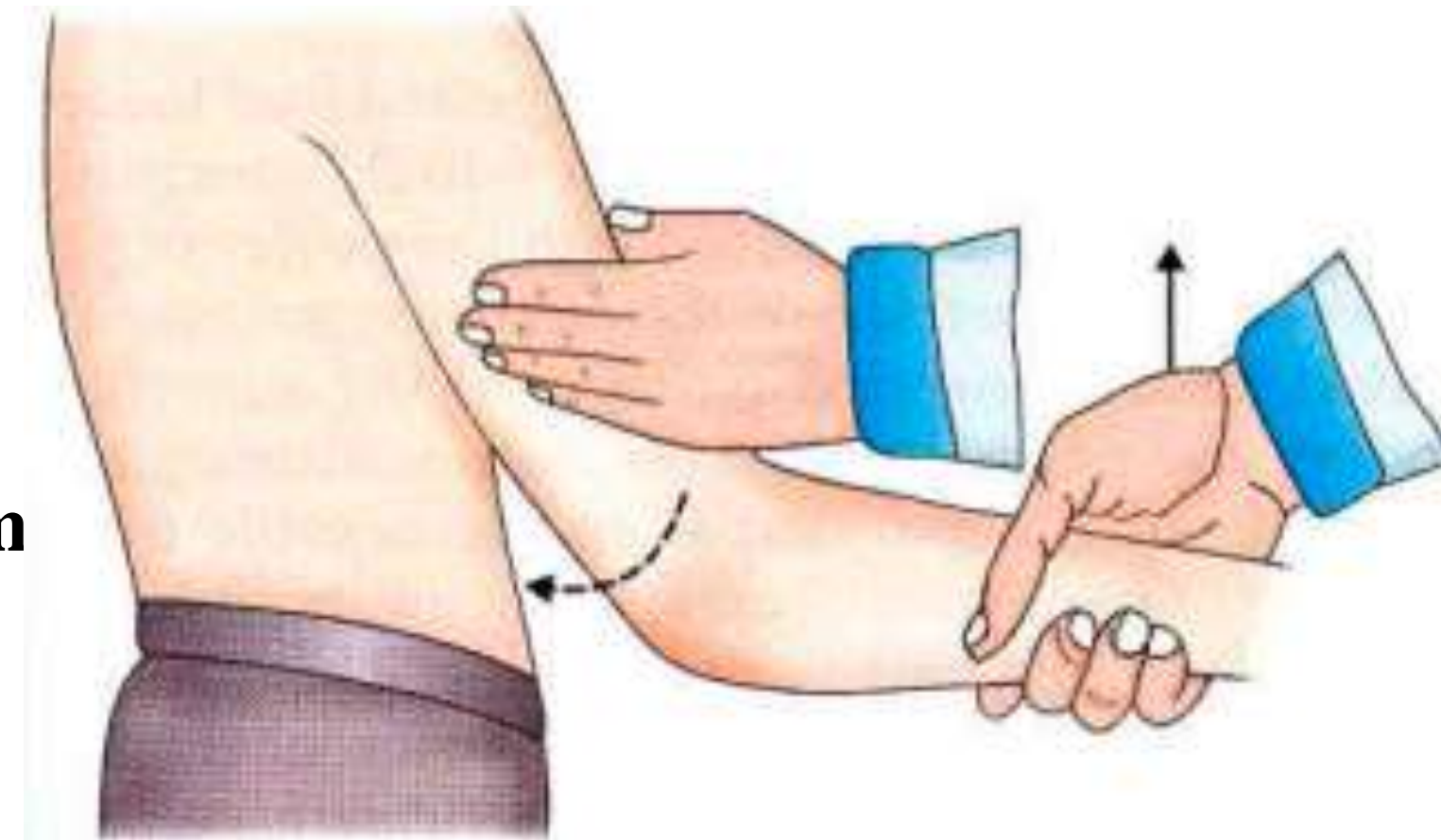


Clinical testing

From elbow flexion, ask patient to extend the forearm at elbow.

Therapist offers resistance against the extension

Palpate the bulk of triceps at the posterior portion of arm





Arterial Anastomosis around the Elbow

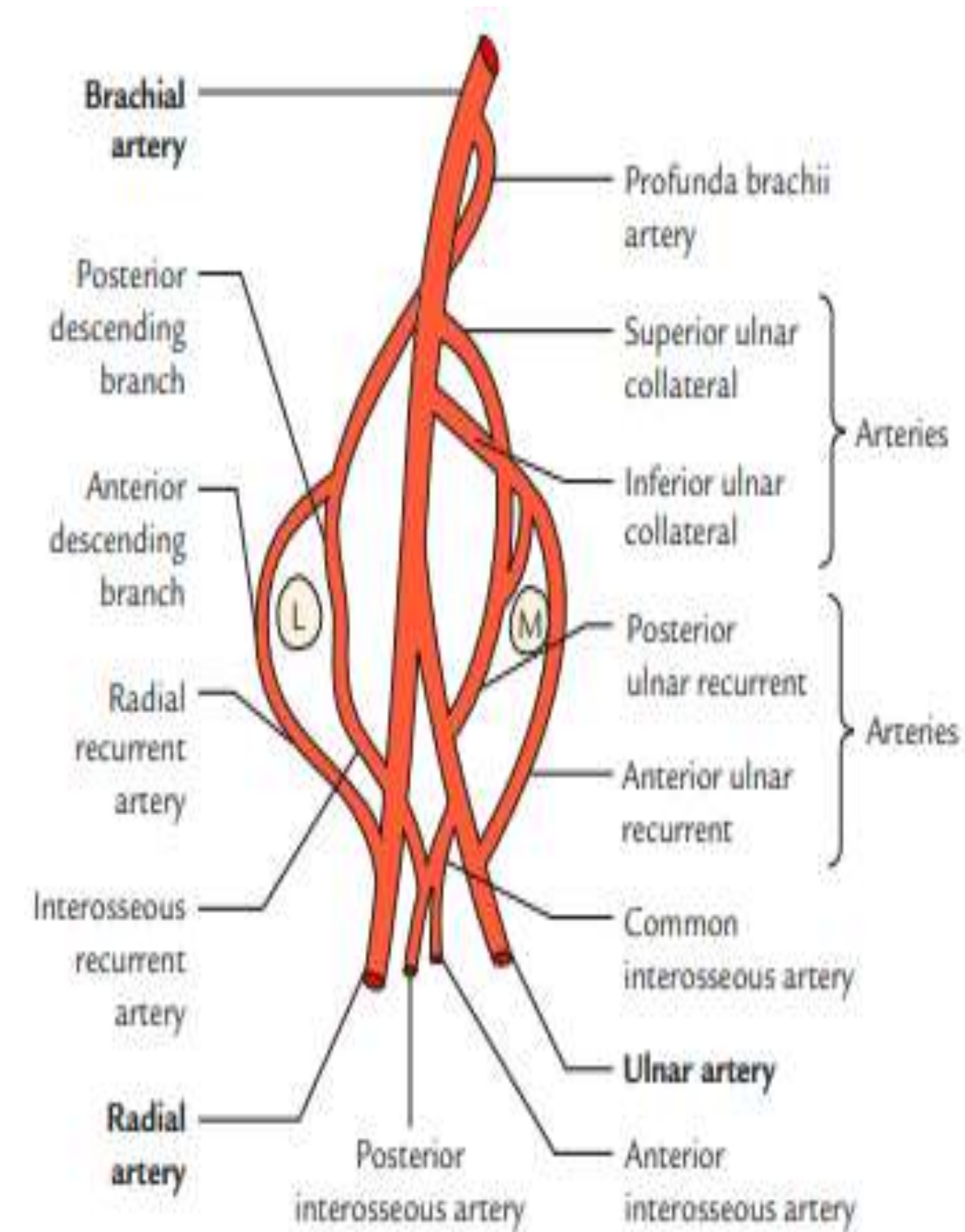


Formed by → brachial artery and upper ends of radial and ulnar arteries

Discussed in following ways

- In front of the medial epicondyle: Inferior ulnar collateral artery with Anterior ulnar recurrent artery
- Behind the medial epicondyle : Superior ulnar collateral artery with Posterior ulnar recurrent artery
- In front of lateral epicondyle : Radial collateral artery with Radial recurrent artery
- Behind the lateral epicondyle : Posterior descending artery with Interosseous recurrent artery
- Above the olecranon fossa : Middle collateral artery with inferior ulnar collateral artery (transverse branch from the posterior division)

- In **front** of the **medial epicondyle**:
Inferior ulnar collateral artery with Anterior ulnar recurrent artery
- **Behind** the **medial epicondyle** :
Superior ulnar collateral artery with Posterior ulnar recurrent artery
- In **front** of **lateral epicondyle** :
Radial collateral artery with Radial recurrent artery
- **Behind** the **lateral epicondyle** :
Posterior descending artery with Interosseous recurrent artery
- Above the **olecranon fossa** :
Middle collateral artery with inferior ulnar collateral artery
(transverse branch from the posterior division)





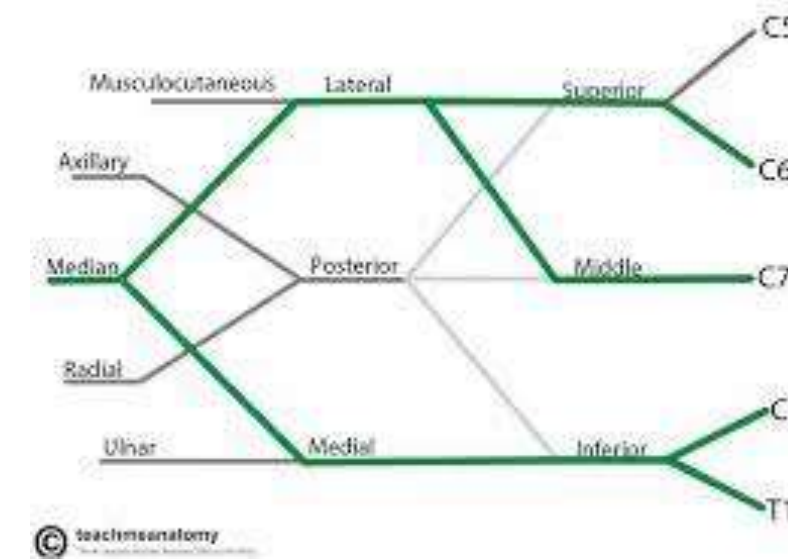
Large Nerves of Arm



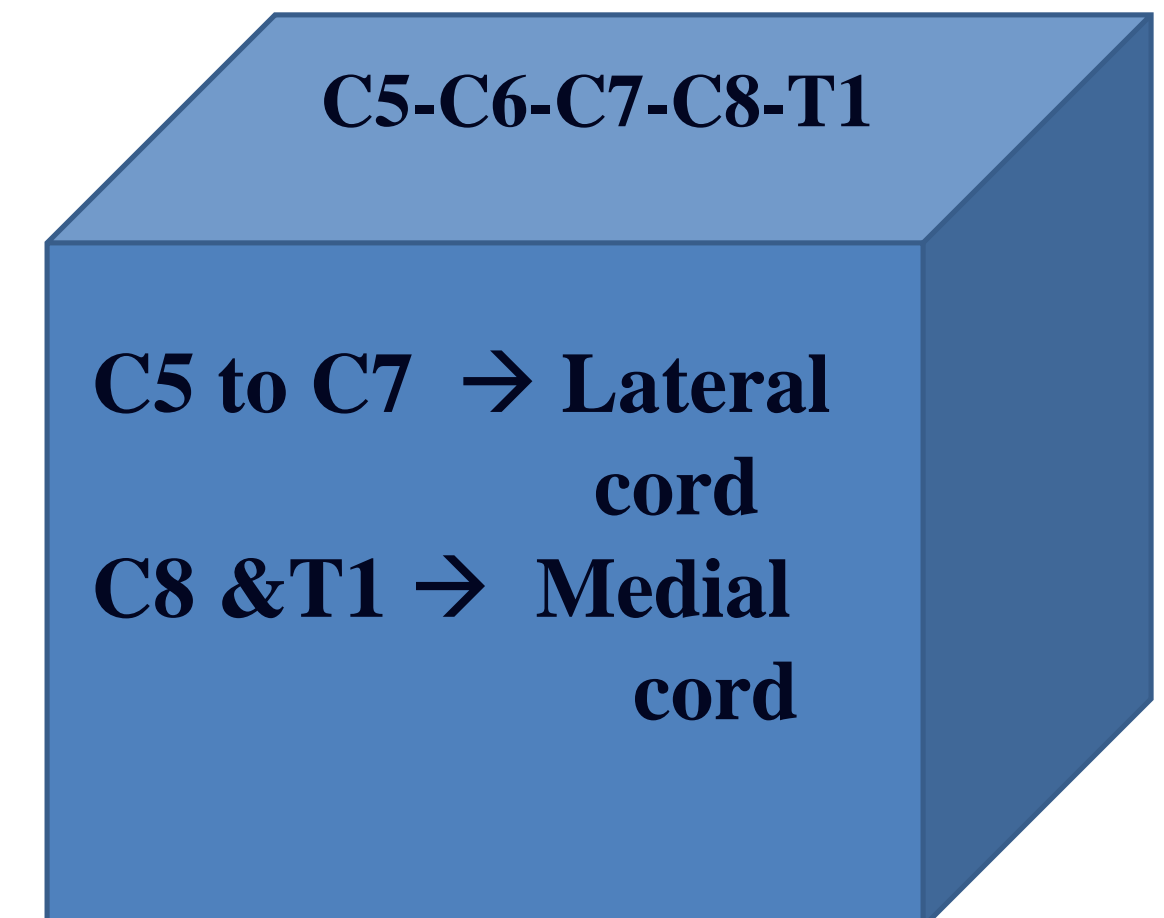
- Median nerve
- Ulnar nerve
- Radial nerve

Median nerve

- Arises : Medial and Lateral cord of brachial plexus
- Extends along the middle of the arm and forearm to the hand
- Closely related to the brachial artery throughout its course in the arm



Root value



Course

Proximally travels down with axillary artery



Enters arm and travel laterally to brachial artery



At level of coracobrachialis insertion nerve switches medially towards elbow



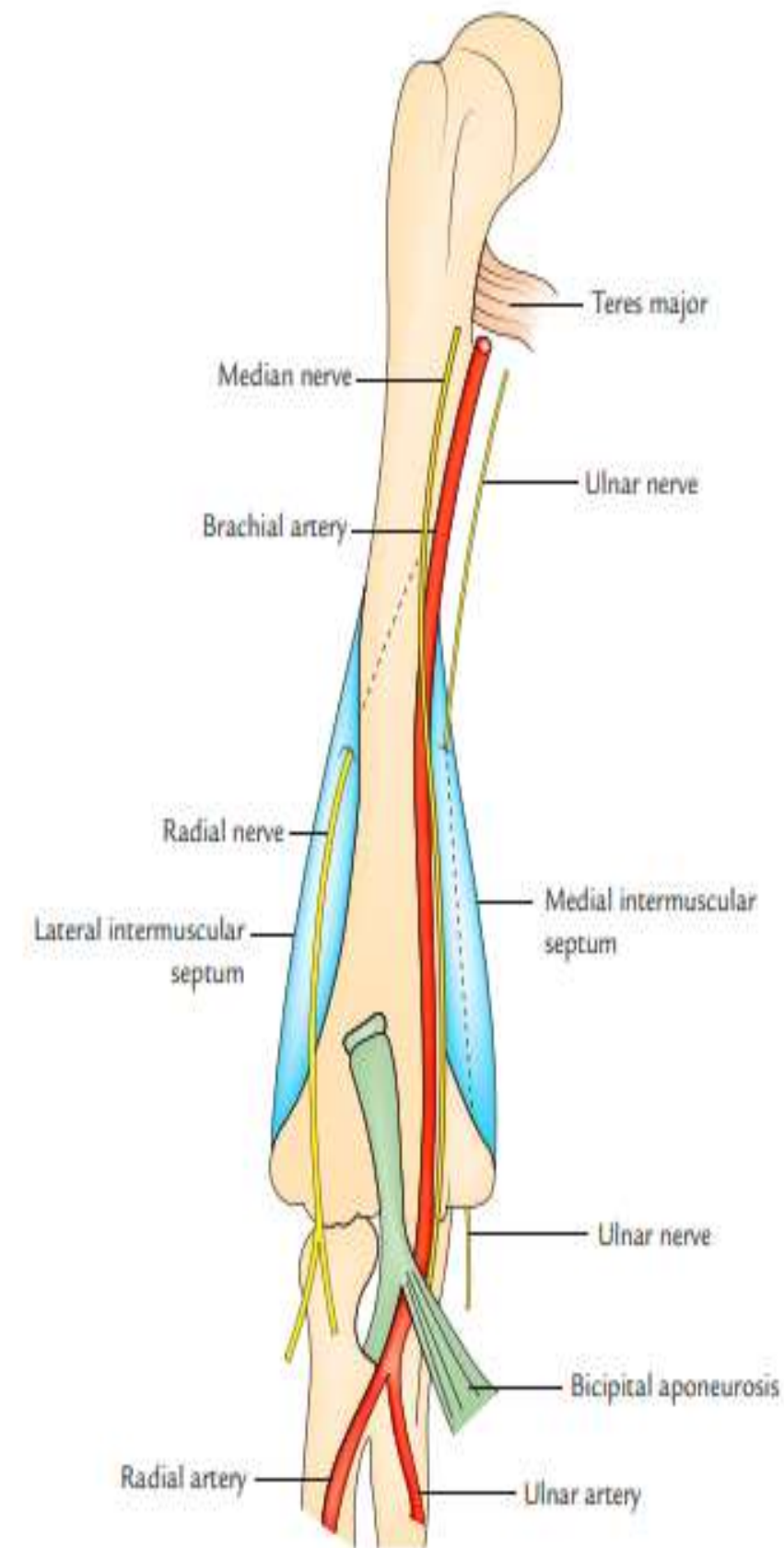
In the forearm, it passes between the two heads of the Pronator teres and crosses the ulnar artery



At wrist descends beneath the Flexor digitorum



Travelling deep to transverse carpal ligament and enters palm



Branches

In Arm :

- Vasomotor nerve to the brachial artery
- above elbow nerve to pronator teres arises

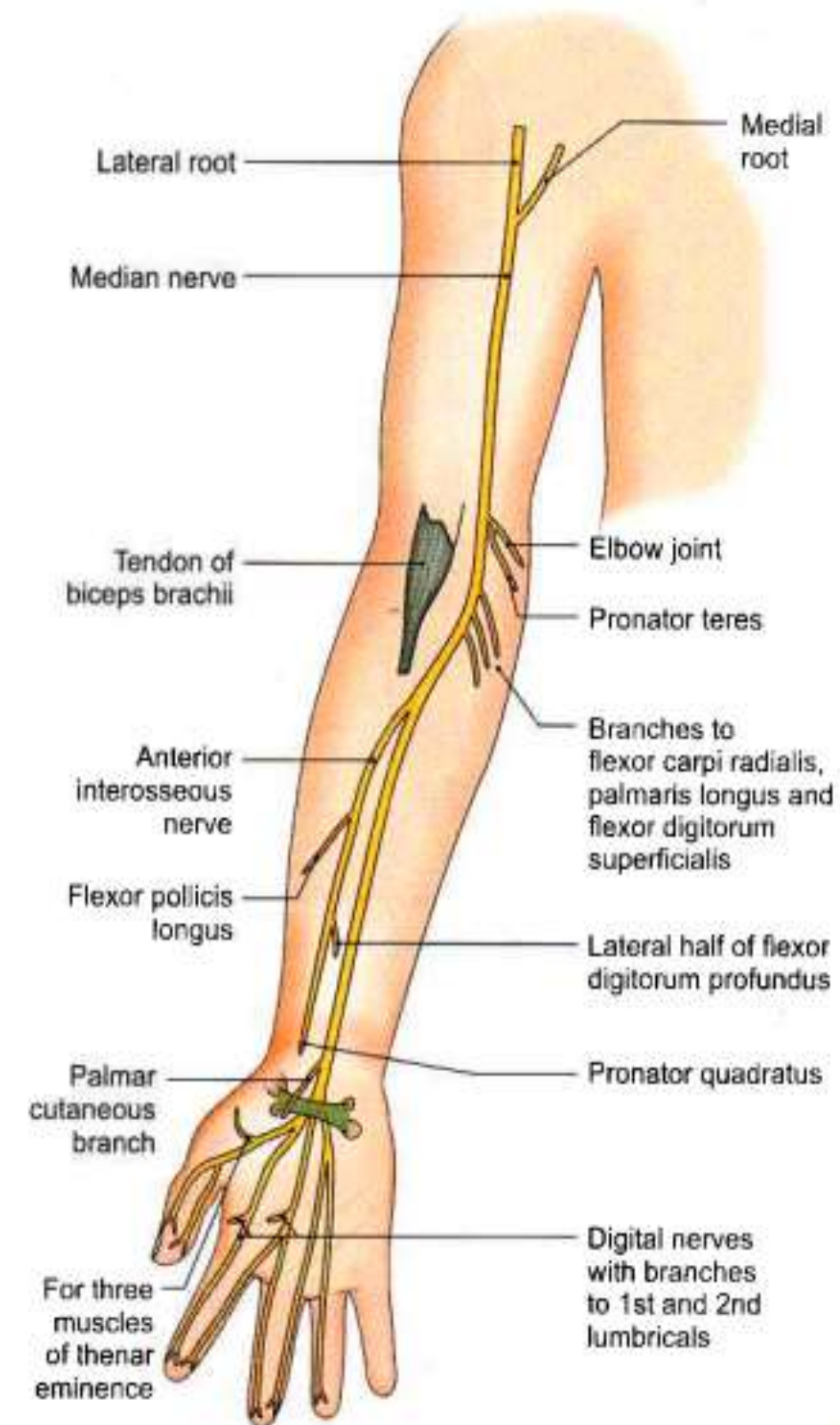
Elbow : one / two branches to elbow joint as passes across it

In forearm :

- Motor branches to muscles of forearm

In hand

- Volar interosseous branch
- Palmar branch (sensory)





Function

Motor innervation

Superficial muscles of forearm

- Pronator teres
- Flexor carpi radialis
- Anterior interosseous (motor)
- Flexor pollicis longus
- Flexor digitorum profundus to 2nd & 3rd fingers
- Pronator quadratus

Deep muscles of hand

- Abductor pollicis brevis
- Opponens pollicis
- Lumbricals: 1st & 2nd
- Flexor pollicis brevis (also innervated by ulnar nerve)



Function

Sensory supply:

Lateral branch supplies

skin over thenar the eminence

Medial branch supplies

Skin of the palm

lateral three and a half-digits

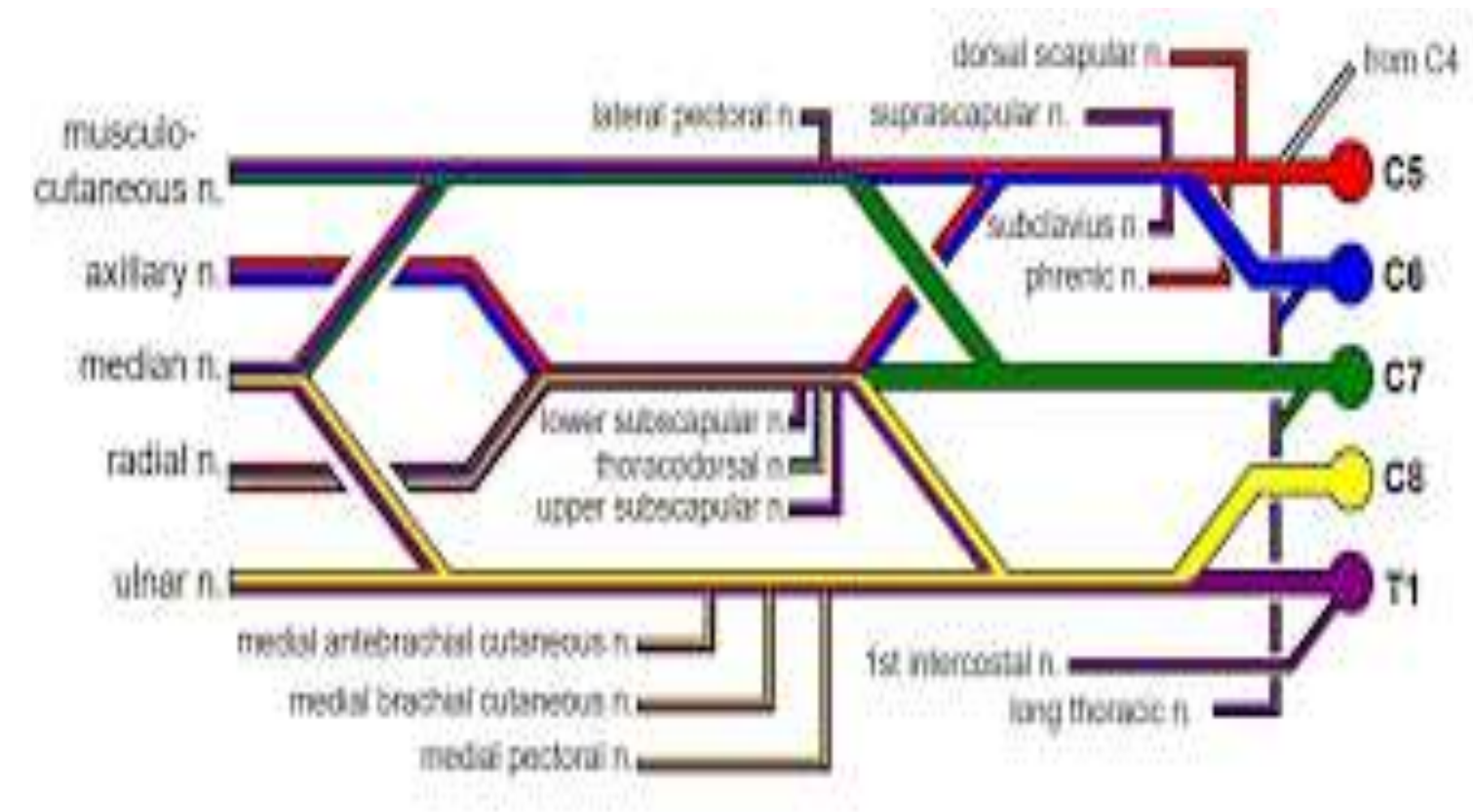
- thumb,
 - 2nd,
 - 3rd
 - lateral 1/2 of 4th finger
-
- their nail beds including skin of distal phalanges on their dorsal aspect



Ulnar nerve

Root value: Ventral rami of C8 and T1.
(also gets some fibres of C7 from the lateral root of median nerve)

Arises from **Medial cord** of brachial plexus



Course

Axilla

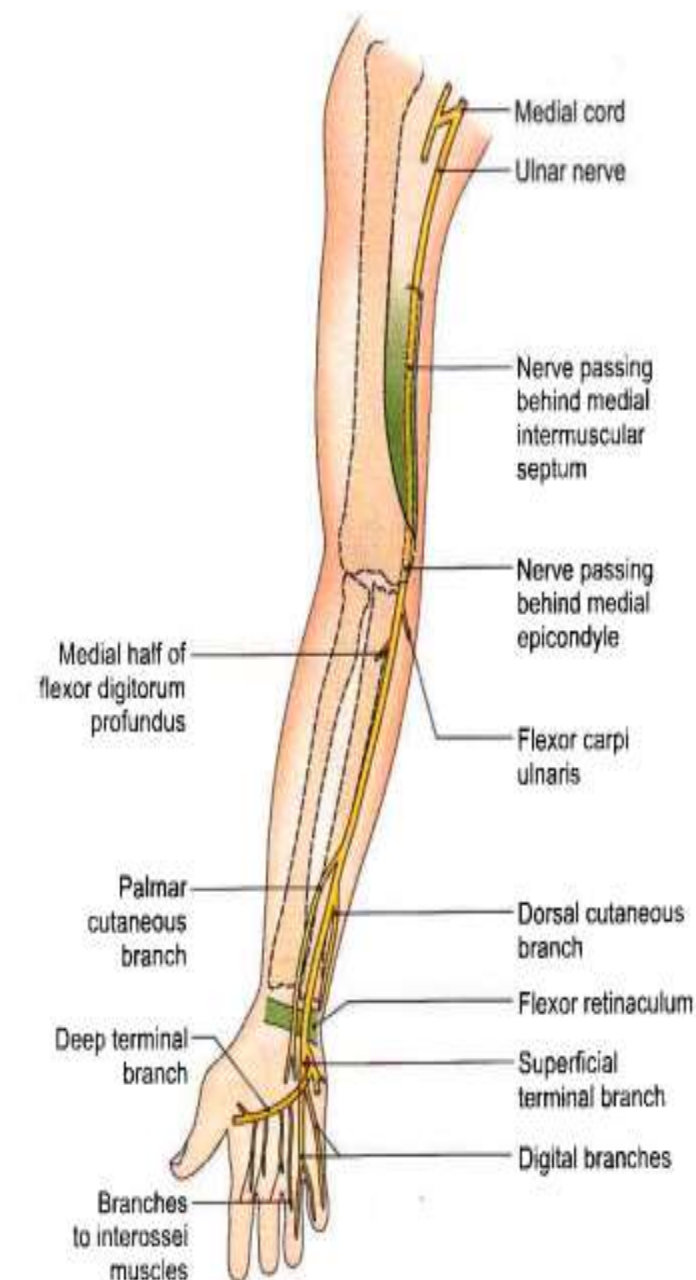
lies in the axilla between the axillary vein & axillary artery

Arm

lies medial to brachial artery and run downward medially in arm

At the **middle of arm** → pierces the medial intermuscular septum descends on the back of medial epicondyle of humerus

Correlation : How humerus got its name?





Ulnar nerve



Humerus – matter of fun

Behind medial epicondyle ulnar nerve is very superficial can be easily palpated.

--Palpation causes tingling sensations

--That is why humerus is called "funny bone"



Course

Forearm

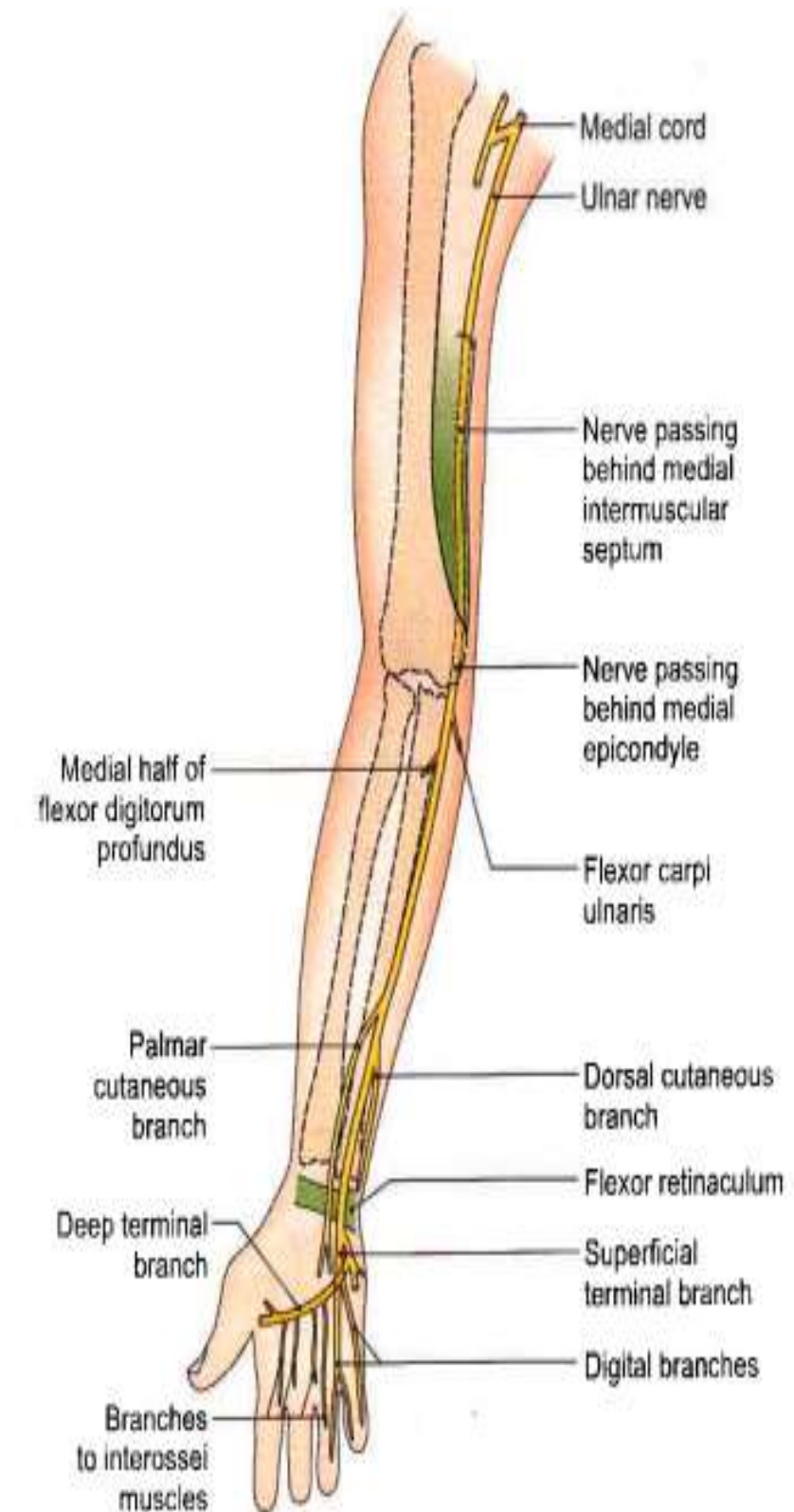
- Enters the forearm by passing between two heads of flexor carpi ulnaris
- Lies on medial part of flexor digitorum profundus.

Flexor Relinaculum

- Lies on the medial part of flexor retinaculum to enter palm.
- @ Distal border of retinaculum divides into superficial and deep branches

Palm

Deep and superficial branches supplies structures in palm





Branches



Muscular

Forearm:

- Medial half of flexor digitorum profundus,
- Flexor carpi ulnaris

Hand

- Deep branch-
- Muscles of hypothenar eminence,
- medial two lumbricals,
- 4-1 dorsal and 4-1 palmar interossei
- Adductor pollicis

Branches

Dorsal cutaneous branch

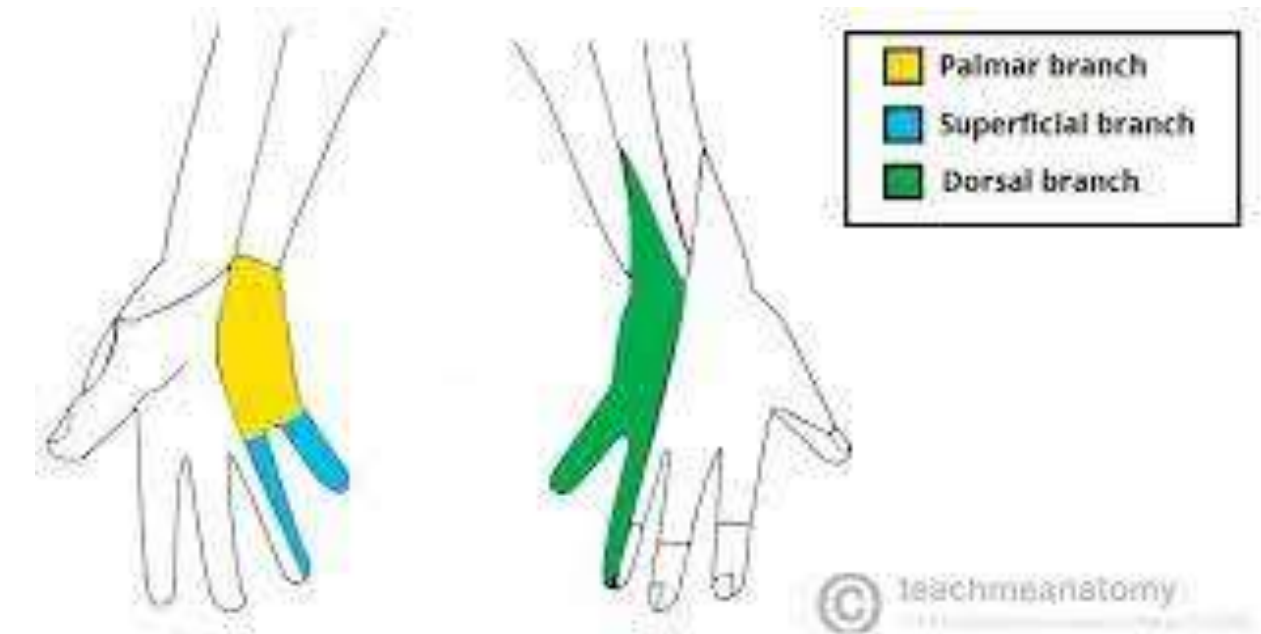
- Medial half of dorsum of hand

Palmar cutaneous branch

Medial one-third of palm.

Digital branches

- Medial one and a half fingers
- Nail beds
- Dorsal aspects of distal phalanges



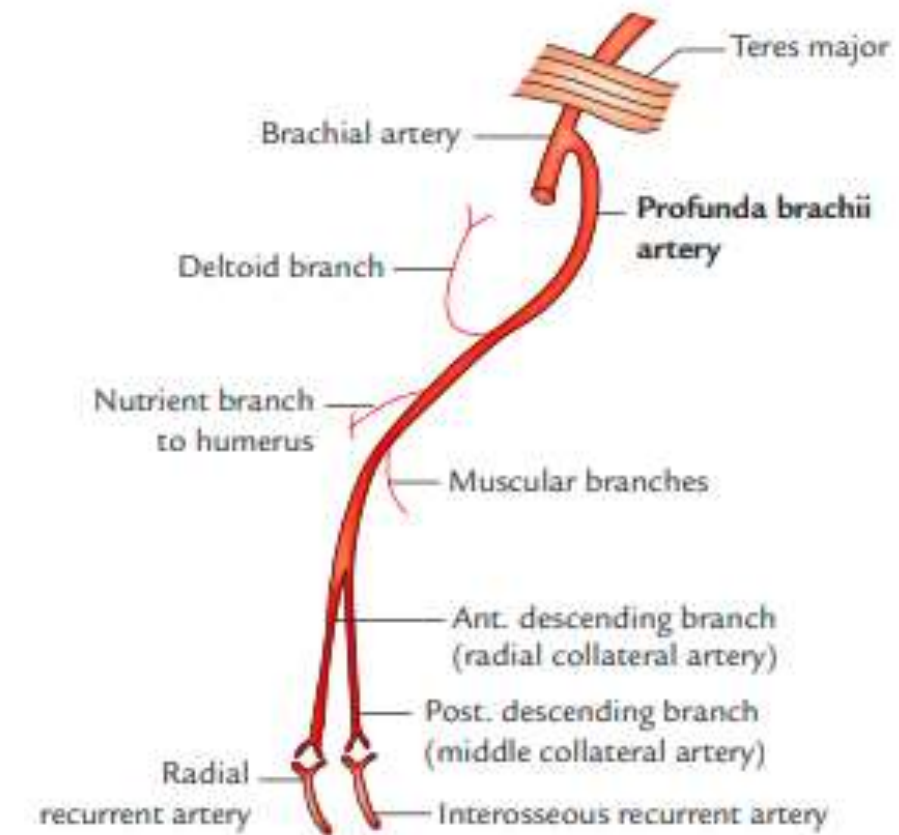
Profunda brachii artery

Largest branch of the brachial artery.

Arises → posterolateral aspect of the brachial artery just below the teres major.

Accompanies → radial nerve through the radial groove

Termination → dividing into
anterior descending branch
Posterior descending branch





Branches



- Deltoid (ascending) branch
- Nutrient artery to humerus
- Anterior descending (radial collateral) artery
- Posterior descending (middle collateral) artery



REFERENCES & THANKING SLIDE