

# Pectoral Region

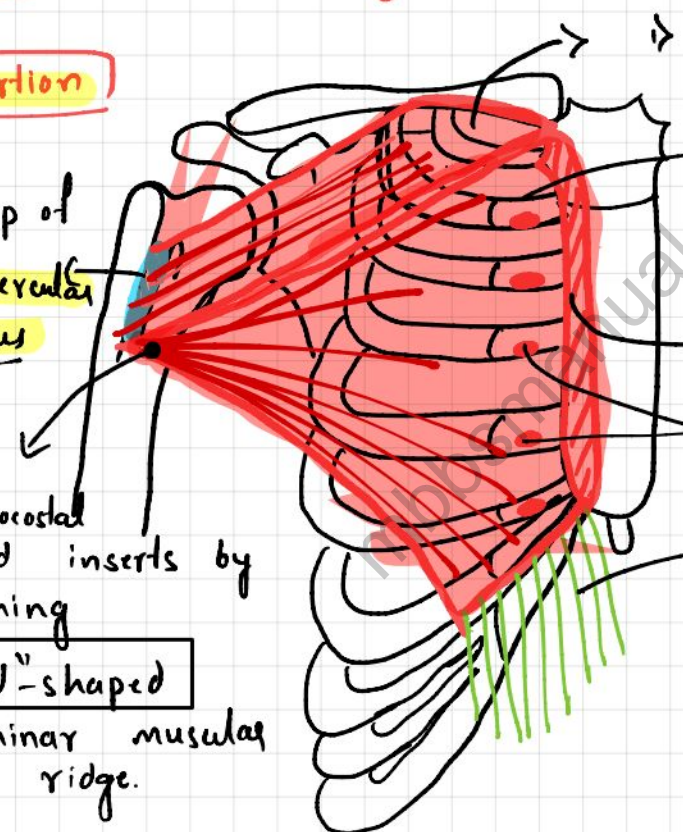
## \* Important topics covered:-

- Muscles → Pectoralis major
- Pectoralis minor
- Subclavius
- Serratus Anterior
- Clavipectoral fascia
- Mammary glands.

## ① Pectoralis Major.

### \* Insertion

↓  
Later lip of intertubercular sulcus



Sternocostal head inserts by forming "U"-shaped bilaminar muscular ridge.

### \* Parts

- 1) Clavicular head
- 2) Sternocostal head

### \* Origin

- \* Ant surface of medial  $\frac{1}{2}$  of Clavicle
- \* Lateral half of ant surface of Sternum
- \* Medial parts of 2<sup>nd</sup> - 6<sup>th</sup> costal cartilages
- \* Aponeurosis of ext oblique muscle.

### \* Actions

- Clavicular head
  - flexion of arm
- Sternocostal head
  - Adduction & medial rotation of arm.

### \* Nerve supply

- 1) [C<sub>5</sub> - C<sub>7</sub>] → Lateral pectoral nerve
- 2) [C<sub>8</sub> & T<sub>1</sub>] → Medial Pectoral nerve.

### \* Clinical aspects

#### ① congenital anomaly

- Absence of 1 part of muscle usually sternocostal part

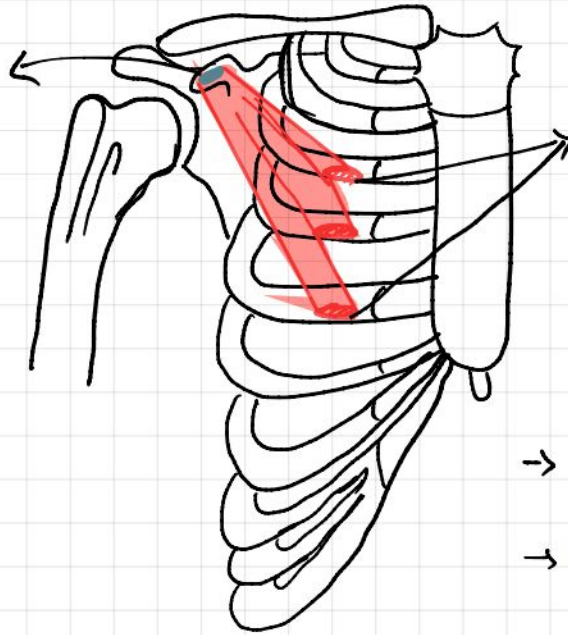
#### ② Clinical testing of P. Major.

- ⇒ lifting heavy rod ⇒ clavicular head
- ⇒ Depressing rod ⇒ sternocostal head

## ② Pectoralis Minor

### Insertion

Medial border of upper surface of the coracoid process.



### \* Origin

3<sup>rd</sup> - 5<sup>th</sup> Ribs near their costal cartilages

### Nerve supply

→ MPN + LPN (C<sub>8</sub>-T<sub>1</sub>) (C<sub>5</sub>-C<sub>7</sub>)

### Actions

- Assists in protraction of scapula
- Depresses the point of shoulder
- Accessory muscle of respiration

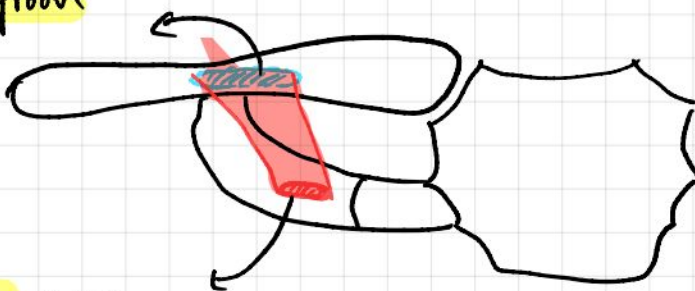
### Clinical

→ Key muscle of Axilla (because it is used to divide axillary artery)

## ③ Subclavius

### \* Insertion

Subclavian groove (middle 1/3 of int surface of clavicle)



### Origin

\* 1<sup>st</sup> Rib near costochondral junction

### Nerve supply

→ Nerve to subclavius from upper trunk.

### Actions

- Stabilization of clavicle during shoulder movement by pulling it int & med

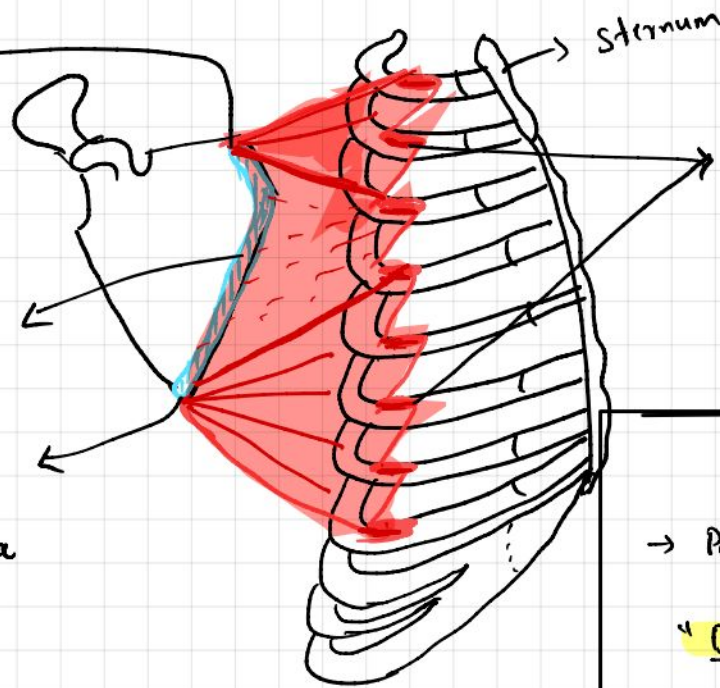
### Clinical

- Provide protection to the
  - subclavian vessel
  - Trunks of brachial plexus.

# ④ Serratus Anterior

## Insertion

- \* First ② digitations on sup angle
- \* Next ② digitations on medial border
- \* Lower ④ digitations on inf angle of scapula



## origin

- \* By 8 digitations from upper 8 Ribs (1-8)

## Actions

- Powerful protractor of scapula "Boxer's muscle"
- Assists in overhead Abduction of arm by rotating scapula lat & upward.
- Keeps med wall of scapula in firm contact with chest wall.

## \* Nerve Supply

- Long thoracic nerve (N to Serratus Anterior) [C5 - C7]

## \* Clinical aspect

\* Paralysis of S. Anterior muscle.

⇒ due to → Injury or compression of long thoracic nerve

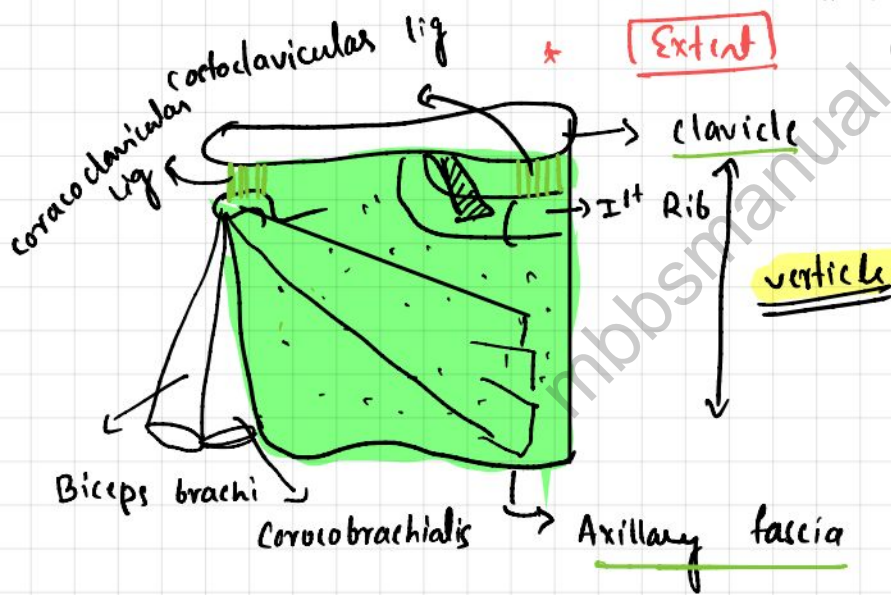
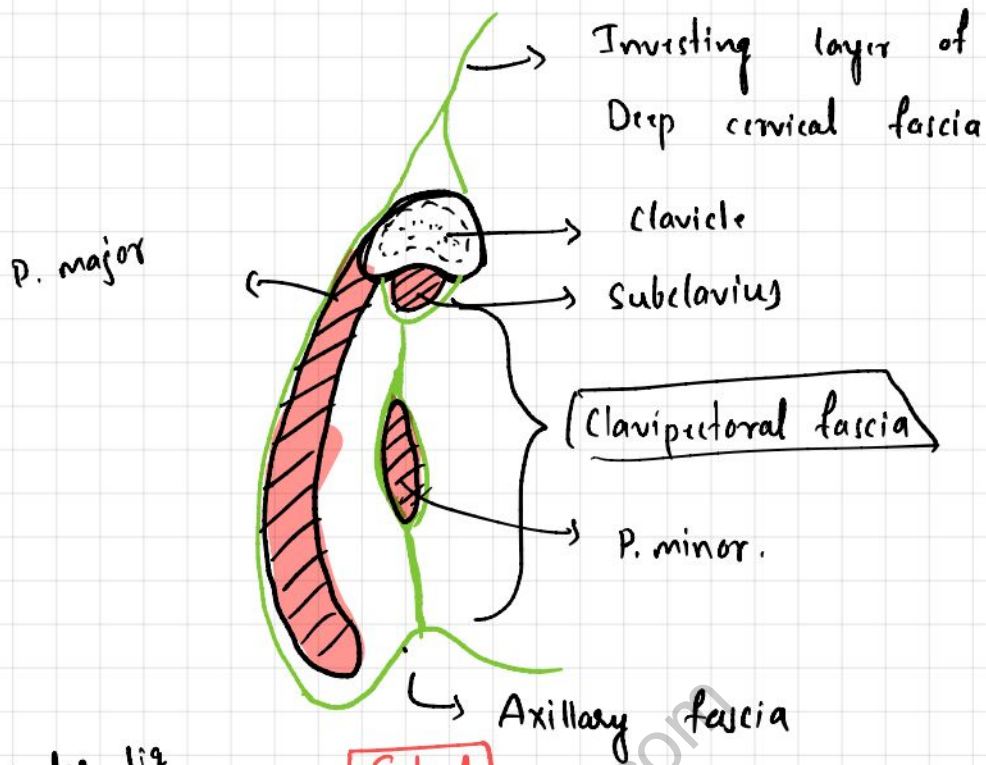
⇒ Clinical features >

- weakened protraction of scapula
- when pt pushes arm against wall, medial border & inf angle of scapula become

unduly prominent & this cond<sup>n</sup> ⇒ "Winging of Scapula"



# \* Clavipectoral fascia



\* Medially  
 1<sup>st</sup> Rib + Costoclavicular lig  
 + Blends with upper 2 ICS.

\* Laterally  
 → Coracoid process + Coracoclavicular lig

## \* Structures piercing clavipectoral fascia (LATLyC)

- 1) Lateral pectoral nerve (Out)
- 2) Thoraco-acromial artery (Out)
- 3) Lymphatics (In)
- 4) Cephalic vein (In)

# Mammary Glands

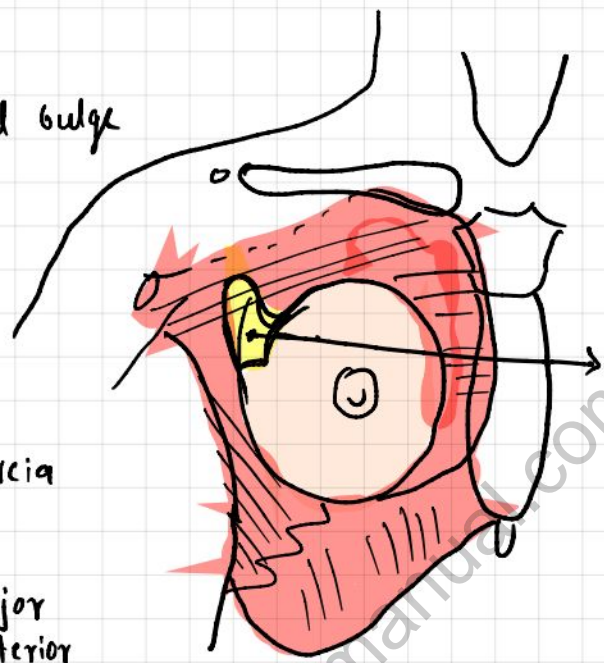
\* Def<sup>n</sup> Modified apocrine sweat gland

\* Location

→ Superficial fascia of Pectoral region

\* Shape

→ Hemispherical bulge



\* Extent

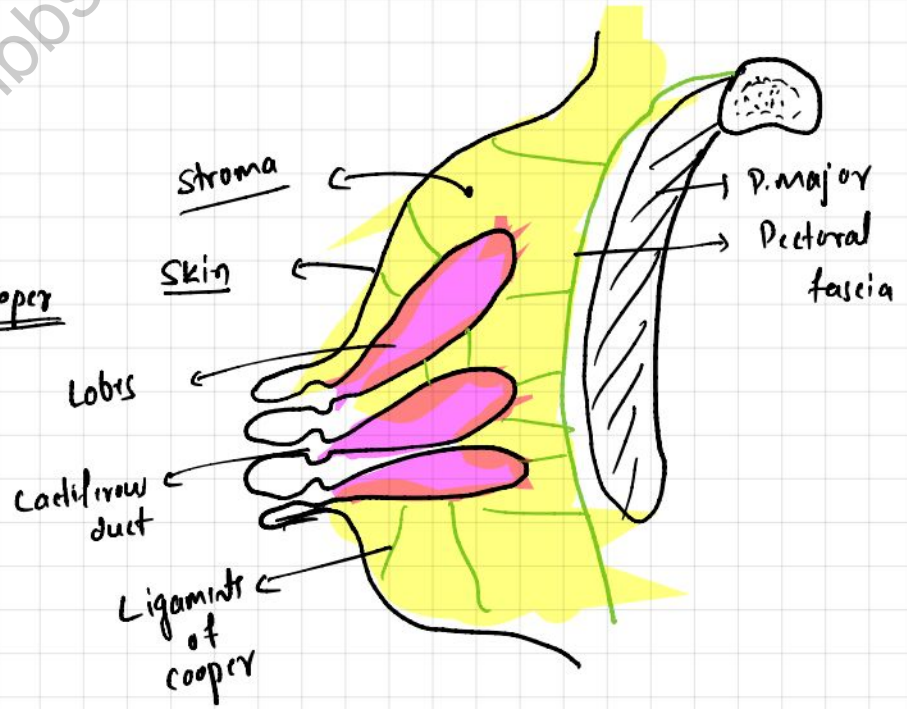
- 1) vertically  
2<sup>nd</sup> Rib ↔ 6<sup>th</sup> Rib
- 2) Horizontally  
- Sternum to mid axillary line

\* (Relations)

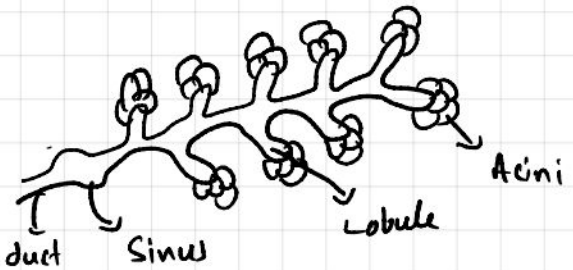
- 1) Pectoral fascia
- 2) 3 muscles
  - ↳ P. major
  - S. Anterior
  - Ext oblique

\* Structure

- ① Skin → Nipple, Areola
- ② Stroma → Fat, Sus lig Cooper
- ③ Parenchyma



\* Parenchyma

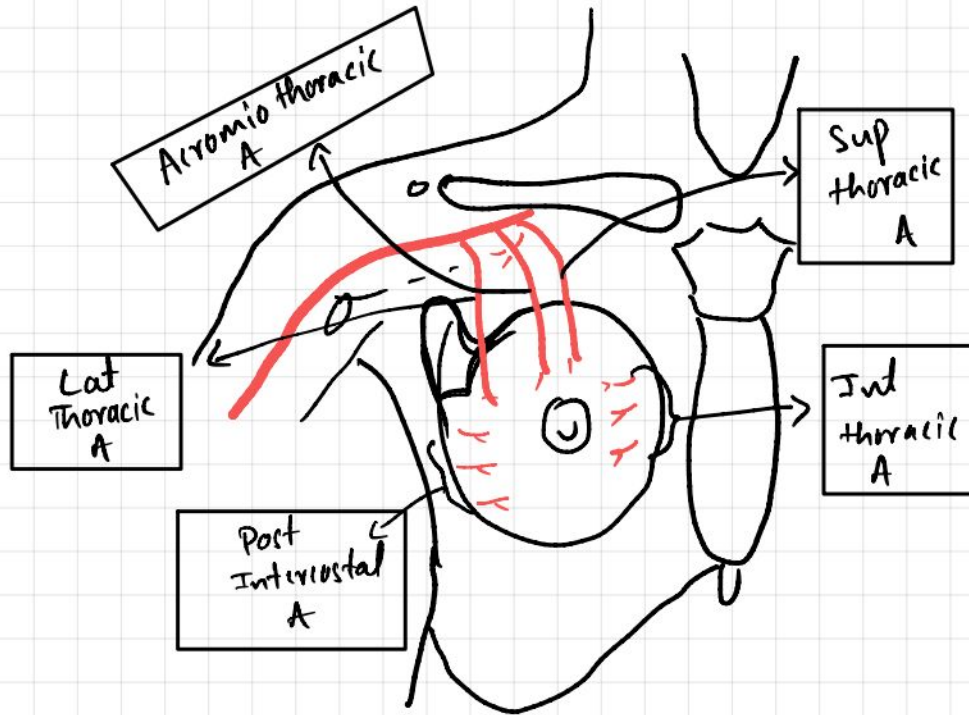


**Lobes** (15-20) → Lobules → Acini

\* Blood Supply

(I) Arterial Supply

- \* From Axillary artery
  - Lat thoracic A
  - Acromio thoracic A
  - Sup thoracic A
- \* Int thoracic A
- \* Posterior Intercostal A



(II) Venous Drainage

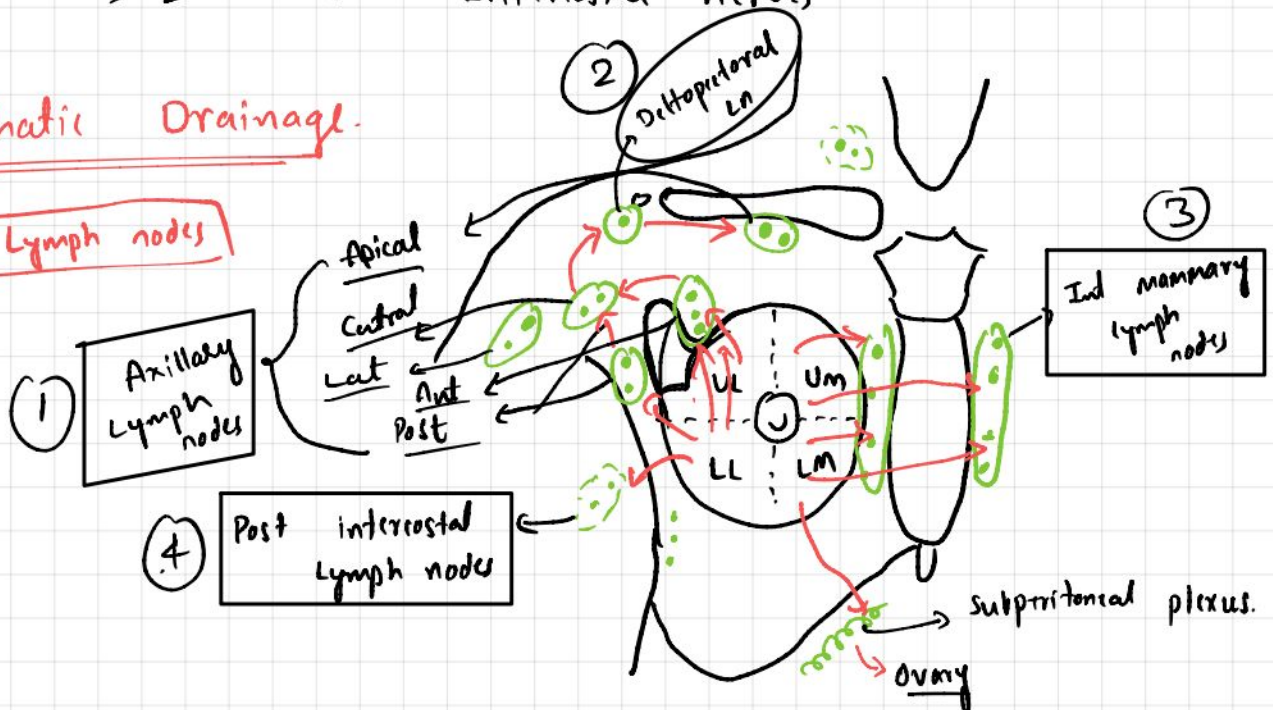
- \* Axillary vein
  - \* Internal thoracic v
  - \* Post intercostal v
- It forms two plexus in breast → Sup plexus → Int thoracic v  
 → Deep venous plexus → other veins.

\* Nerve Supply

⇒ Somatosensory  
 ↳ 2<sup>nd</sup> - 6<sup>th</sup> Intercostal nerves

\* Lymphatic Drainage

\* Lymph nodes



## \* Parts

Breast divided into 4 parts

- Upper
  - U. Lateral
  - U. Medial
- Lower
  - L. Lateral
  - L. Medial.

## \* Lymphatics

① Superficial lymphatics (drain skin except nipple & areola)

② Deep lymphatics (drain - Parenchyma - nipple & areola)

↓  
forms plexus

↓  
"Subareolar plexus of Sappey"

↓  
Anterior group of Axillary L.N

① Lower Lat quadrant

→ Post intercostal LN

→ Ant Axillary LN

② Lower Med quadrant

→ Internal mammary LN

→ Subperiosteal lymph plexus

③ Upper Lat quadrant

→ Ant & Post Axillary LN

④ Upper med quadrant

→ Internal mammary LN.

Anterior & Posterior Axillary LN

⇒ Central LN ⇒

Apical group  
via  
Deltpectoral LN.

## \* Clinical

### Breast Tumor

→ It arises from → Epithelial cells of lactiferous duct

### \* Clinical Features

- Painless hard lump
- Breast become immobile (infiltrat<sup>n</sup> of sus lig of Cooper)
- Retraction of nipple
- Peaud' orange appearance of skin

### \* Investigation

- Physical Examination
- Mammography
- FNAC

### \* Treatment

→ Mastoidectomy with Axillary Lymph nodes



→ Retracted nipple

→ Peau d'orange appearance.



# Axilla

It is a pyramidal space b/w upper part of arm & side of the chest wall.

Important topics covered :-

- ① Axillary Artery
- ② Axillary lymph nodes
- ③ Brachial Plexus

\* Contents of the Axilla.

- 1) Axillary Artery
- 2) Axillary vein
- 3) Cords of the brachial plexus
- 4) Axillary lymph nodes
- 5) Fibrofatty tissue
- 6) Axillary tail of breast
- 7) Long thoracic & intercostobrachial nerves.

# Axillary artery

## \* Formation

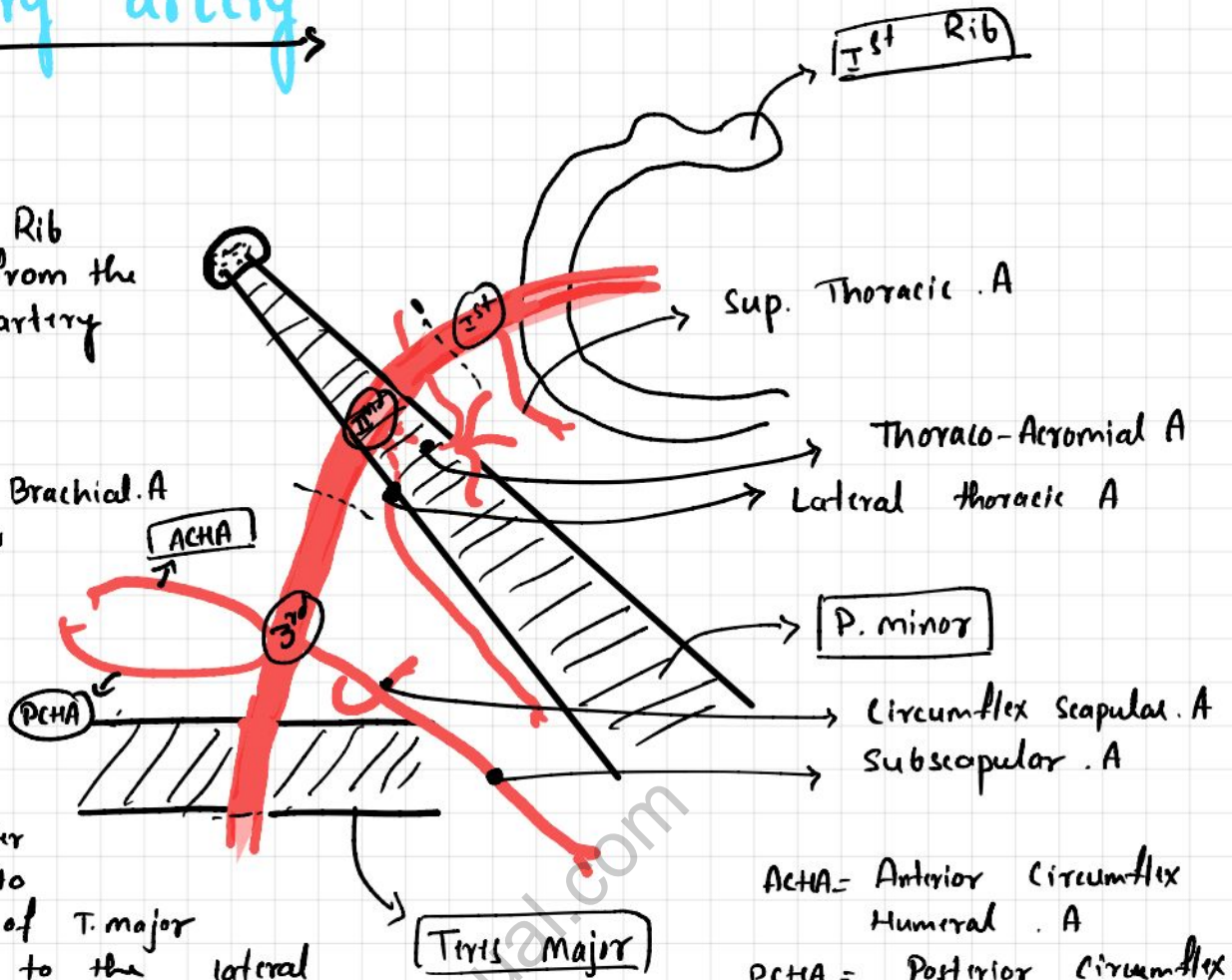
from 1<sup>st</sup> Rib  
continued from the  
subclavian artery

## \* Termination

Continue as Brachial.A  
@ lower border  
of T. Major  
muscle

## \* Course

from outer border  
of 1<sup>st</sup> Rib to  
lower border of T. major  
Runs closely to the lateral  
wall of the axilla



ACHA = Anterior Circumflex  
Humeral .A  
PCHA = Posterior Circumflex  
Humeral .A.

## \* Parts

Three parts.

I<sup>st</sup> Part → ① branch

II<sup>nd</sup> Part → ② branches

III<sup>rd</sup> Part → ③ branches

## \* Branches

From I<sup>st</sup> Part  
↓

① Sup. Thoracic .A

From II<sup>nd</sup> Part  
↓

① Thoraco-Acromial.A

② Lateral Thoracic A

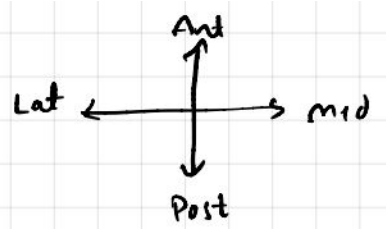
From III<sup>rd</sup> Part  
↓

① Subscapular .A

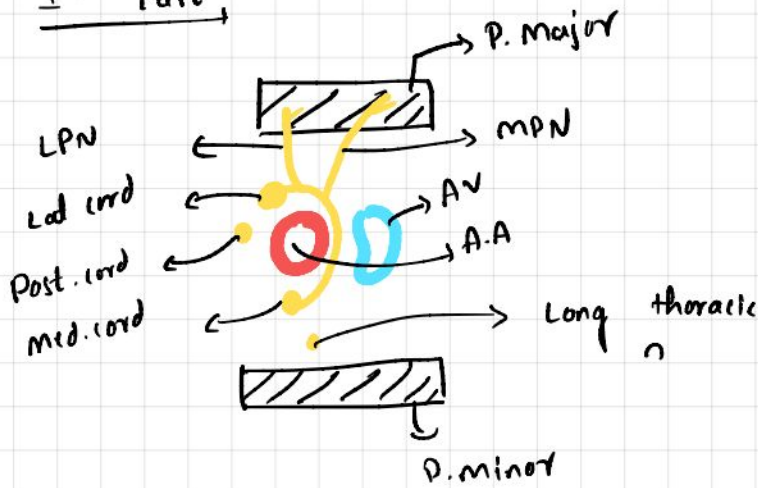
② ACHA

③ PCHA.

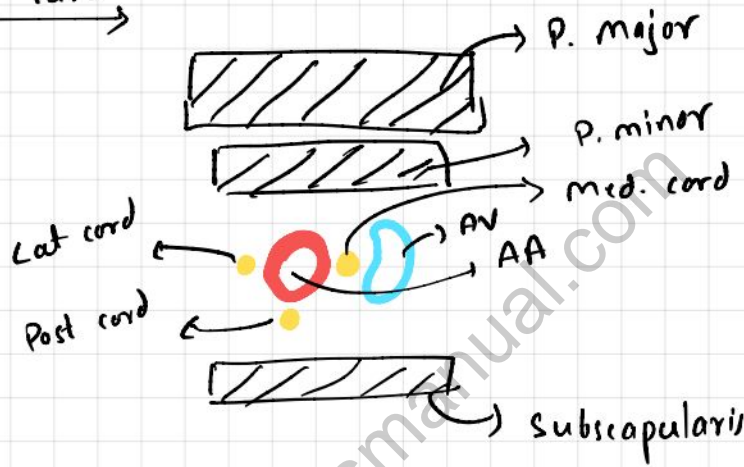
# \* Relations of the Artery



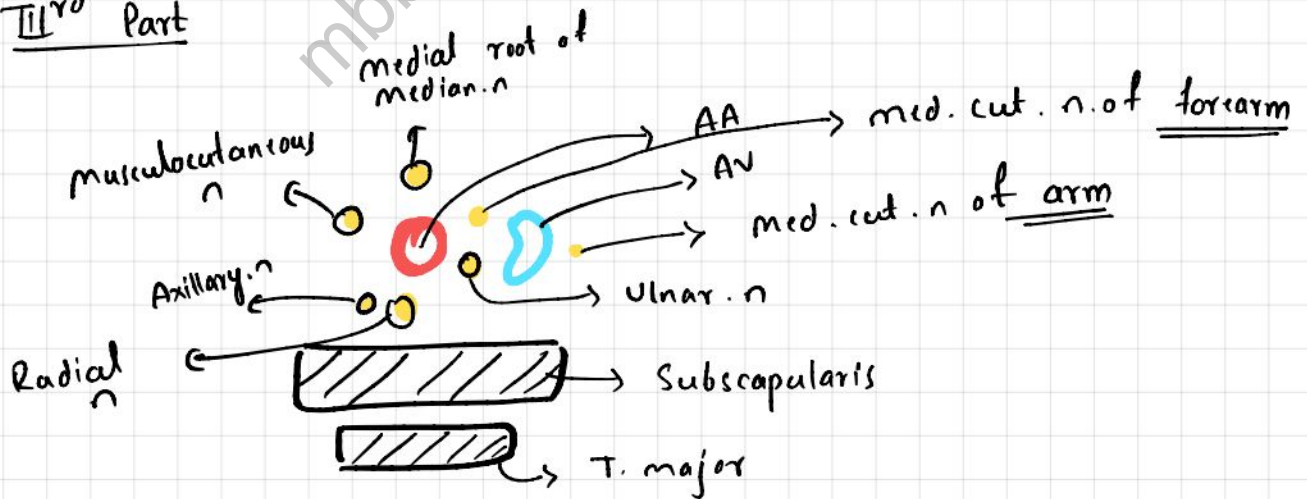
⇒ I<sup>st</sup> Part



⇒ II<sup>nd</sup> Part



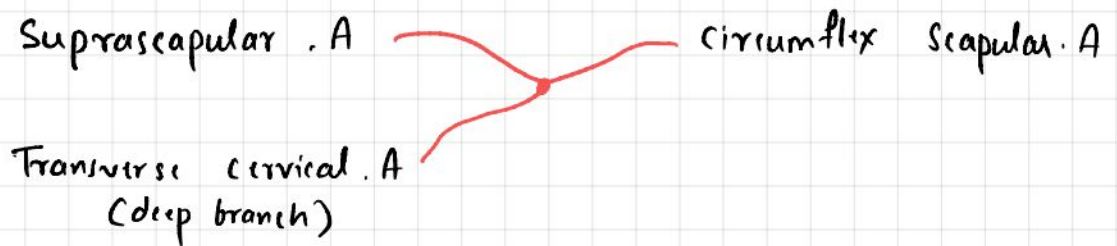
⇒ III<sup>rd</sup> Part



## \* Scapular Anastomosis

It is b/w I<sup>st</sup> part of Subclavian . A  
III<sup>rd</sup> part of Axillary . A

① Around the body of scapula.



② Over the acromion process :-



## \* Clinical Aspect

① collateral circulation through scapular Anastomosis

If any block in b/w I<sup>st</sup> part of subclavian . A & III<sup>rd</sup> part of Axillary . A

# Brachial Plexus

## \* Formation

It is formed by the **ventral rami** of **C<sub>5</sub>-C<sub>8</sub> & T<sub>1</sub>** spinal nerves with little contribution from the C<sub>4</sub> to T<sub>2</sub> spinal nerves

## \* Components

(1) Roots  
ventral rami of C<sub>5</sub> to T<sub>1</sub>

(2) Trunks

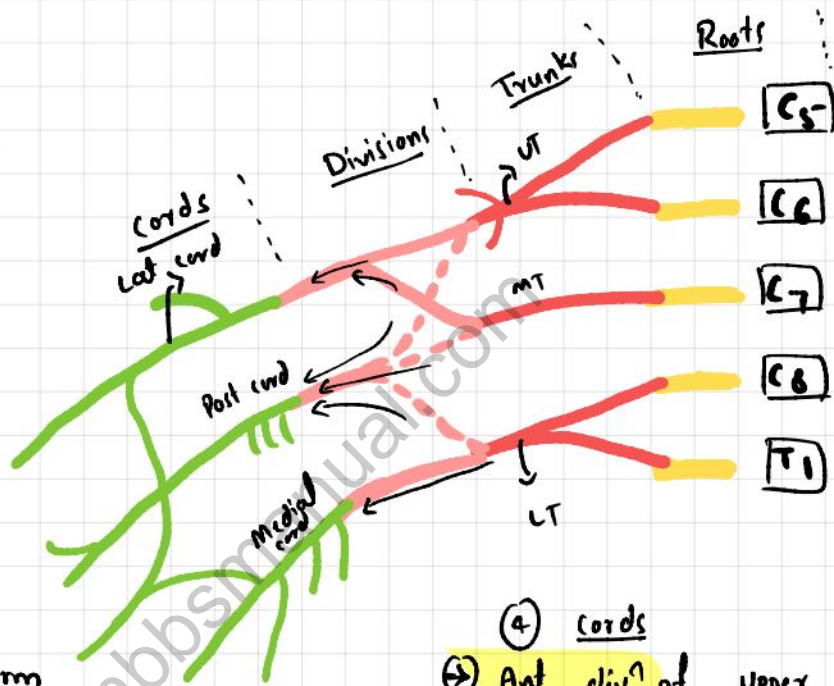
→ C<sub>5</sub> - C<sub>6</sub> joins to form upper Trunk

→ C<sub>7</sub> form middle Trunk

→ C<sub>8</sub> - T<sub>1</sub> joins to form Lower Trunk

(3) Division

→ each Trunk  $\begin{cases} \rightarrow \text{Anterior} \\ \rightarrow \text{Posterior} \end{cases}$



(4) cords

→ Ant div<sup>n</sup> of upper + middle trunk forms the **Lateral cord**

→ Post div<sup>n</sup> of all trunk forms the **Posterior cord**

→ Ant div<sup>n</sup> of Lower Trunk forms the **Medial cord**.

\* Branches

⇒ From Roots

⇒ From Trunks

NS ⇒ Nerve to subclavius [C5 & C6]

⇒ From Div<sup>n</sup>

NO branches

(C5-C7)  
Musculocutaneous Nerve

(C5 & C6) Axillary N

(C5-T1) Radial N

⇒ From cords

Median N (C5-T1)

Ulnar N (C7, C8 & T1)

① Lateral cord

→ Lat Pectoral Nerve [C5-C7]

→ Lat root of Median N (C5-C7)

→ Musculocutaneous N (C5-T7)

② Medial cord

→ Med Pectoral N (C8 & T1)

→ Med cut N of arm (C8 & T1)

→ med cut N of forearm (C8 & T1)

→ medial root of median N (C8 & T1)

→ Ulnar nerve (C7, C8 & T1)

③ Posterior cord

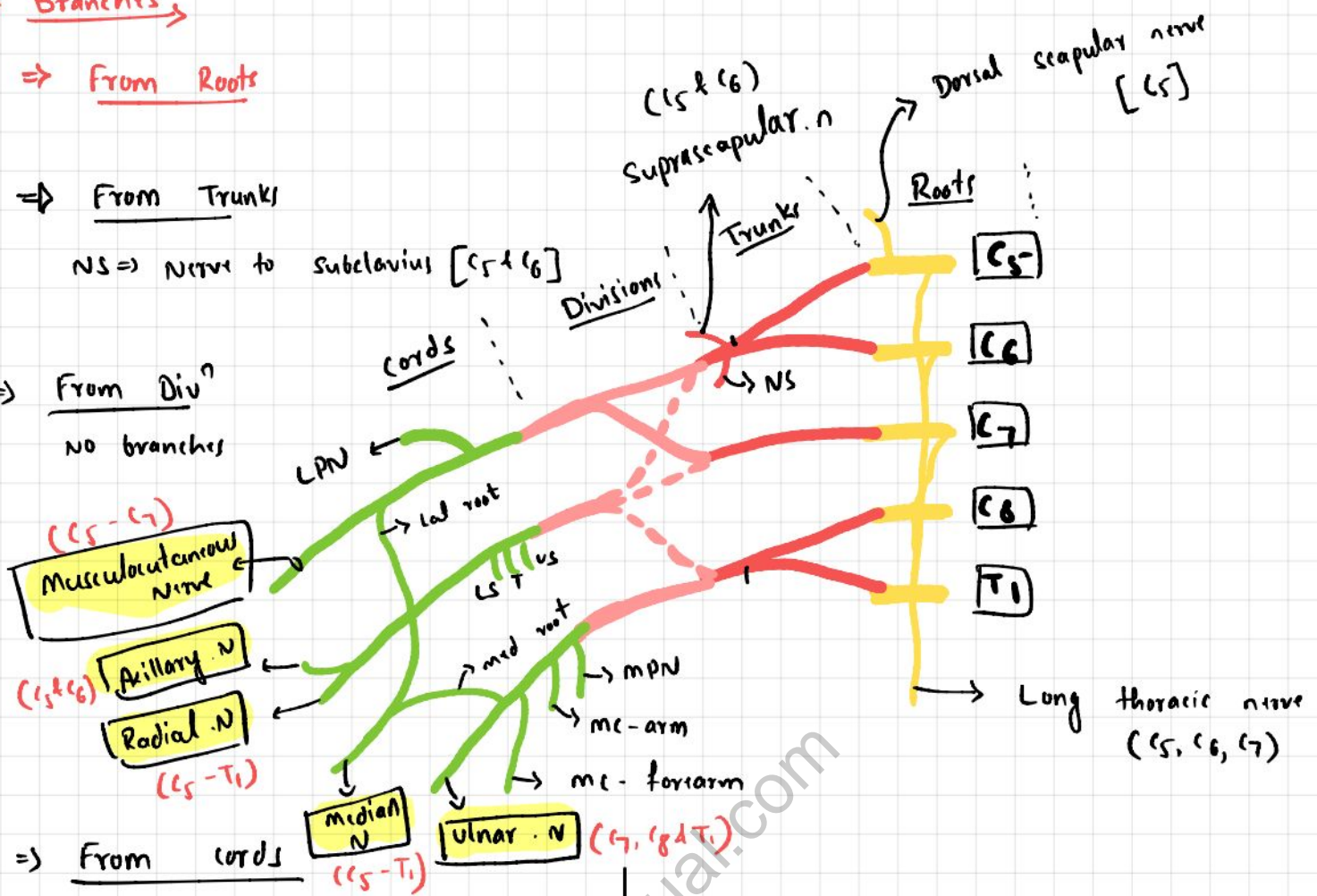
→ Radial nerve [C5-C8 & T1]

→ Axillary n (C5 & C6)

→ Thoraco-dorsal N (C6-C8)

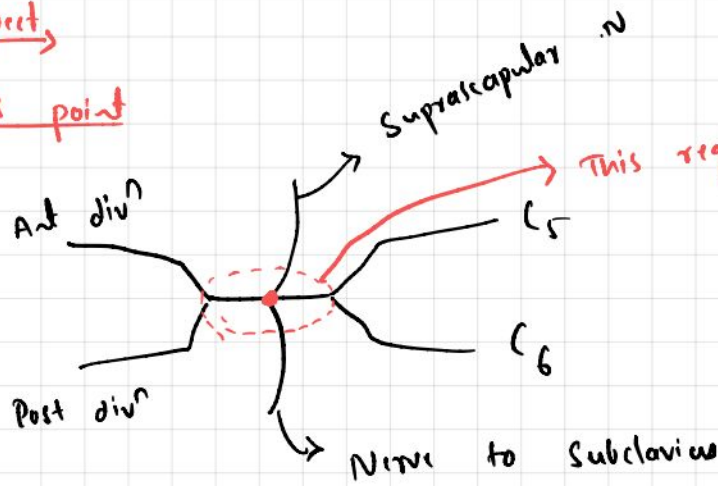
- Upper subscapular N (C5 & C6)

- Lower subscapular N (C5 & C6)



\* clinical aspect

⇒ Erb's point



This region of union of 6 nerves is called "Erb's point"

(I) Erb's paralysis (C5 & C6)

cause ⇒ fall from a horse

→ Traction of arm during birth of a child

→ All above due to excessive ↑ L<sup>4</sup> b/w head & shoulder.

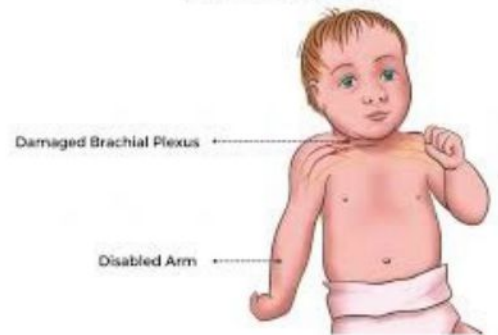
Deformity ⇒ "Policeman's tip hand"

→ arm is adducted & medially rotated.

→ forearm is extended & pronated

→ Loss of sensation along the outer aspect of arm.

ERB'S PALSY



(II) Klumpke's paralysis (lower plexus injury)

involves ⇒ C8 & T1

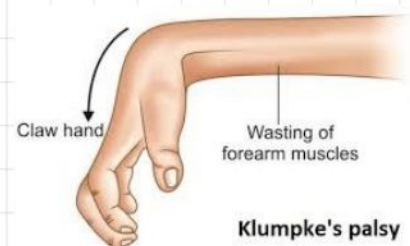
cause ⇒ hyperabduction of arm

clinical features

→ Claw hand

→ Loss of sensation along medial border of forearm & hand

→ Horner's syndrome



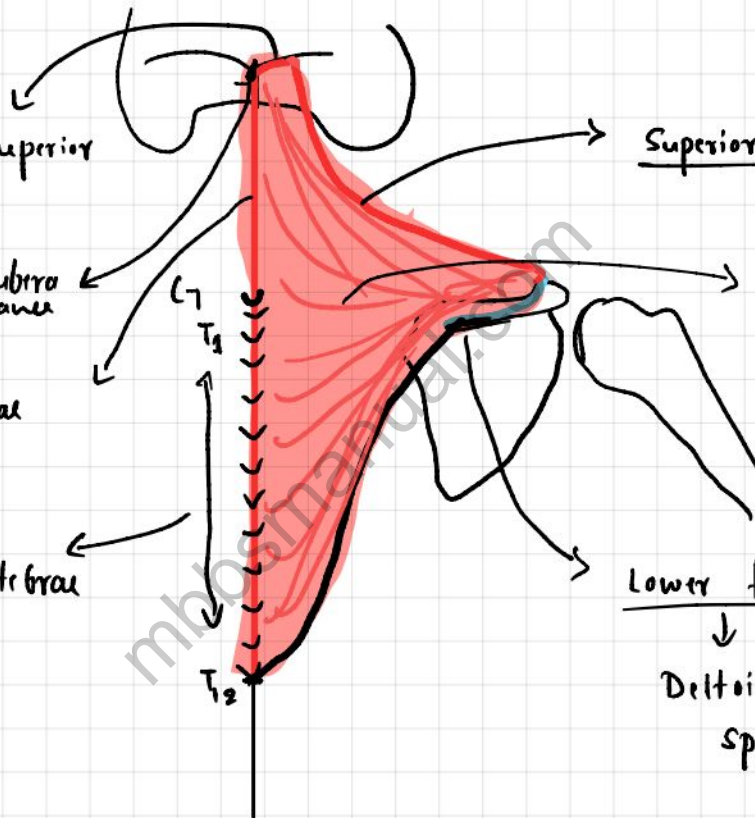
# Back of the body & Scapular Region

## Trapezius Muscle

- triangular muscle on the back of neck & upper thorax.

### \* origins

- medial  $\frac{1}{3}$ rd of superior nuchal line
- ext occipital protuberance
- Ligamentum nuchae
- Spine of C7 & all thoracic vertebrae



### \* Insertion

- Superior fibres → Post border of lateral  $\frac{1}{3}$  of clavicle
- middle fibres ↓  
Acromion + upper lip of crest of the spine
- Lower fibres ↓  
Deltoid tubercle of spine of the scapula.

### \* Nerve supply

- Spinal part of accessory nerve → Motor supply
- Ventral rami of C3 & C4 → Proprioceptive sensation

### \* Actions

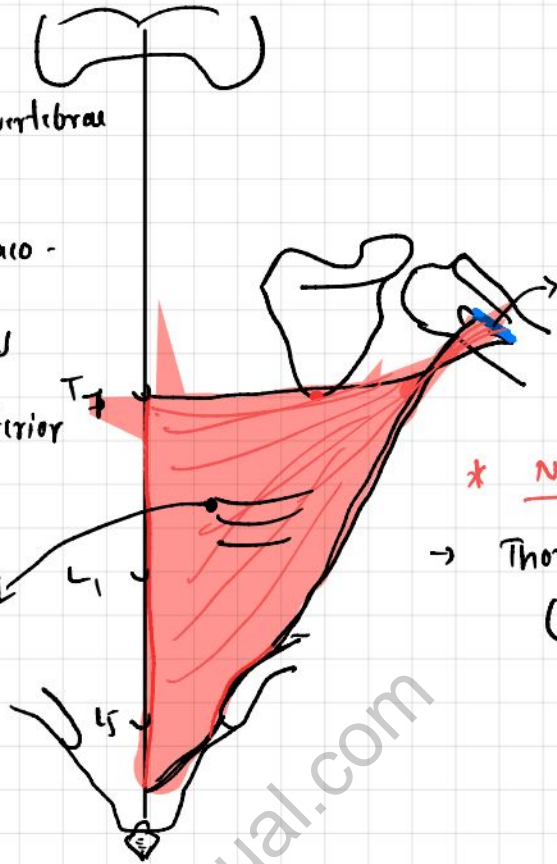
- Upper fibres → Shrugging the shoulder
- Middle fibres → Bracing back the shoulder
- Lower fibres → Depress the medial part of spine of scapula



# \* Latusmus Dorsi →

## \* origin,

- Spines of T<sub>7</sub> - T<sub>12</sub> vertebrae by tendinous fibres
- Post lamina of Thoraco-lumbar fascia by tendinous fibres
- Outer lips of the posterior part of iliac crest by muscular slips
- Lower 3 ribs → fleshy slips
- Inferior angle of scapula



## \* Insertion

↓  
Floor of intertubercular sulcus of humerus.

## \* Nerve supply →

→ Thoraco dorsal nerve (C6, C7, C8)

## \* Actions →

- Adduction, Extension & Medial rotation of humerus
- Pulls up trunk upwards & forwards while climbing
- Swinging of arm (backward) → Assist in walking
- Violent expiratory effort.

## \* Clinical aspect,

① Musculocutaneous flap → used in reconstructing of breast following mastectomy.

② Repair of heart → Used in place of surgically removed portion of heart → but requires a pacemaker.

# \* Rhomboideus Major

## \* origin

Spine of T<sub>2</sub> - T<sub>5</sub> vertebrae  
+  
Supraspinatous ligaments

## \* Insertion

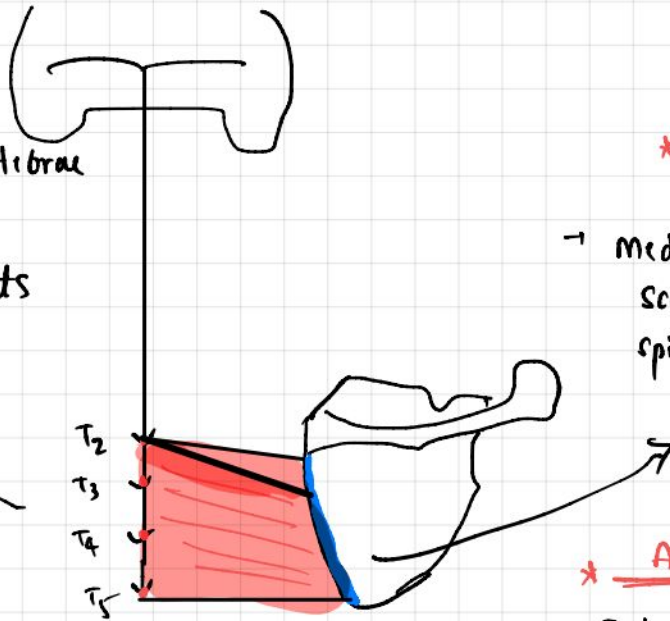
→ medial border of scapula b/w root of spine & Inf angle of scapula.

## \* Nerve supply

Dorsal scapular nerve [C<sub>5</sub>]

## \* Actions

- Retraction of scapula.



# \* Triangle of Auscultation

## Boundaries

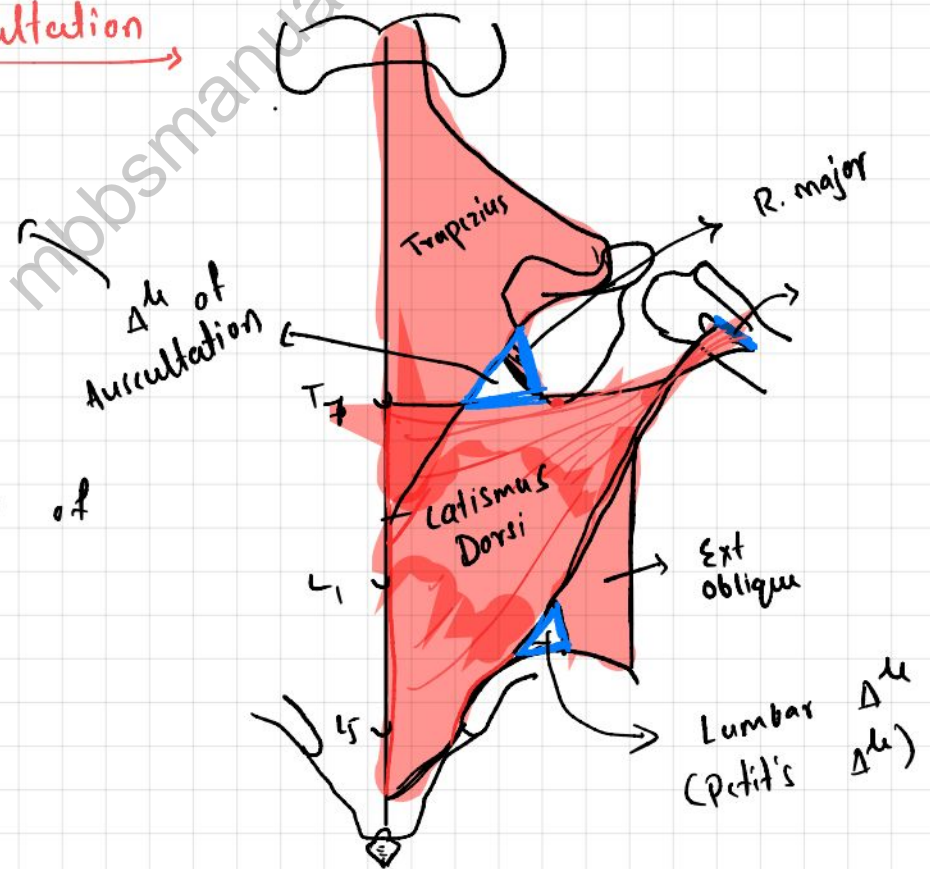
- Intercostal border of **Trapezius**
- Medial border of **scapula**
- supra-horizontal border of **Latissimus dorsi**

## Floor

- 6<sup>th</sup> & 7<sup>th</sup> Ribs
- 6<sup>th</sup> ICS

## Significance

upper part of lower lobe lies deep to 6<sup>th</sup> ICS



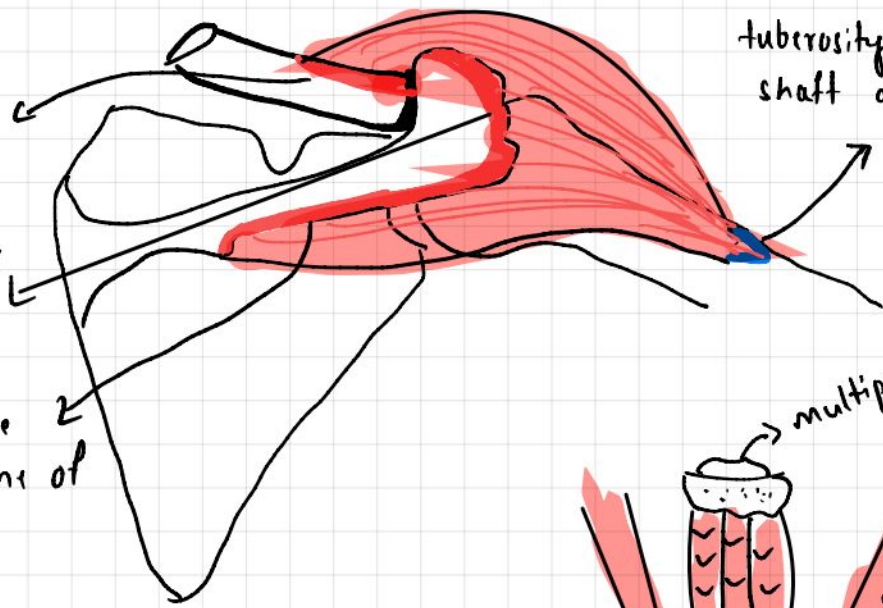
# Deltoid

## \* Insertion

→ V-shaped deltoid tuberosity in mid shaft of humerus

## \* origin

- Lat  $\frac{1}{3}$  of clavicle
- Lat margin of upper surface of acromion
- Lower lip of the crest of the spine of scapula

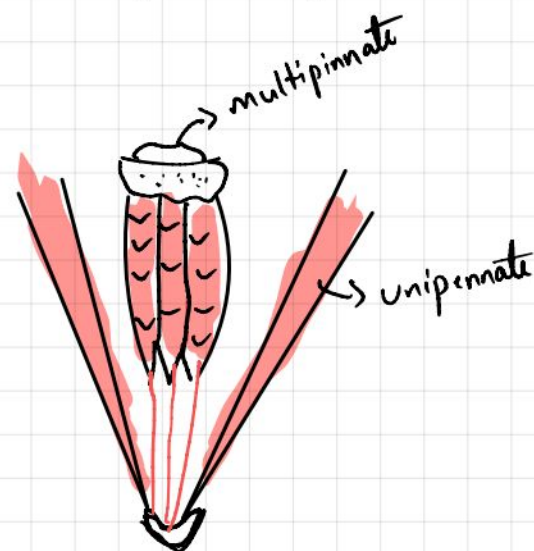


## \* Nerve supply

Axillary nerve [C5 & C6]

## \* Actions

- Anterior fibres → flexors & medial rotators of arm
- Middle fibres → Abduction ( $15^\circ - 90^\circ$ )
- Posterior fibres → Extensors & lateral rotators of arm.



## \* Structures under cover of Deltoid

\* Bones → humerus & acromion process

\* Joints → Shoulder Joint

\* Ligament → coracoacromial lig

\* Bursae → subscapular, subacromion & infraspinatus

\* Muscles → P. major, P. minor, T. major, latissimus dorsi

SITS group

→ Biceps, coracobrachialis, triceps

\* Vessels → PCHA + AchA

\* Nerves → Axillary nerve

\* Spaces → Quadrangular &  $\Delta^h$  subscapular intermuscular spaces.

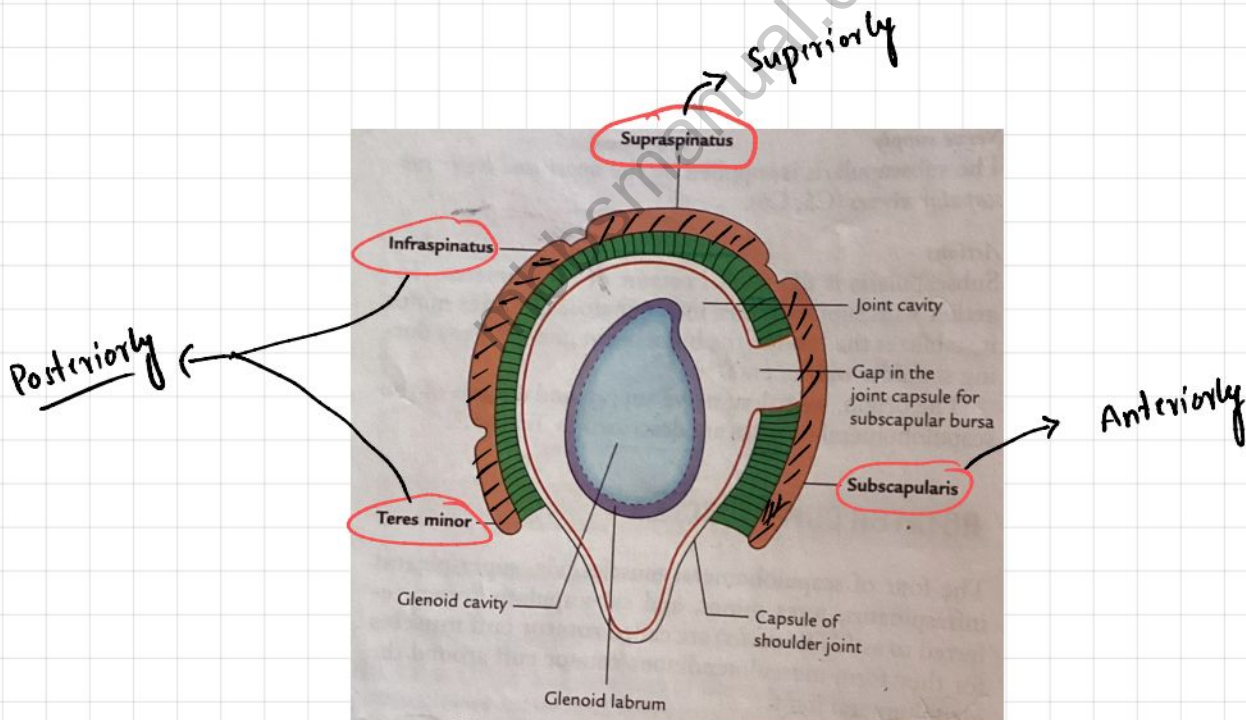
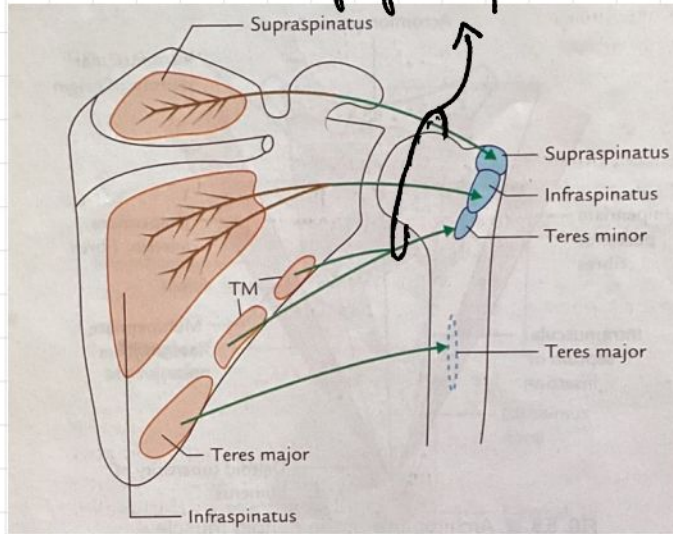
# Rotator Cuff (musculotendinous cuff)

" It is the tendons of Supraspinatus, Infraspinatus, T. minor & Subscapularis which are fused with underlying capsule of shoulder joint

## \* Importance

→ stabilizing the shoulder joint  
by ↓

grasping large head humerus & hold it against the smaller, shallow glenoid cavity.



# \* Movements of Scapula →

## ① Protraction

- Serratus Anterior
- P. minor

## ② Retraction

- Trapezius (middle fibres)
- R. minor + Major

## ③ Elevation

- Trapezius (upper fibres)
- Levator scapulae

## ④ Depression

- P. minor
- Latissimus Dorsi
- Trapezius (lower fibres)

## ⑤ Medial Rotation

- L. scapulae
- R. major
- R. minor

## ⑥ Lateral Rotation

- Trapezius (upper & lower fibres)
- Serratus Anterior.

# Subscapular Spaces

## ① Quadrangular Space

### \* Boundaries

Superior → T. minor + Subscapularis + capsule of shoulder joint

Inferior → T. major

Medial → Long head of triceps

Lateral → Surgical neck of humerus

### \* Structures passing

→ Axillary nerve

→ pCHA

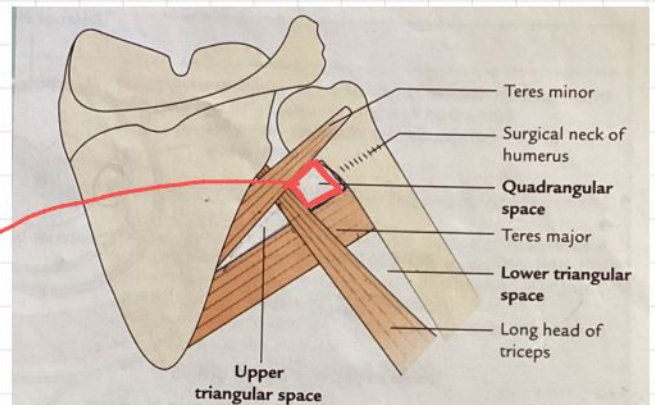
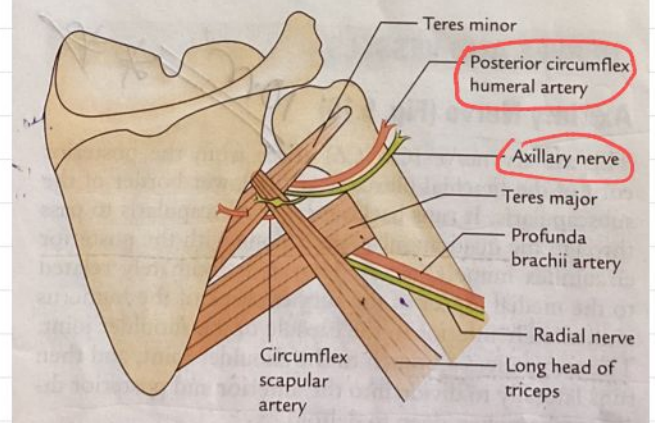
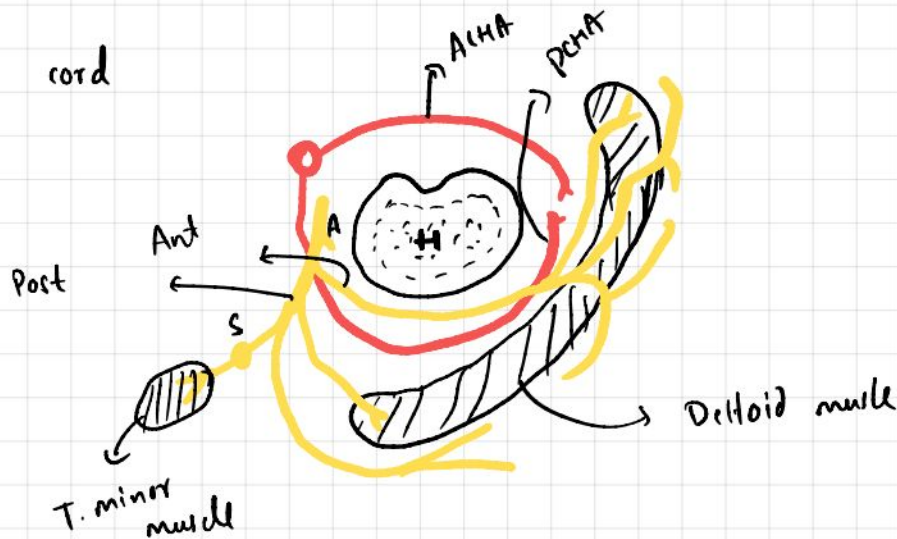


FIG. 5.13 ■ Intermuscular spaces of the subscapular region (subscapular spaces).

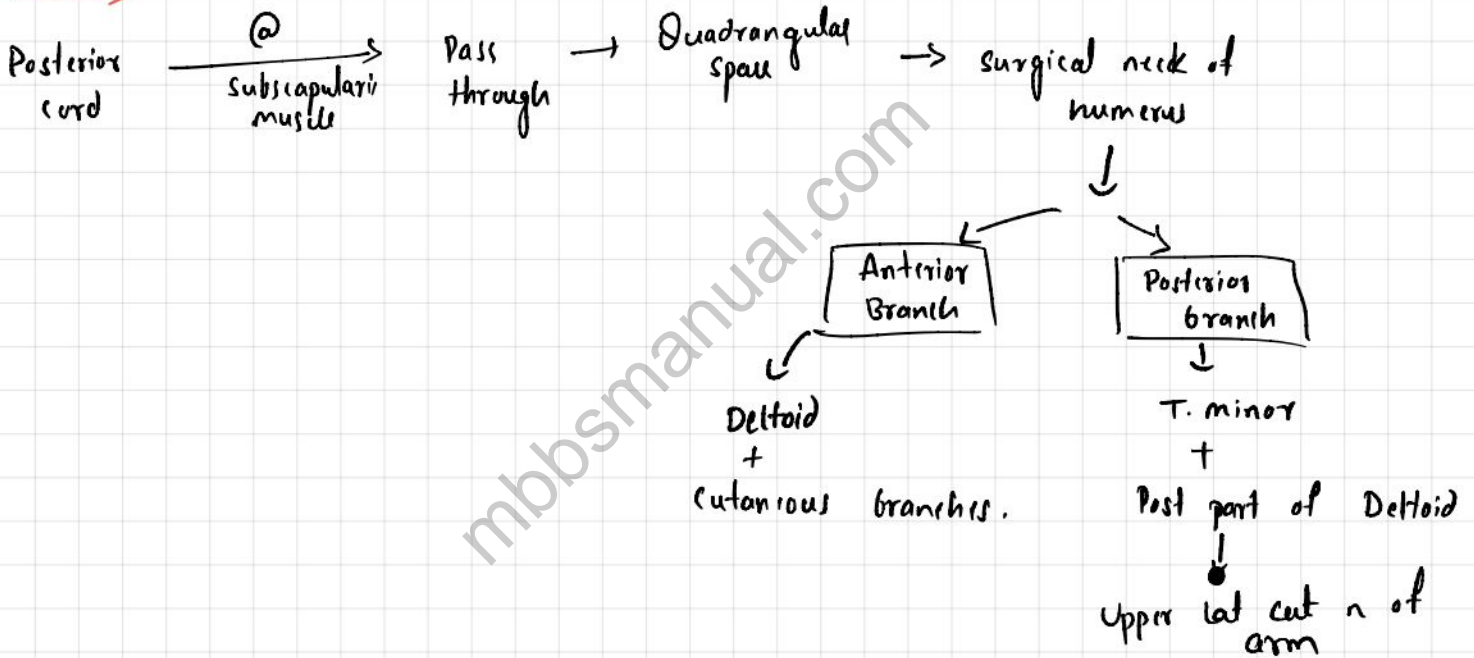


# Axillary Nerve [C5, C6]

↓  
Posterior cord



## Course



## Injury

Damage of Axillary nerve can lead to

- Impaired Abduction of shoulder
- loss of sens<sup>n</sup> of the lower half of deltoid  
" Regimental badge "
- Loss of shoulder contour with prominence of greater tubercle of the humerus.

[mbbsmanual.com](http://mbbsmanual.com)

# Shoulder Joint

"It is a joint b/w the head of humerus and glenoid cavity of scapula."

## \* Type

Ball & socket type of synovial joint.

## \* Articular surfaces

head of humerus  $\longleftrightarrow$  Glenoid cavity of scapula

## \* Ligaments

### ① Capsular ligament

Attachment :- medially to margin of glenoid cavity  
- Laterally anatomical neck of humerus

### ② Glenohumeral ligament

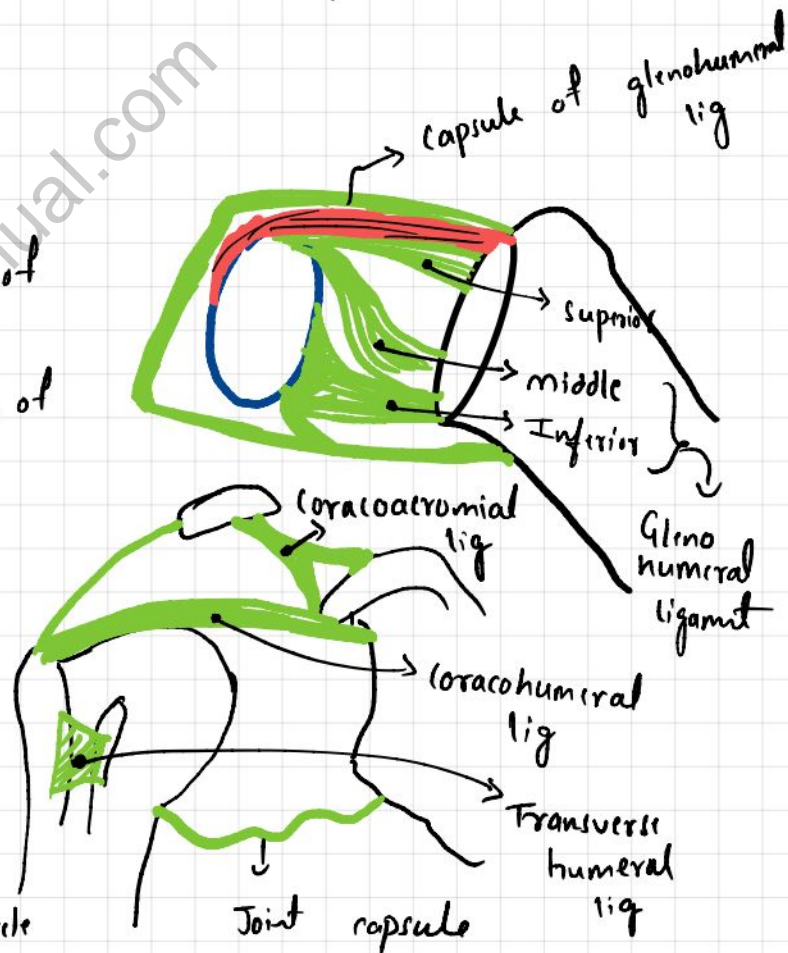
- Superior
- middle
- Inferior fibres.

### ③ Coracohumeral ligaments

Passes from base of coracoid process to the greater tubercle of humerus.

### ④ Transverse humeral ligament

→ It bridges the bicipital groove from greater tubercle & lesser tubercle.





\* Necessary ligaments

=> Coracoacromial ligament

It extends from coracoid process to acromion process.

=> Coracoacromial arch.

It is composed of → coracoid process + coracoacromial ligament + Acromion process.

\* Bursae related to shoulder joint.

① Subscapular bursa :-

- lies b/w tendon of subscapularis & neck of the scapula
- Protects tendon from neck of scapula

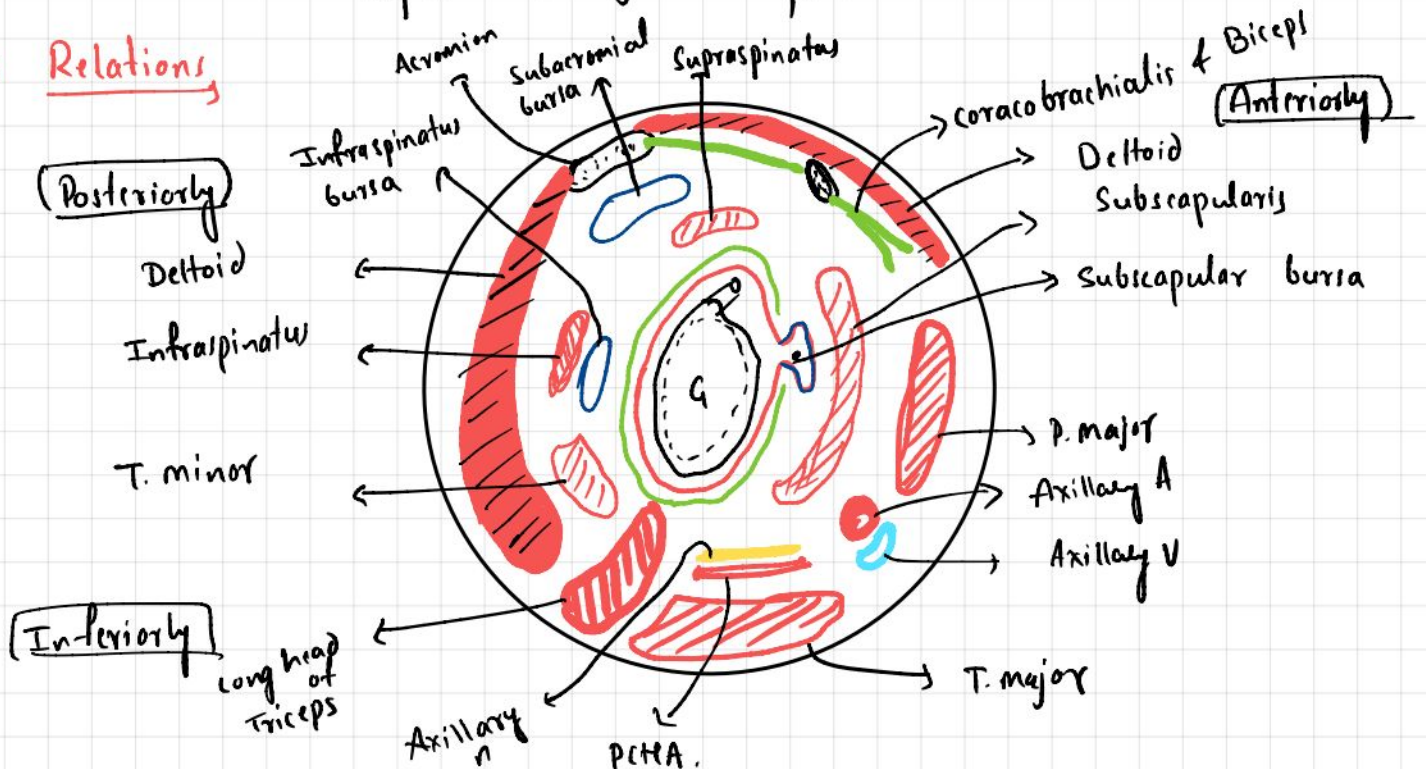
② Subacromial bursa

lies b/w coracoacromial ligament and acromion process above and supraspinatus tendon + joint capsule below

③ Infraspinatus bursa

Lies b/w the tendon of infraspinatus and posterolateral aspect of joint capsule.

\* Relations



## \* Arterial Supply

- ACHA & PCHA
- Suprascapular artery
- Subscapular artery

## \* Nerve Supply

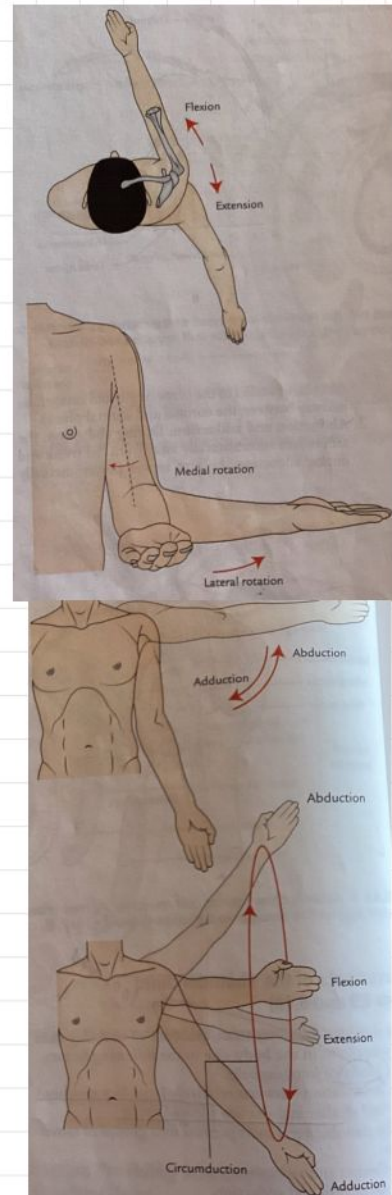
- Axillary n
- Suprascapular n
- musculocutaneous n

## \* Factors providing stability

- 1) Rotator cuff
- 2) Coracoacromial arch
- 3) Long head of biceps tendon
- 4) Glenoid labrum

## \* Movements of Shoulder Joint.

- ROM →
- ① Flexion → P. Major → 90°  
Deltoid
  - ② Extension → Deltoid + L. Dorsi → 45°
  - ③ Abduction → Deltoid → 180°  
+ Supraspinatus
  - ④ Adduction → Deltoid → 45°  
→ P. Major
  - ⑤ Lat Rotation → Deltoid → 45°
  - ⑥ Med Rotation → Subscapularis → 55°



## Clinical Aspect

① Dislocation of shoulder joint.

→ often occur inferiorly

types → Ant dislocation  
Post "

cause → Excessive extension & lateral rotation

Clinical features,

→ Hollow in rounded shoulder

→ Prominence of shoulder tip.

② Frozen shoulder,

→ Pain + limitation of movements

→ Due to shrinkage of joint capsule

↓  
due to Age (40-60yrs)

③ Rotator cuff disorders,

→ Calcific supraspinatus tendinitis

→ Subacromial bursitis.

# Arm

## Biceps brachii

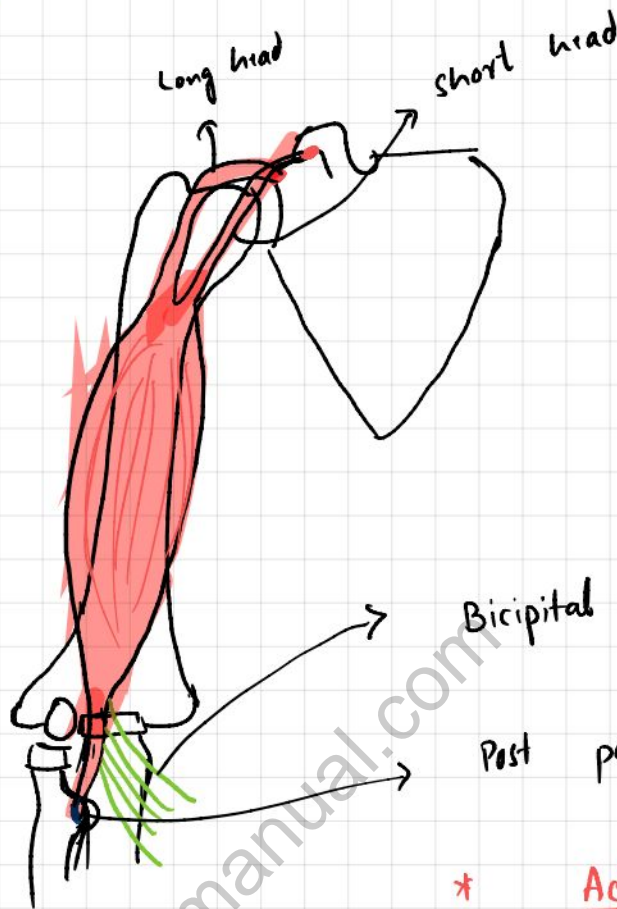
### \* Origin

① Long head

from supraglenoid tubercle

② Short head

from tip of coracoid process



### \* Insertion

Bicipital aponeurosis

Post part of radial tuberosity

### \* Nerve Supply

Musculoskeletal nerve [C<sub>5</sub> - C<sub>7</sub>]

### \* Action

→ Strong supinator of forearm

→ Flexor of forearm

→ Weak flexor of shoulder joint.

### \* Anatomical events occurring @ the inser<sup>n</sup> of coracobrachialis:-

1) Circular shaft of humerus — triangular

2) Brachial A passes from medial aspect to anterior of arm

3) Basilic vein pierces deep fascia

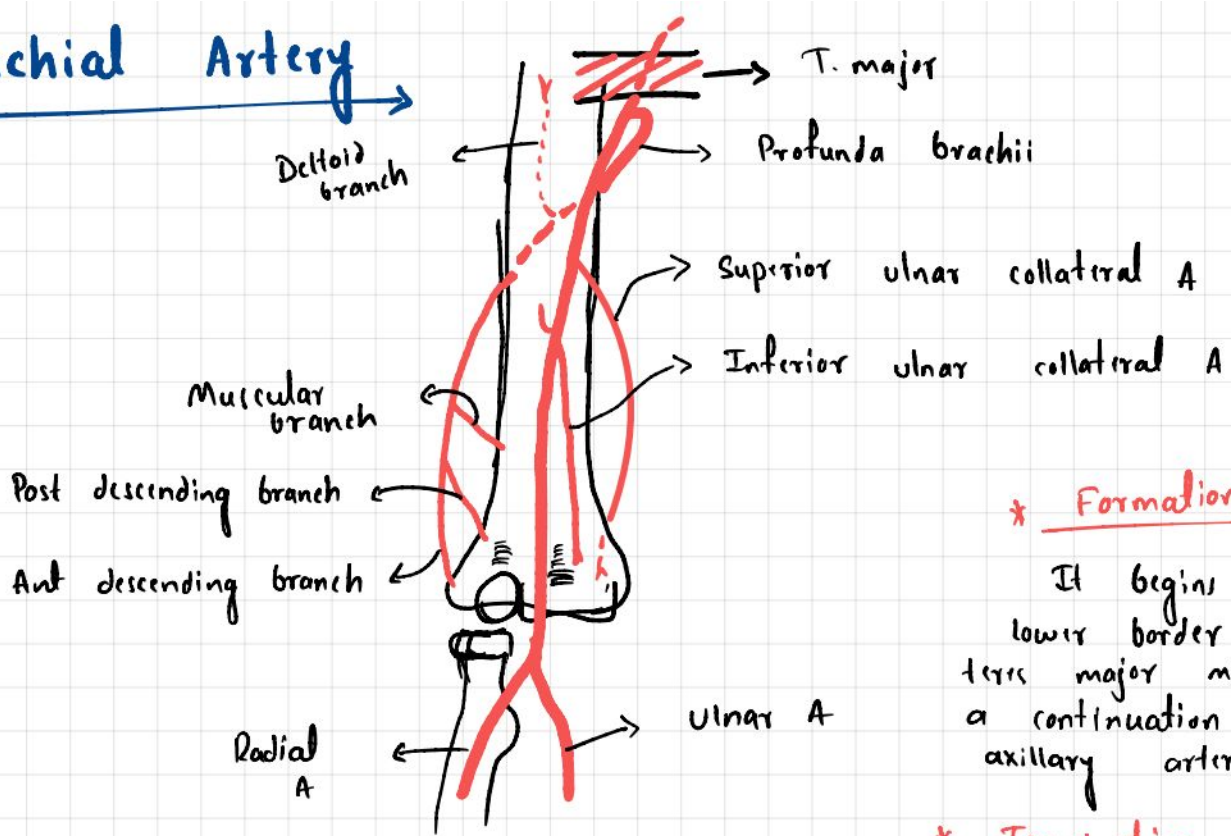
4) Median n crosses brachial A from lat → med side

5) Radial n pierces the lat intermuscular septum.

6) Ulnar n pierces the med intermuscular septum.

7) Nutrient A pierces humerus.

# Brachial Artery



## \* Formation

It begins at the lower border of **terc major muscle** as a continuation of the **axillary artery**.

## \* Termination

at level of the neck of radius by dividing into **Radial A** & **Ulnar A**.

## \* Relations

### Anteriorly

- Upper part → med cut n of forearm (lies in front)
- Mid part → Crossed by median n (Lat to med side)
- Lower part → Bicipital aponeurosis

### Posteriorly

- long head of triceps
- Medial head of triceps
- coracobrachialis
- Brachialis muscle

### Medially

- Upper part → Ulnar n & Basilic vein
- Lower part → Median n

### Laterally

- Upper part → median n + coracobrachialis + Biceps
- Lower part → Tendon of biceps.

\* Branches

- 1) Muscular branches
- 2) Profunda brachii (largest & 1<sup>st</sup> branch)
- 3) Nutrient artery to humerus
- 4) Superior ulnar collateral artery
- 5) Inferior ulnar collateral A
- 6) Radial A
- 7) Ulnar A

\* Clinical aspect

\* Volkman's ischaemic contracture

In this condition there will be supracondylar fracture → cause rupture of Brachial artery.

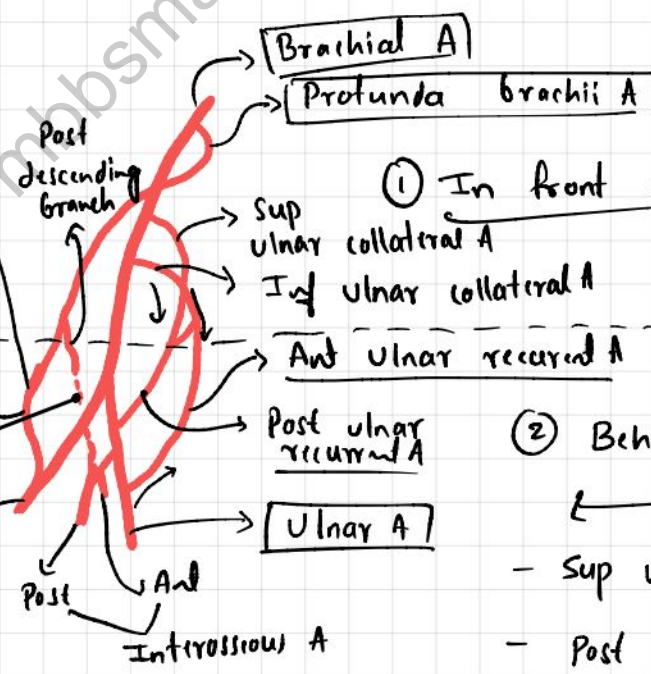
\* Arterial Anastomosis around the Elbow

③ Front of Lat condyle

Ant descending branch  
↓  
Radial recurrent A

④ Behind of Lat epicondyle

Post descending branch  
↓  
Interosseous recurrent A  
Radial A



① In front of Medial Epicondyle

- ② Behind the medial Epicondyle
- Sup ulnar collateral A
  - Post ulnar recurrent A

⑤ Above olecranon fossa

Middle collateral A ↔ Inf ulnar collateral A

# Cubital Fossa

## \* Boundaries,

Lat → Medial border of brachioradialis muscle

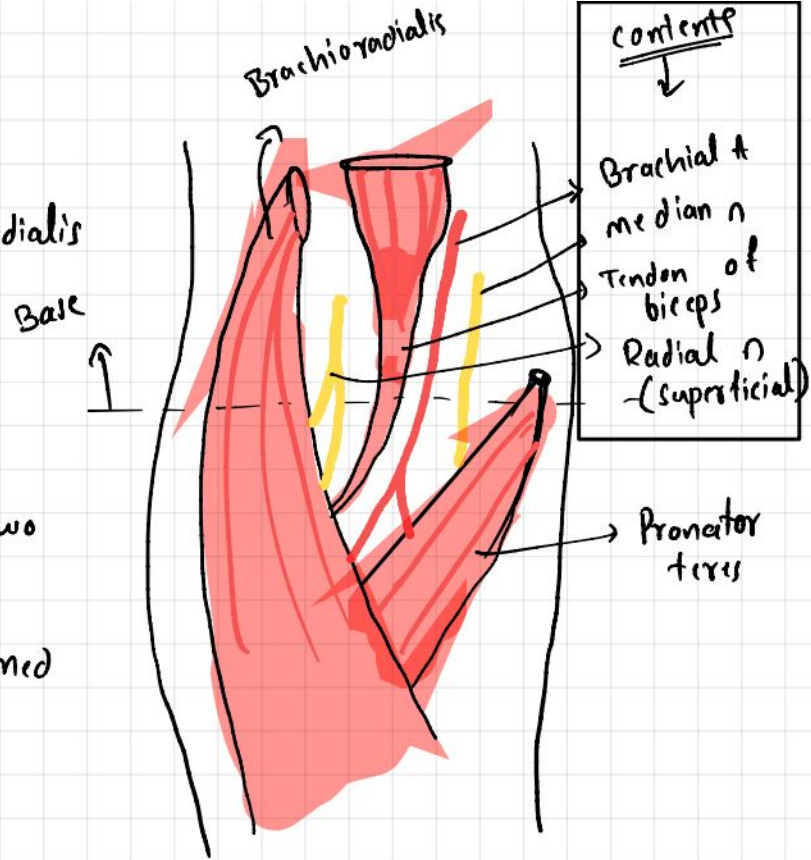
Med → Lat border of Pronator Teres muscle

Base → Imaginary line joining two epicondyles of humerus

Apex → Meeting point of lat & med boundaries

Floor → Brachialis + Supinator

Roof → Deep fascia of forearm + Bicipital aponeurosis



## \* Contents,

From medial → Lateral side

① Median nerve

② Brachial Artery

③ Biceps tendon

④ Radial nerve

(MBBS) → superficial radial nerve.

## \* Clinical Aspect,

① Median cubital vein → choice for collecting blood samples & giving IV injection

② Recording of BP

# Forearm

## \* Anterior interosseous Artery →

→ deepest artery on the front of the forearm.

course →

descends on the front of the interosseous membrane



Pierces the membrane @ pronator quadratus



Joins with posterior interosseous artery



Dorsal carpal arch

Supply →

main source of blood supply to the forearm.

## \* Extensor Retinaculum →

"Deep fascia on the back of the wrist is thickened to form an oblique fibrous band"

⇒ 2cm broad vertically.

## \* Attachments →

Medial end → styloid process of ulna + triquetrum + pisiform

Lateral end → lower part of anterior border of Radius





## \* Compartments

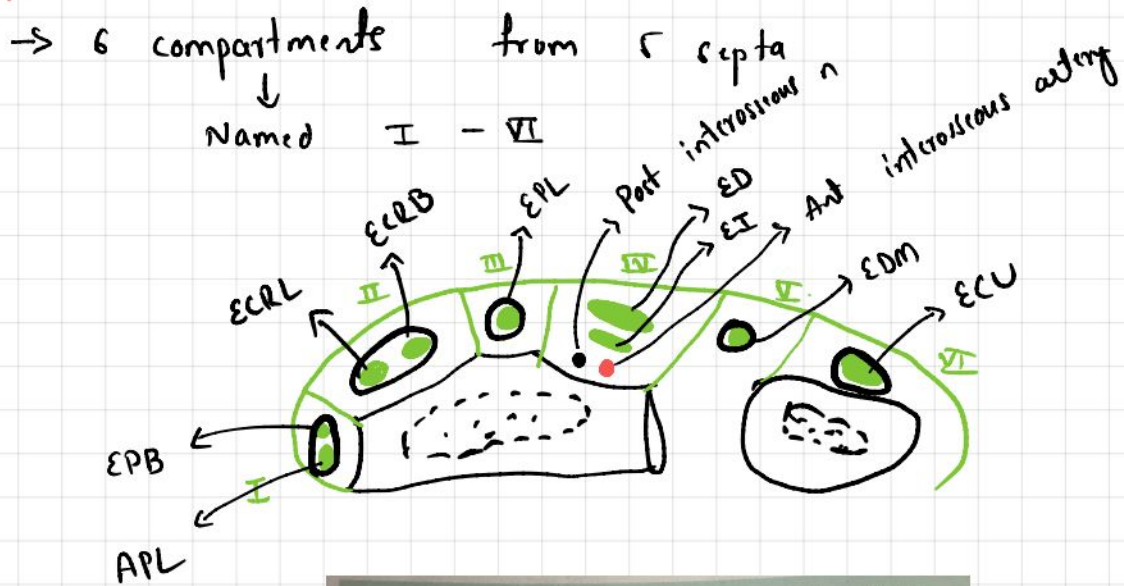


TABLE 9.3 Structures passing through various compartments beneath the extensor retinaculum of the wrist

Compartment	Structure/structures, passing through
I	<ul style="list-style-type: none"> <li>Abductor pollicis longus (APL)</li> <li>Extensor pollicis brevis (EPB)</li> </ul>
II	<ul style="list-style-type: none"> <li>Extensor carpi radialis longus (ECRL)</li> <li>Extensor carpi radialis brevis (ECRB)</li> </ul>
III	Extensor pollicis longus (EPL)
IV	<ul style="list-style-type: none"> <li>Extensor digitorum (ED)</li> <li>Extensor indicis (EI)</li> <li>Posterior interosseous nerve</li> <li>Anterior interosseous artery</li> </ul>
V	Extensor digiti minimi (EDM)
VI	Extensor carpi ulnaris (EUC)

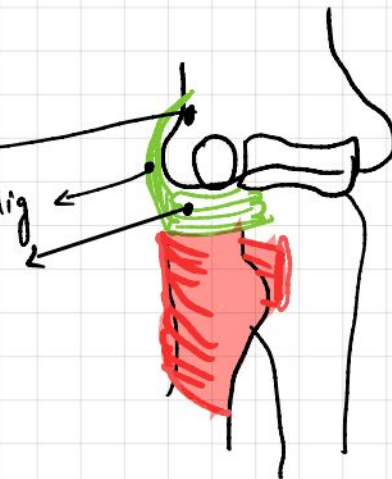
## \* Functions

holds the extensor tendon in place while movement of wrist.

## \* Supinator

### Origin

- Lateral epicondyle
- Radial collateral lig
- Annular lig
- Supinator crest
- Adjoining part of triangular area



### Insertion

Upper 1/3 of lat surface of radius

### \* Nerve supply

Post interosseous nerve

### \* Action

Supination of forearm.

## \* Posterior Interosseous Artery →

\* Formation → terminal branch of the common interosseous A from ulnar artery

\* Course  
Begin in cubital fossa  
↓  
Passes b/w APL & supinator  
Accompany Post interosseous nerve  
↓

\* Termination → Anastomosis with Anterior Interosseous Artery

\* Branches  
→ Interosseous recurrent artery (at cubital fossa)

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# Elbow Joint

"It is a joint b/w the lower end of the humerus and upper ends of the radius & ulna."

Type →

hinge type of synovial joint

Articular surfaces

Upper articular surface → capitulum & trochlea of humerus

Lower articular surface → head of the radius  
+  
trochlear notch of ulna.

Ligaments

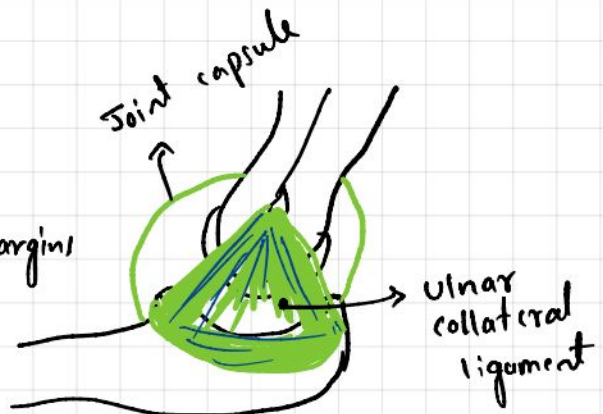
↳ Capsular ligament (Joint capsule)

→ Fibrous sac enclosing joint cavity

\* Attachments

Above → Medial epicondyle + upper margins  
of radial, coronoid & olecranon  
fossae & Lateral epicondyle.

Below → ant & med margins of the coronoid process of the  
ulna, upper margin of the annular ligament, and  
upper & medial margins of olecranon process



2) Ulnar collateral ligament

Apex → medial epicondyle

base → coronoid & olecranon process of ulna

Divided into → anterior  
→ Posterior  
→ Inferior parts.

### 3) Radial collateral ligament

→ Extends from the lateral epicondyle of the humerus to Annular ligament

### \* Relations

Anterior :- Brachialis muscle

- Median n
- Brachial A
- tendon of biceps

Posterior

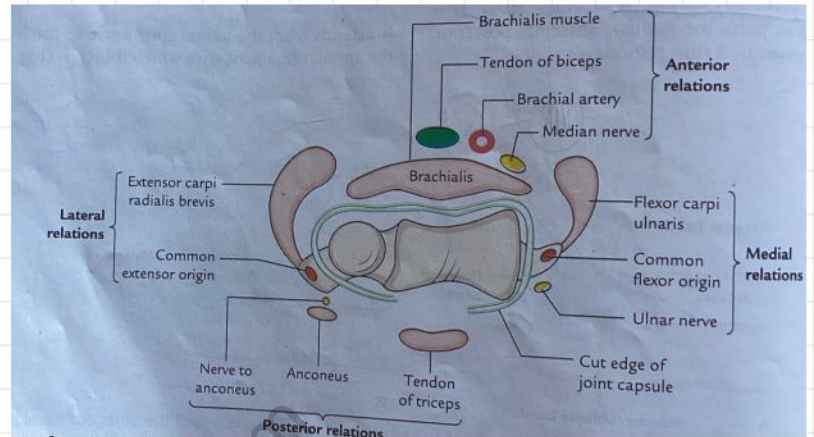
- Tendon of triceps
- anconeus

Medially

- FCU
- Ulnar n
- common flexor origin of muscles of forearm

Laterally

- supinator
- common extensor origin
- ECRB.



### \* Bursae related to joint

- 1) Subtendinous olecranon bursa } related to triceps insert<sup>n</sup>
- 2) Subcutaneous olecranon bursa }
- 3) Bicipitoradial bursa } related to biceps insertion
- 4) Small tendon separating biceps tendon & oblique cord.

### \* Stability of the joint

- Due to shape & fit of trochlea & trochlear notch
- strong ulnar & radial collateral ligaments.

### \* Blood supply

Anastomosis around the elbow joint.

## \* Nerve Supply →

- Radial .n (via branch to anconeus)
- Musculocutaneous .n (via branch to brachialis)
- Ulnar .n
- Median .n

## \* Movements

- ① Flexion → Brachialis  
→ Biceps brachii  
- Brachioradialis
- ② Extension → Triceps  
→ Anconeus.

## \* Clinical aspect →

### ① Dislocation

→ Post dislocation is common A/s with fracture of coronoid process.

### ② Nursemaids elbow

occurs in children (1-3 yrs)

Cause, when forearm is suddenly pulled in pronation  
↓  
head of radius comes out of annular lig  
↓  
Elbow flexed & pronated.

### ③ Tennis elbow (lateral epicondylitis)

→ Pain & tenderness over lat epicondyle during abrupt pronation.

- due to → Sprain of lateral collateral lig  
→ tear of fibres of ECRB  
→ Inflammation of bursa  
→ tear of common extensor origin

\* Golfer's elbow (Medial epicondylitis)

Pain & tenderness → medial epicondyle

due to → tear of common flexor origin  
→ Inflammation of medial epicondyle

\* Student's elbow (Miner's elbow)

→ Round fluctuating painfull swelling over the olecranon.

due to → Inflammation of subcutaneous olecranon bursa

# Radio Ulnar Joint

## \* Superior Radio-Ulnar Joint

Type → Pivot type of synovial joint

Articular surface → Radial head  
fibro-osseous ring made by radial notch of the ulna + annular ligament.

### Ligaments

- ① Capsular ligament
- ② Annular ligament
- ③ Quadratus ligament

### Relations

Anteriorly & Laterally → Supinator muscle

Posteriorly → Anconeus

### Blood supply

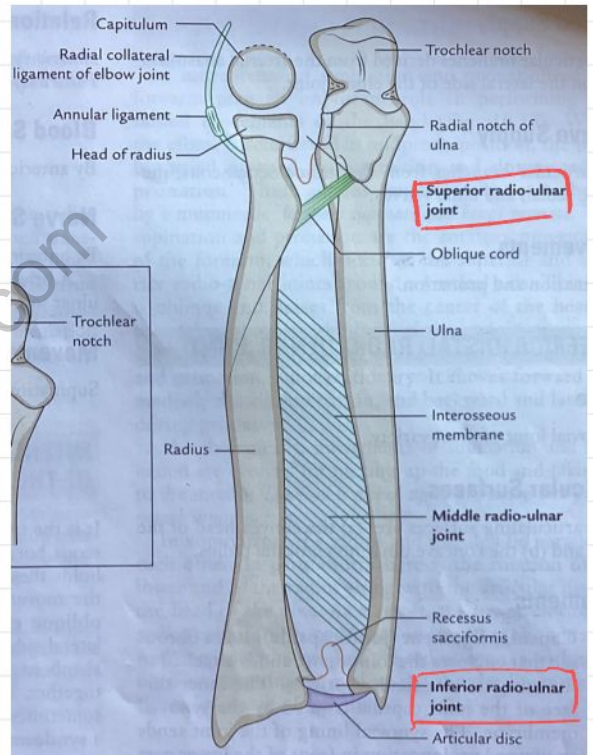
→ Derived from arterial anastomosis on the lateral side of elbow joint

### \* Nerve supply

from  
- musculocutaneous, median, radial & ulnar nerves

### \* Movements

Supination & Pronation.



## \* Inferior Radio-Ulnar Joint

Type → Pivot type of synovial joint

### Articular surfaces

- convex head of ulna
- concave ulnar notch of radius

### Ligaments

- ① Capsular ligament
- ② Articular disc

### Relations

Anteriorly → FDP

Posteriorly → EDM

### Blood supply

Ant & Post interosseous artery

### Nerve supply

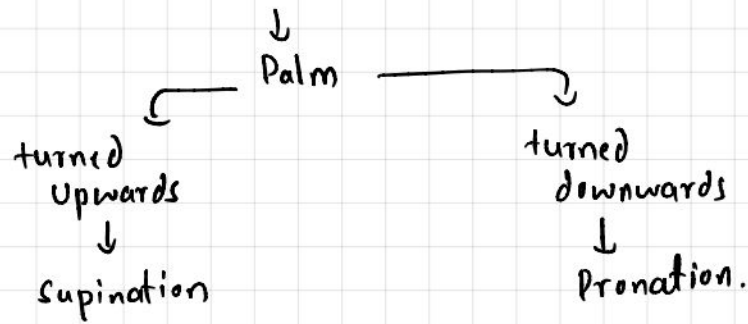
Ant & Post interosseous nerve

### Movements

Supination & Pronation.

# Supination & Pronation

" when elbow is semiflexed in midprone position



⇒ Supination  
radius & ulna lie parallelly

## Pronation

There is rotation of the lower end of the radius along with the articular disc on the head of ulna

⇒ Supination →  
→ Supinator  
→ Biceps brachii  
→ Brachioradialis

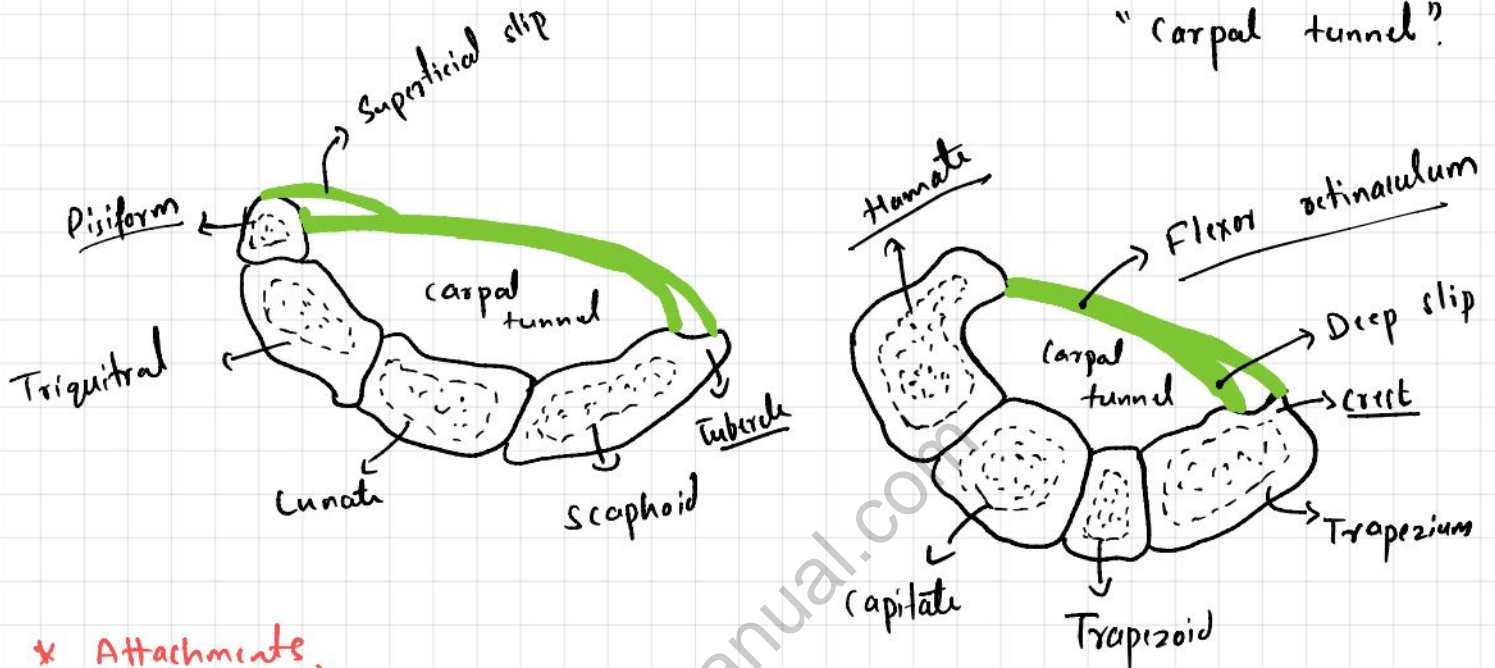
→ Pronation →  
→ Pronator teres  
→ Pronator quadratus  
→ Brachioradialis



# Hand

## Flexor Retinaculum

It is a fibrous band that bridges the anterior concavity of carpal arch and converts it into osseofibrous tunnel  
 ↓  
 "Carpal tunnel"

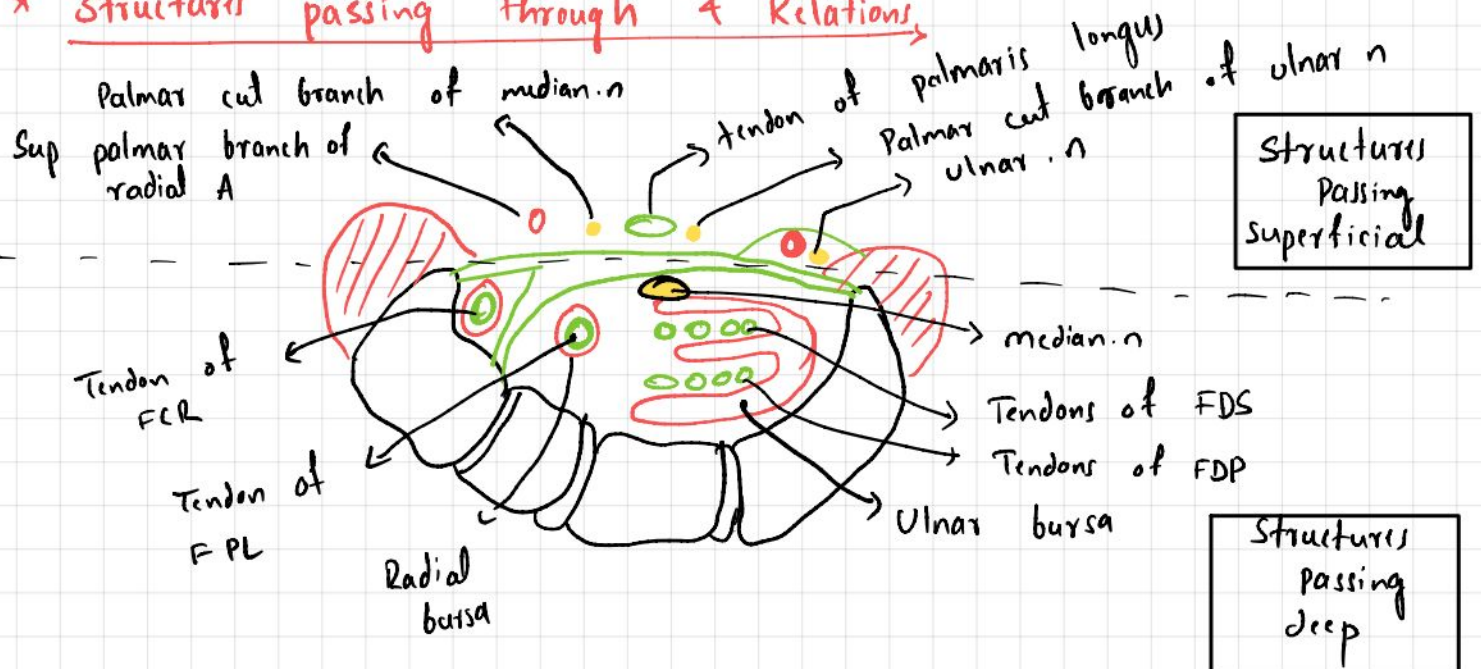


### \* Attachments

Medially → Pisiform & hook of hamate

Laterally → Tubercle of Scaphoid & Crest of Trapezium

### \* Structures passing through & Relations



# Palmar Aponeurosis

"It is the deep fasci of palm in central part"

It covers the long flexor tendons & superficial palmar arch.

\* Shape, triangular

\* Features

1) Apex

2) Base

3) Medial border:-

- It is continuous with fascio covering hypothenar muscle

→ Gives origin to Palmaris brevis

4) Lateral border :-

Continuous with the deep fascia covering thenar muscle

\* Functions

→ Improves grip of hand by fixing the skin

→ Protects the underlying tendons, nerves & vessels.

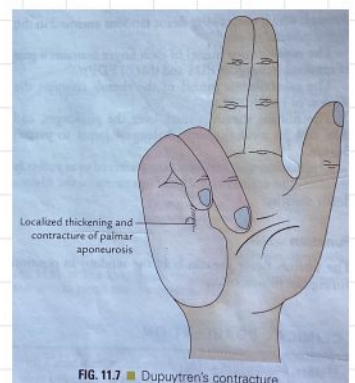
\* Clinical aspects

\* Dupuytren's contracture.

"Progressive fibrosis in the medial part of palmar aponeurosis"

Later → Progressive thickening → permanent contracture

Rx ⇒ Surgical fasciectomy.

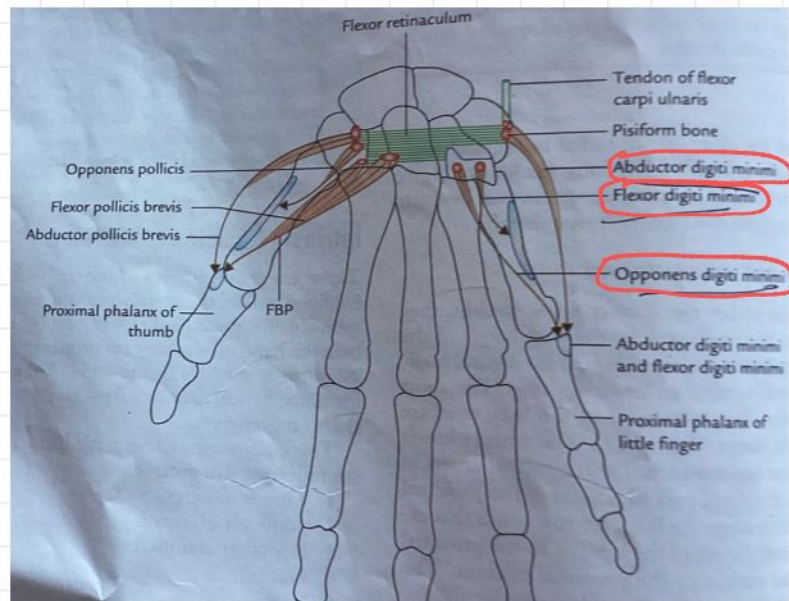


# Hypothenar Muscles

- ① Abductor digiti minimi (ADM)
- ② Flexor digiti minimi (FDM)
- ③ Opponens digiti minimi (ODM)

## \* Relations

- ADM lies medially
- FDM lies laterally
- ODM lies deep to above two muscles.



## \* Features

- form hypothenar eminence of the palm
- Supplied → Ulnar nerve

## \* Actions

- ① ADM → Abduction of little finger
- ② FDM → Flexion of little finger
- ③ ODM → Opposition of tip of little finger with tip of thumb

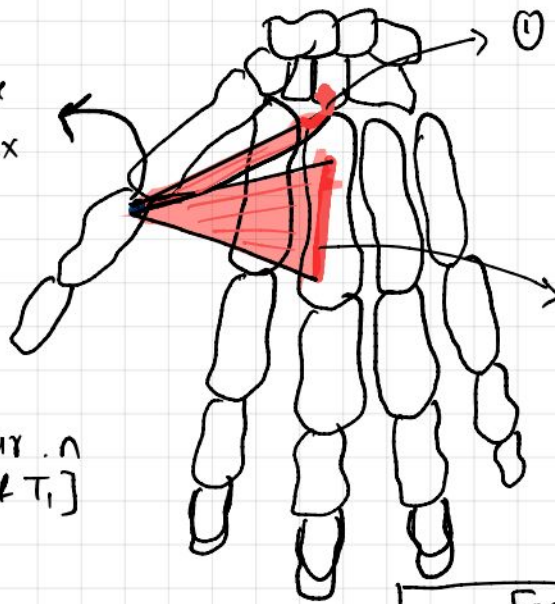
# Adductor Pollicis Muscle

\* origin

two head

Insertion

Medial side of base of proximal phalanx



① Oblique head

Arises from Capitate + Base of 2<sup>nd</sup> & 3<sup>rd</sup> metacarpals

② Transverse head

Arises from shaft of 3<sup>rd</sup> metacarpal

\* Nerve supply

Deep branch of Ulnar n [C8 & T1]

Actions

Adduction of thumb.

# Lumbrical Muscles

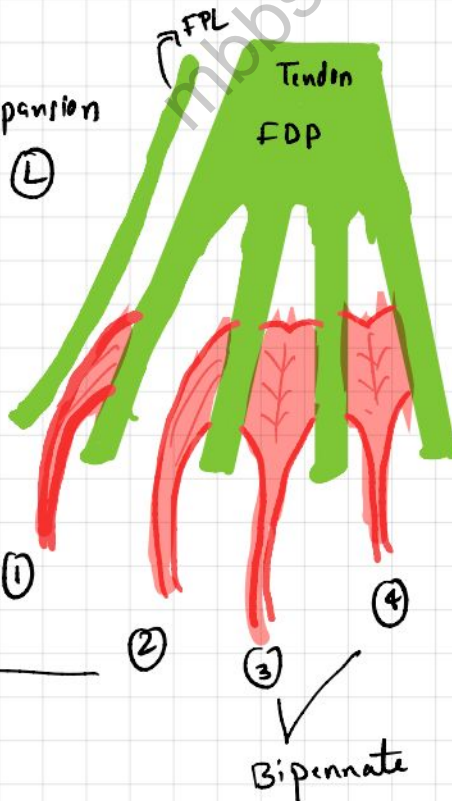
Foment's sign

Ask pt to hold paper in b/w thumb & index finger.

⊗ To check paralysis of muscle

\* Insertion

Lateral side of dorsal digital expansion of corresponding digit



\* origin

⇒ ① & ② ⇒ Lateral side of lateral two tendon of FDP

⇒ ③ & ④ ⇒ Adjacent sides of medial 3 tendons of FDP

\* Nerve supply

① & ② → median n

③ & ④ → Ulnar n (deep branch)

\* Actions

→ Flex MP joints

→ Extends PIP & DIP joints.

Unipennate

Bipennate

# Interossei

• Eight small muscles located b/w metacarpal bones

Arranged in two groups → Palmar interossei  
↳ Dorsal interossei

located b/w palmar surfaces of metacarpals

located b/w the shafts of metacarpals

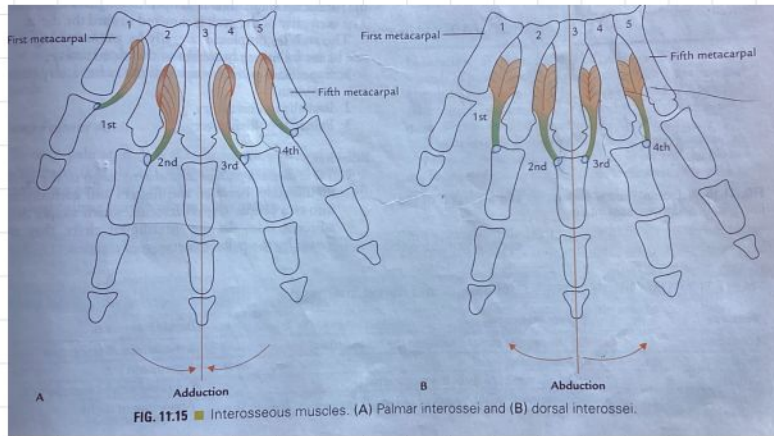


FIG. 11.15 Interosseous muscles. (A) Palmar interossei and (B) dorsal interossei.

## \* Nerve Supply

→ deep branch of ulnar nerve

## \* Actions

PAD → Palmar ii → Adducts the digits

DAB → Dorsal ii → Abducts the digits.

## \* Clinical testing

Ask the pt to hold paper b/w two adjacent fingers.

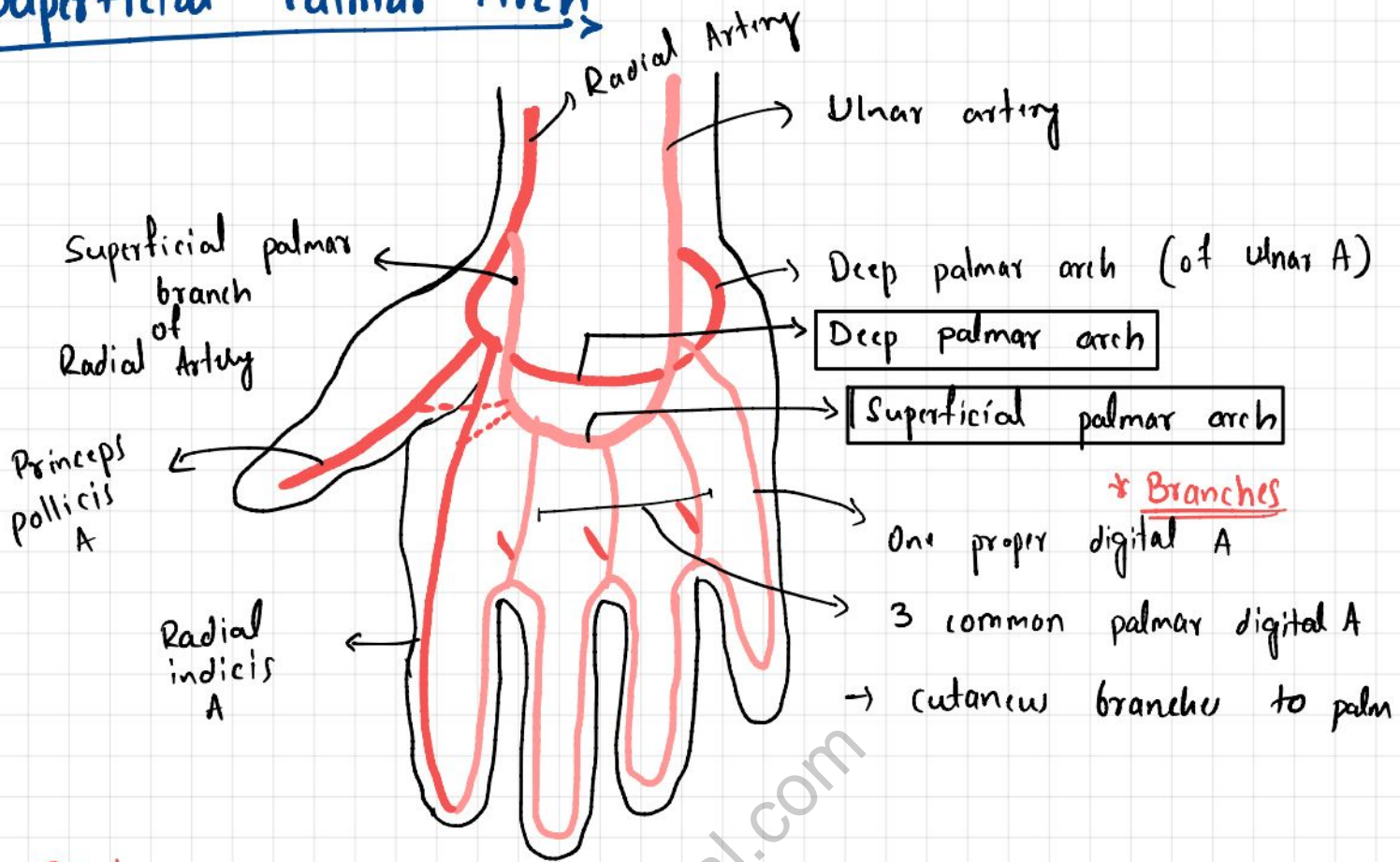
TABLE 11.2 Origin and insertion of the palmar and dorsal interossei

Muscles	Origin	Insertion
<b>Palmar Interossei</b>		
• First palmar interosseous	Medial side of the base of the first metacarpal	Each palmar interosseous muscle is inserted into the dorsal digital expansion and base of proximal phalanx of the corresponding digit - First and second into medial sides of the thumb and index fingers, respectively - Third and fourth into lateral sides of the fourth and fifth digits, respectively
• Second palmar interosseous	Medial half of the palmar aspect of the second metacarpal	
• Third and fourth palmar interossei	Lateral parts of the palmar aspects of the shafts of the fourth and fifth metacarpals	
<b>Dorsal Interossei</b>		
• First dorsal interosseous	Adjacent sides of the shafts of first and second metacarpals	Each dorsal muscle is inserted into the dorsal digital expansion and base of the proximal phalanx of the digit - First and second on the lateral sides of the index and middle fingers, respectively - Third and fourth on the medial sides of the middle and ring fingers, respectively
• Second dorsal interosseous	Adjacent sides of the shafts of second and third metacarpals	
• Third dorsal interosseous	Adjacent sides of the shafts of third and fourth metacarpals	
• Fourth dorsal interosseous	Adjacent sides of the shafts of fourth and fifth metacarpals	

TABLE 11.3 Differences between the palmar and dorsal interossei

Features	Palmar interossei	Dorsal interossei
Location	On the palmar surface between the metacarpals	Between the metacarpals
Type	Unipennate	Bipennate
Origin	From palmar aspects of the metacarpals	From the side of metacarpals
Action	Adduction of digits	Abduction of digits

# Superficial Palmar Arch



## \* Relations

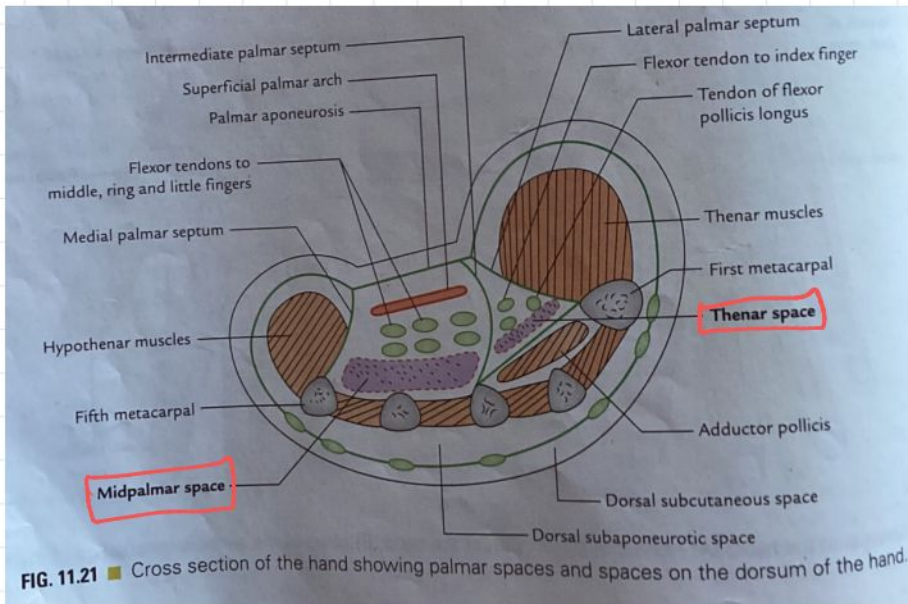
Superficial → Palmar aponeurosis

Deep → FDS & FDP

→ Lumbricals

→ Digital branches of median & ulnar nerves.

# Fascial Spaces of hand



## Various Spaces

(A) Palmar spaces  
 → midpalmar space  
 → Thenar space  
 → Pulp space

(B) Dorsal spaces  
 → Dorsal subcutaneous space  
 → Dorsal subaponeurotic space

(C) Space of Parona

# Palmar Spaces

## ① Midpalmar Space

### \* Boundaries

#### ⇒ Anteriorly

- Palmar aponeurosis
- Superficial palmar arch
- Digital nerves
- Ulnar bursa
- Medial 3 Lumbricals

#### = Posteriorly

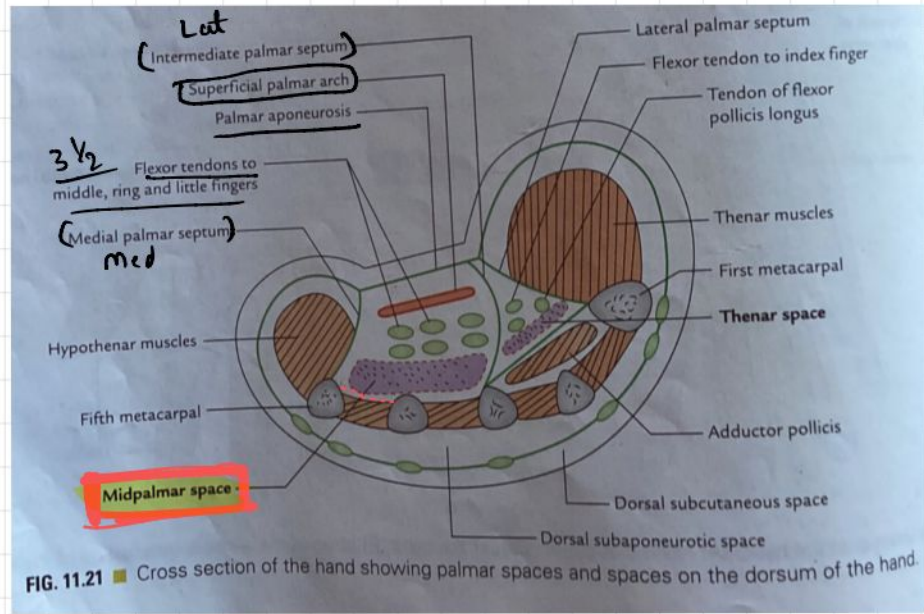
Fascia covering interossei

#### ⇒ Laterally

Intermediate palmar septum

#### → Medially

medial palmar septum



\* Proximal

continuous with forearm space of Parona

\* Distal

continuous with medial 3 web spaces

## Thenar Spaces

### Boundaries

#### Anterior

- Palmar aponeurosis
- Digital n
- Radial bursa
- Flexor tendons of index finger
- 1<sup>st</sup> lumbrical

#### Laterally

Lat palmar septum

#### Medial

Intermediate palmar septum

#### Posterior

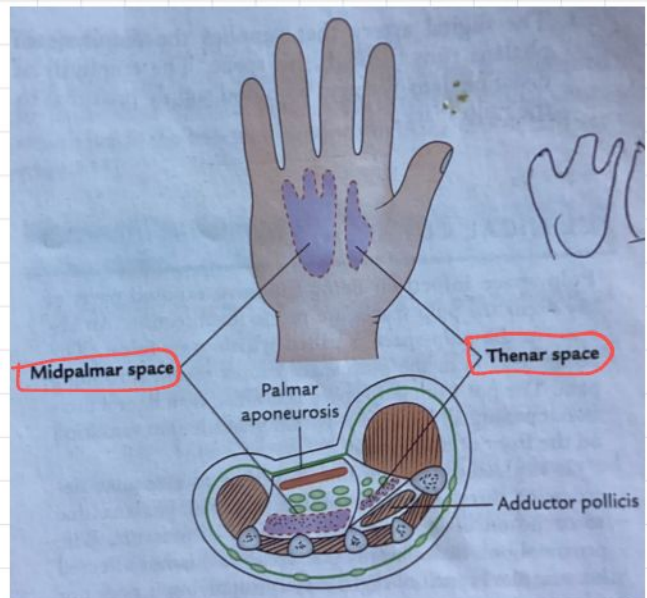
Fascia covering transverse head of Adductor pollicis

#### Proximal

Carpal tunnel

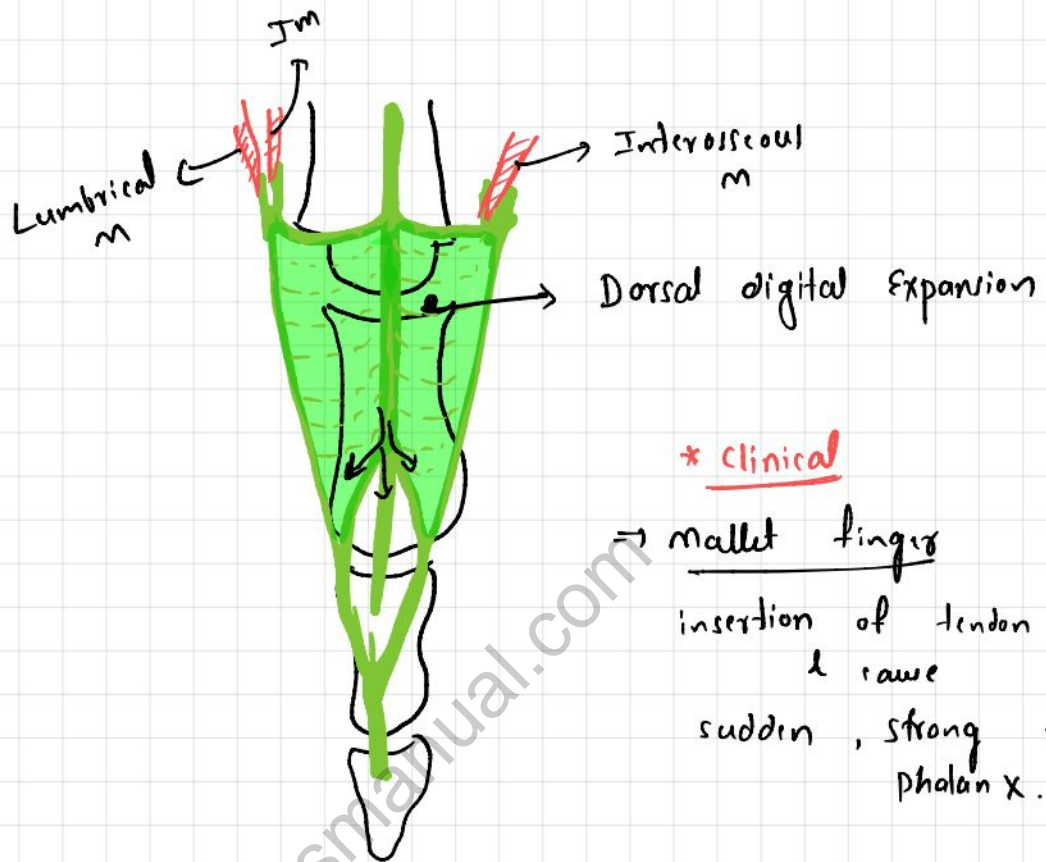
#### Distal

1<sup>st</sup> lumbrical canal.



# Dorsal Digital Expansion

Each tendon of Extensor digitorum → Expands and covers the MP Joint



\* Clinical

→ mallet fingers

insertion of tendon is torn & cause sudden, strong flexion of phalanx.

# Anatomical Snuff box

"elongated triangular depression seen on lateral side of dorsum of hand when  
 Thumb  
 ↓  
 hyperextended.

\* Boundaries,

Anterolaterally → Tendon of APL + EPB

Posteromedially → Tendon of EPL

Floor → Scaphoid & trapezium

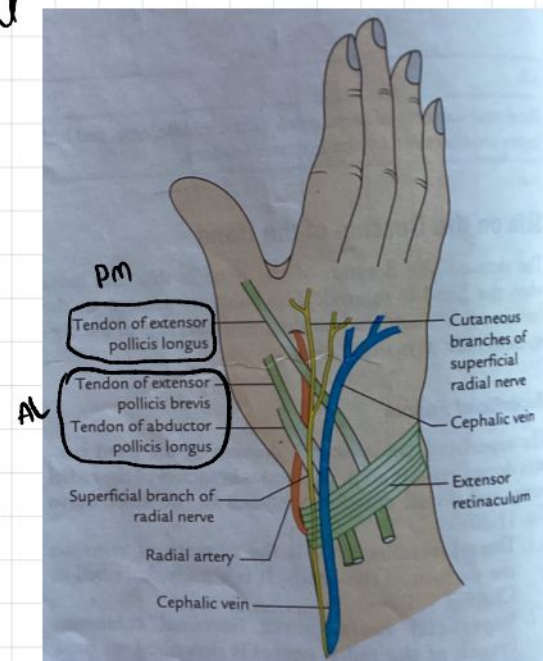
Roof → skin + superficial fascia

Contents → Radial Artery

\* Structures passing

1) Cephalic vein (Med → Lat)

2) superficial radial n (Lat → med)





# Wrist Joint

Type :- synovial joint of ellipsoid variety

## Articular surfaces:-

1) Proximal articular surface

→ by inferior surface of lower end of radius & radio-ulnar joint

2) Distal articular surface

- Scaphoid, lunate & triquetral

## Ligaments

① Capsular ligament

attached above → distal ends of radius & ulna

below → proximal row of carpal bones

② Radial collateral ligament

③ Ulnar collateral ligament

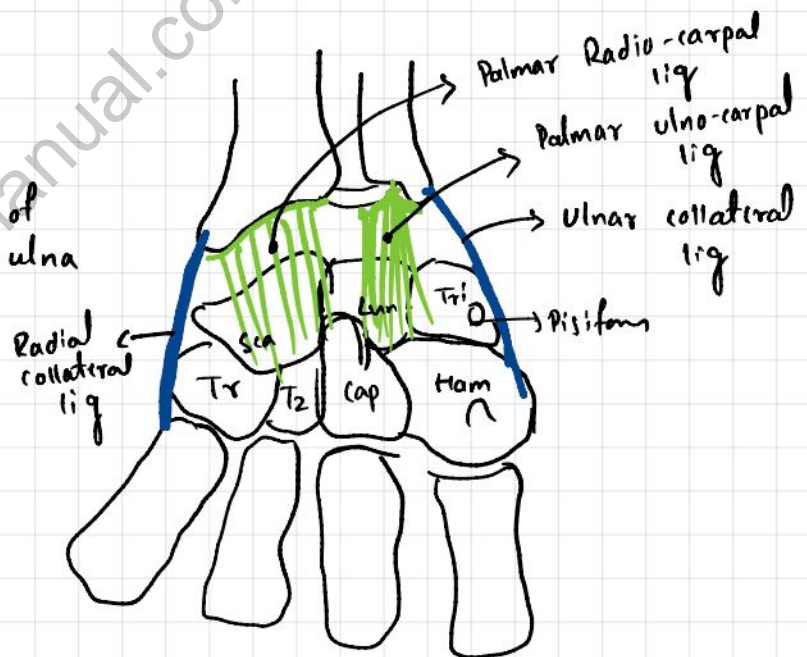
④ Palmar radio-carpal ligament

lower end of radius ↔ Ant surface of scaphoid, lunate & triquetral

⑤ Palmar ulnar ligament

Base of styloid process ↔ lunate & triquetral

⑥ Dorsal radio-carpal ligament.



## \* Relations

Anteriorly → FDS + FDP + Ulnar bursa  
→ FPL + Radial bursa  
→ Median nerve  
→ FCR  
→ Ulnar nerve

Posterior → tendons of Extensors  
→ Anterior interosseous artery  
→ Posterior interosseous nerve

Lateral,  
→ Radial artery  
→ APL  
- EPB

medial, Dorsal cut branch of ulnar nerve

## \* Movements, movement

	<u>Muscle</u>	<u>ROM</u>
① <u>Flexion</u>	FCR FCU PL	0-60°
② <u>Extension</u>	ECRL + ECRB + ECU	0-50°
③ <u>Abduction</u>	FCR + ECRB + ECRL + APL	0-15°
④ <u>Adduction</u>	FCU ECU	0-50°
⑤ <u>Circumduction</u>		

## \* Clinical

Ganglion → non tender, cystic swelling

cause := mucoid degeneration of synovial sheath around the tendon

# First Carpometacarpal Joint

Type,  
Synovial joint of saddle variety

## Articular surfaces

Proximal → Distal surface of trapezium

Distal → Proximal surface of I<sup>st</sup> metacarpal

## Ligaments

### ① Joint capsule

Proximally → margins of trapezium

Distally → Base of I<sup>st</sup> Metacarpal

### ② Lateral ligament

Lateral surface of Trapezium ↔

Lateral side of base of I<sup>st</sup> metacarpal.

### ③ Anterior ligament

Palmar surface of T<sub>8</sub> ↔

Ulnar side of base of I<sup>st</sup>M

### ④ Posterior ligament

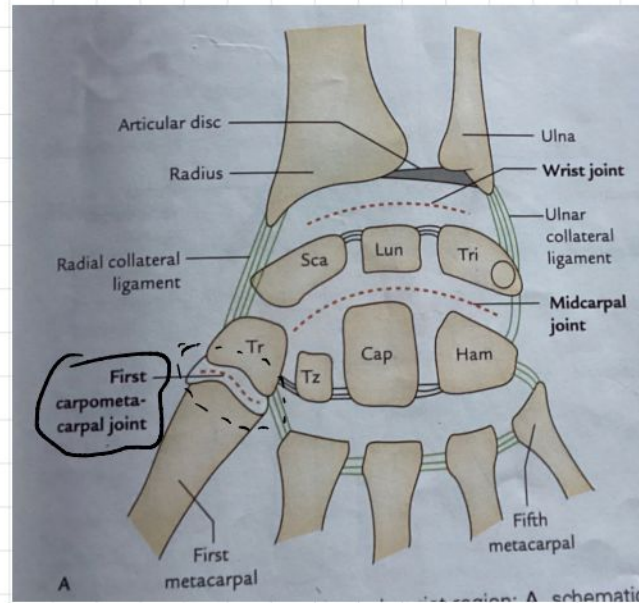
Dorsal surface of T<sub>8</sub> ↔

Ulnar side of base of I<sup>st</sup>M

## \* Relations,

→ Radial artery (Postero medial)

→ I<sup>st</sup> dorsal interosseous muscle (medial)



## Blood supply

→ Radial artery

## Nerve supply

— Median nerve

## Movements

→ Flexion → FPL + FPB + OP

→ Extension → EPL + EPB

→ Abduction → APL + APB

→ Adduction → AP

→ Opposition → OP

→ medial & lateral rotation

→ Circumduction

mbbsmanual.com

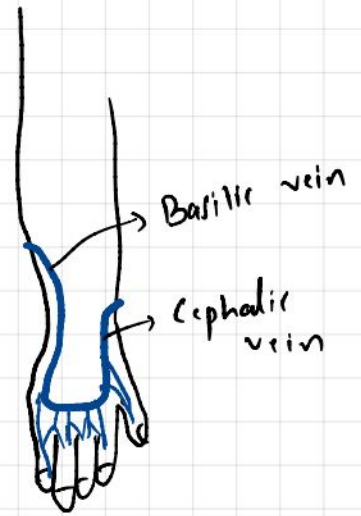
# Venous Drainage

## \* Dorsal Venous Arch

"It is the network of veins on the dorsum of hand."

### Tributaries

- ⇒ 3 dorsal metacarpal veins
- ⇒ dorsal digital vein → little finger
- ⇒ dorsal digital vein → index finger
- ⇒ Two dorsal digital veins of thumb
- ⇒ Veins draining palm of hand

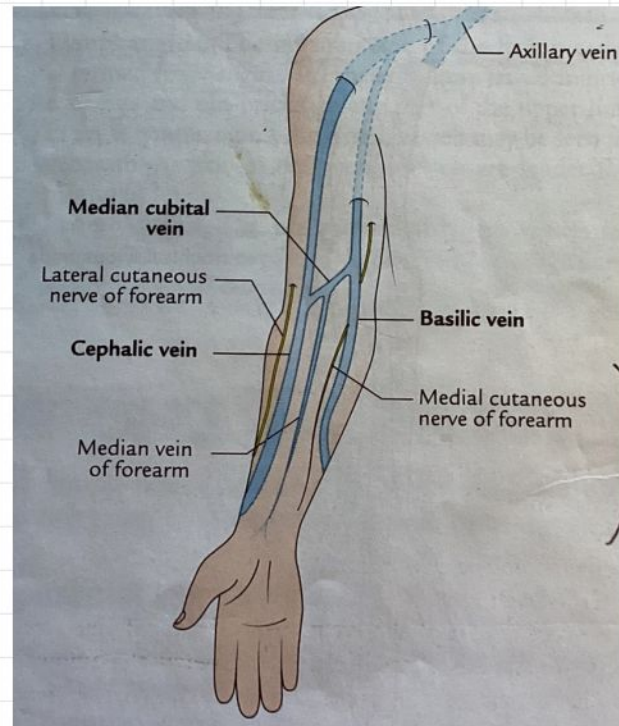


## \* Cephalic vein

⇒ "It continues as dorsal venous arch"

### Course

crosses Anatomical snuff box  
↓  
Ascends on radial border of forearm  
↓  
pierces deep fascia at lower border of P. major  
↓  
Runs in deltopectoral groove  
↓  
pierces clavicle pectoral fascia & drain into Axillary vein

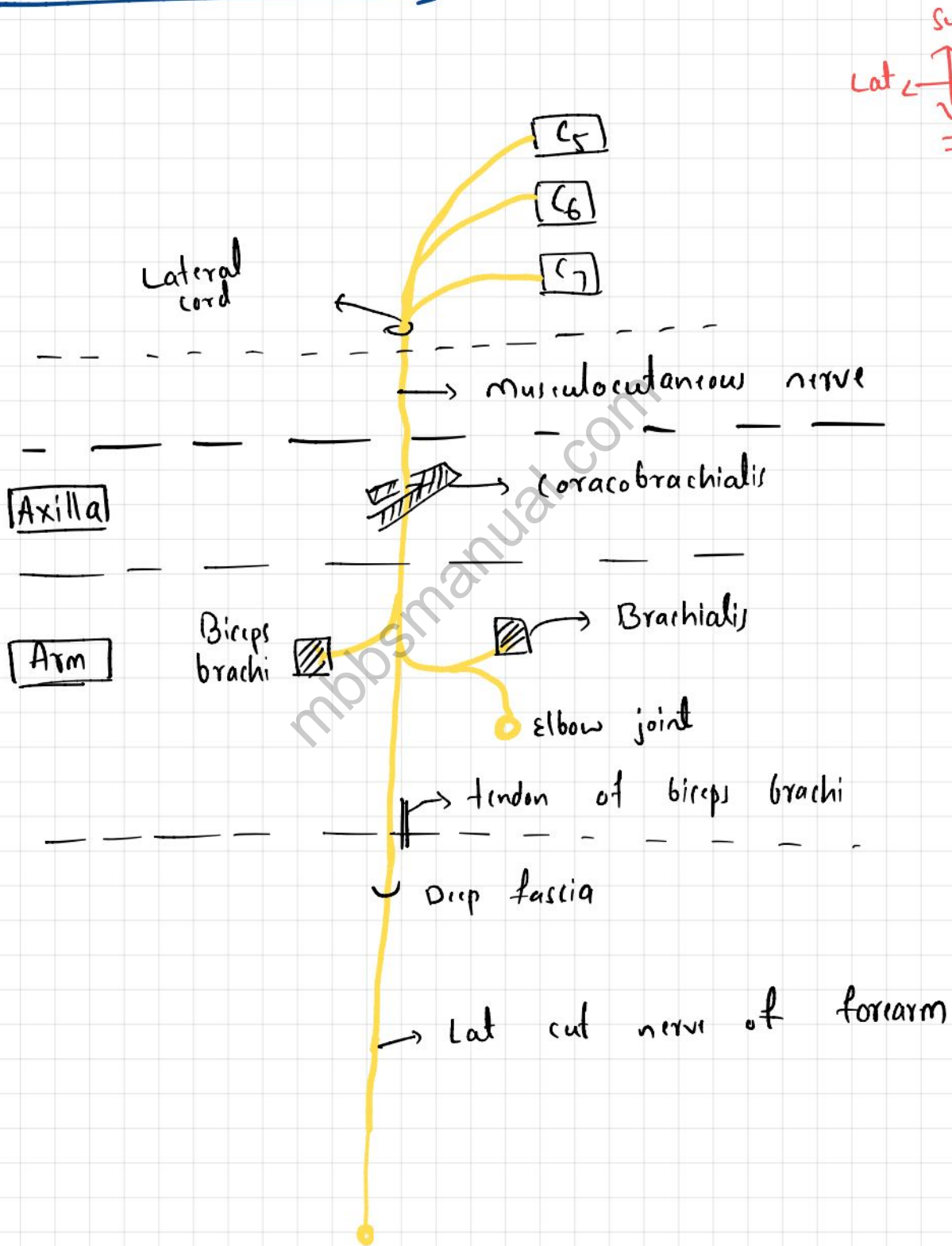


### Significance

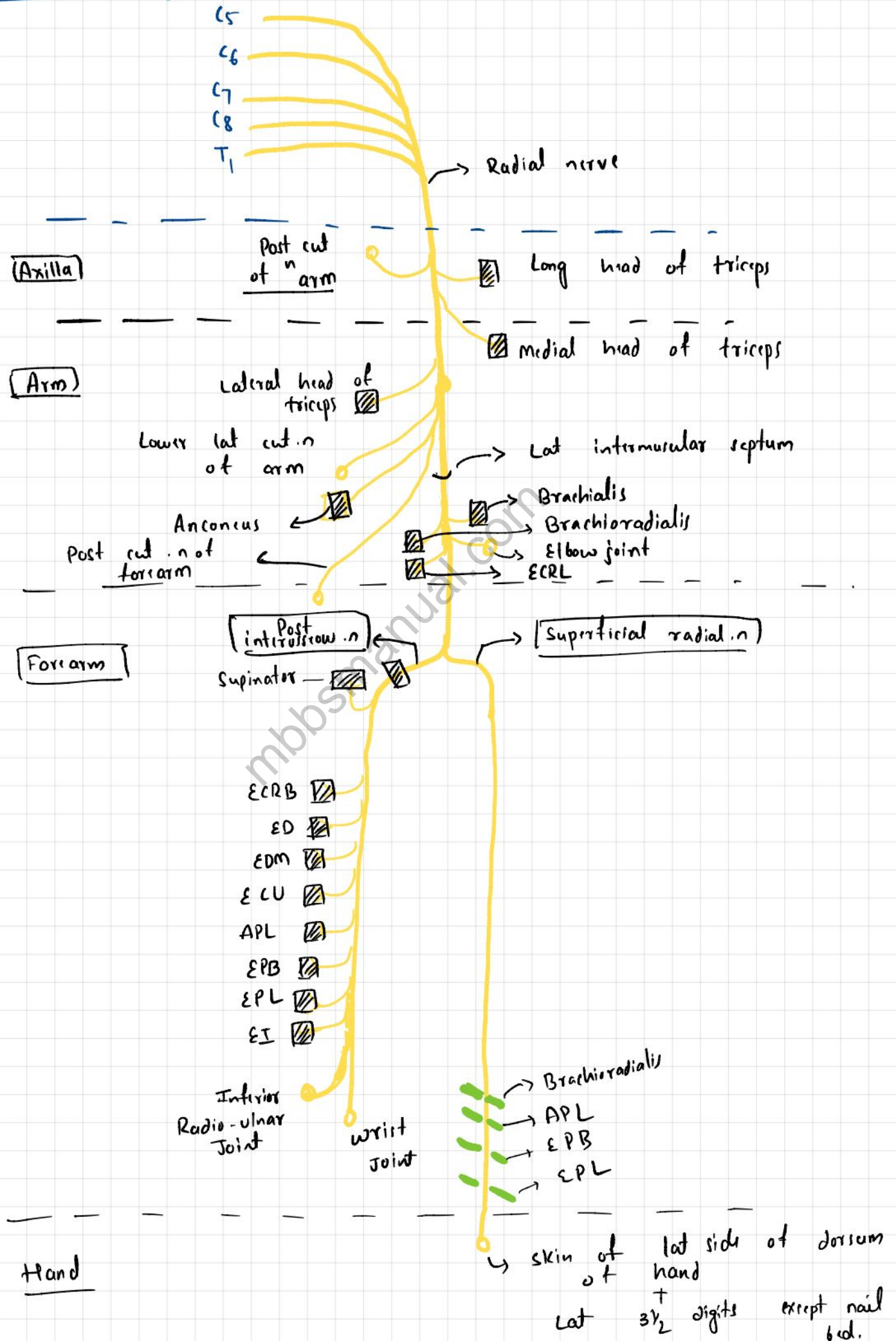
This vein is preferred for hemodialysis

# Major Nerves of Upper Limb

## \* Musculocutaneous Nerve



# Radial nerve



## x Clinical Aspect

### ① Injury in the Axilla

#### "Crutch Palsy"

##### Clinical features

\* motor loss → triceps + extensors of wrist +  $\left[ \begin{array}{l} ED + EI + EDM \\ EPL \end{array} \right]$

\* Sensory loss → lower part of arm

+  
Back of forearm

+  
Lat 3½ Dorsum of hand except nail bed.

### ② Injury in spiral groove.

#### "Saturday night paralysis"

##### Clinical features

→ Loss of extension of wrist & fingers

→ Wrist drop

→ Loss of supination

### ③ Injury at elbow

#### "Radial tunnel syndrome"

##### Clinical features

→ Loss of extension of wrist & fingers

→ No wrist drop

→ Pain over extensor aspect of forearm



# Median nerve

Axilla

Arm

Forearm

Hand

C5  
C6  
C7  
C8  
T1

Brachial artery

Biceps tendon

Pronator teres

Anterior interosseous nerve

FCR

PL

FDS

FPL

FDP

PP

Wrist +  
Radio ulnar joint

FDS

Palmar cut branch (Lat 1/2 of palmar skin)

APB

FPB

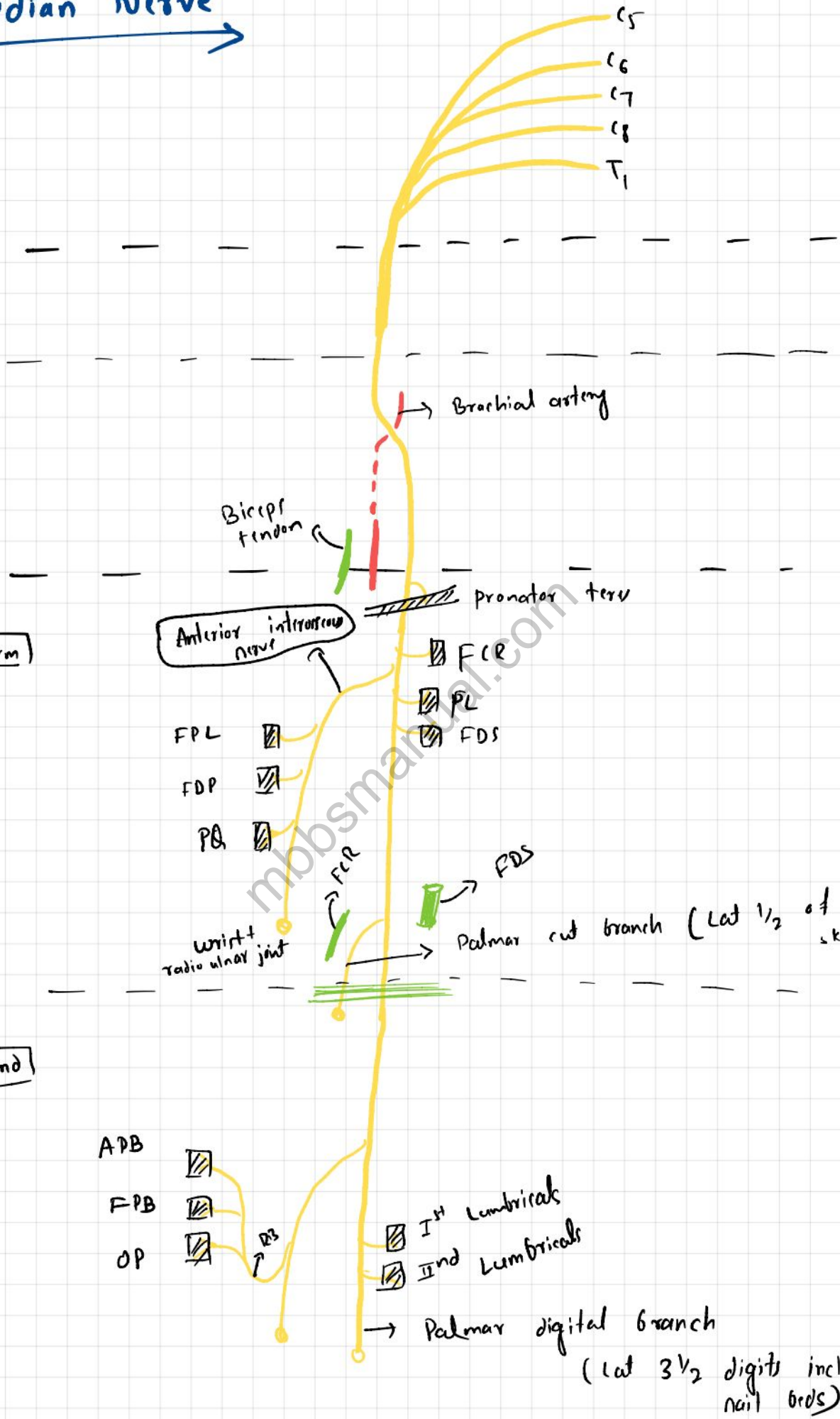
OP

I<sup>st</sup> Lumbricals

II<sup>nd</sup> Lumbricals

Palmar digital branch

(Lat 3 1/2 digits including nail beds)



## \* Clinical aspect

### Ⓐ Injury at elbow,

#### Clinical features,

forearm → supine

wrist flexion → weak

Adduction of wrist → TP → Thumb

No flexion of IP joints → Index & middle finger

#### " Benediction deformity of hand "

↓  
No flexing

→ Ape thumb deformity

→ Thumb laterally rotated.

- loss of sensation of lat 3 1/2 digits + dorsal aspect

### Ⓑ Injury at forearm

→ Ape thumb deformity

→ loss of sensation

### Ⓓ Injury at carpal tunnel

- "carpal tunnel syndrome"

#### Clinical features,

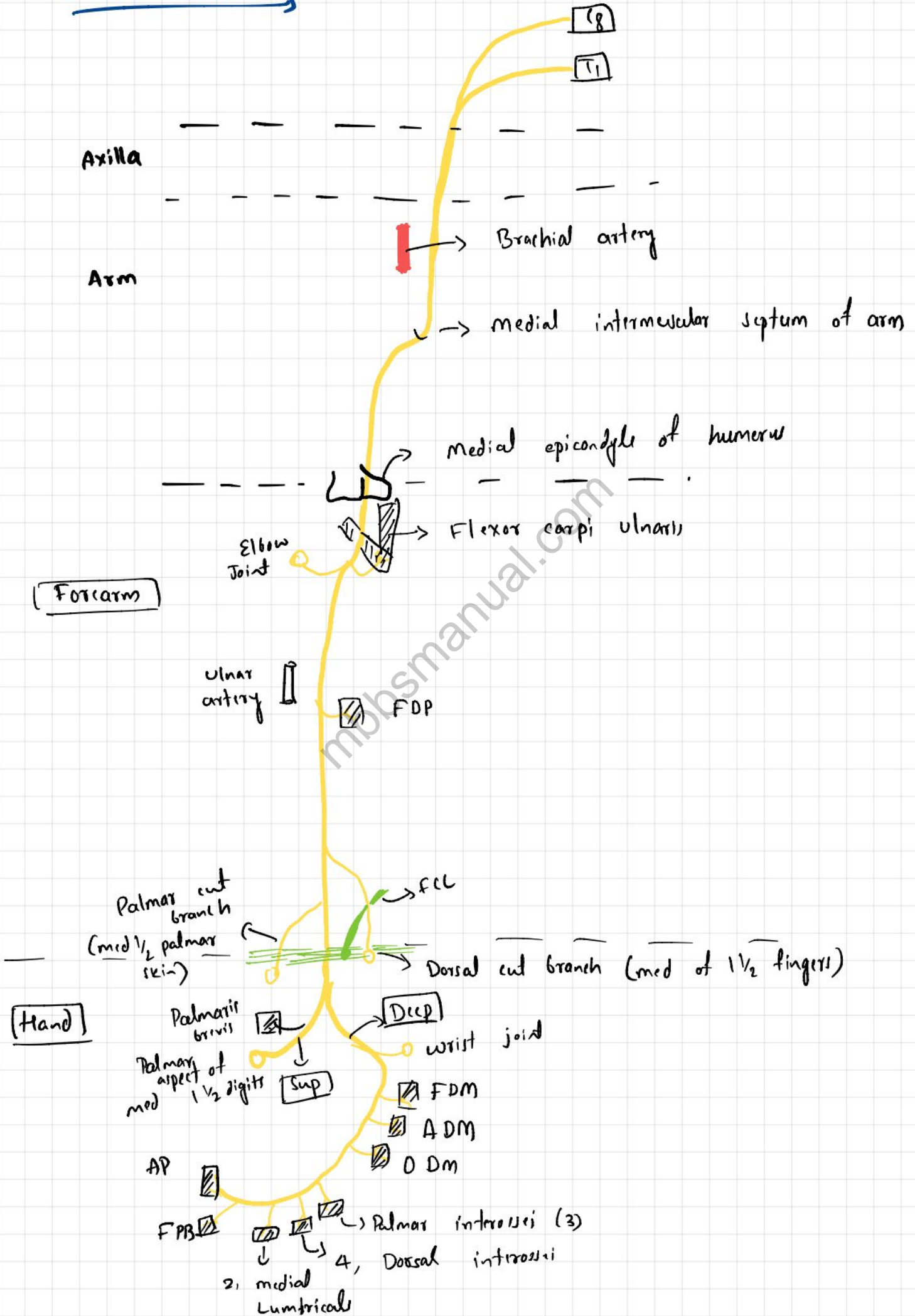
→ Burning sensation along sensory distribution

→ Weakness of thenar muscles

→ Ape thumb deformity

→ (+) Tinel's sign & Phalen's test

# Ulnar nerve



Clinical →

① Injury at elbow →

- Flattening of hypothenar eminence
- Claw hand deformity (Incomplete)
  - ↳ ring & little fingers → I<sup>st</sup> P → Extended
  - II<sup>nd</sup> & III<sup>rd</sup> P → Flexed
- Loss of abduction & adduction of fingers
- " " adduction of thumb
- Loss of sensation ⇒ medial 1/3 of hand
  - 1 1/2 fingers
- Foment's sign → (+ve)

② Injury @ wrist →

- Claw hand deformity (complete)
- Flattening hypothenar eminence
- Loss of abduction & adduction of fingers
- Foment's sign → (+ve).