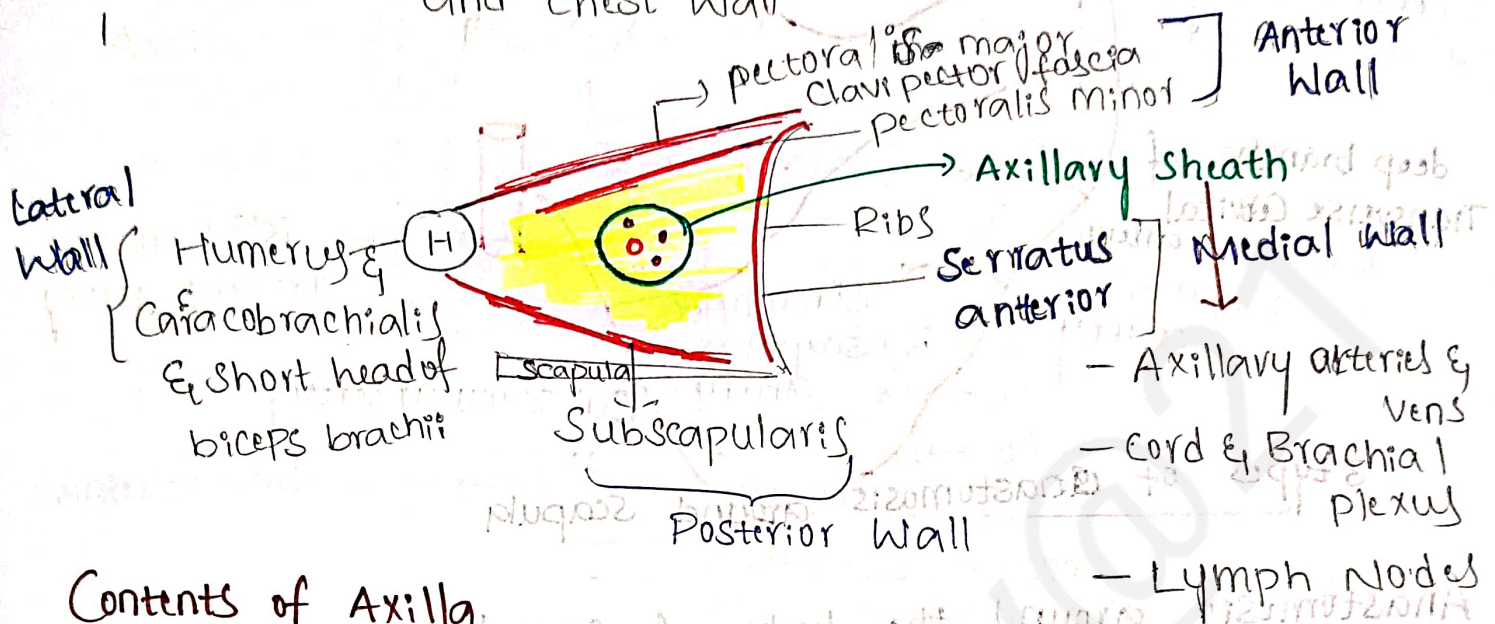


Upper Limb

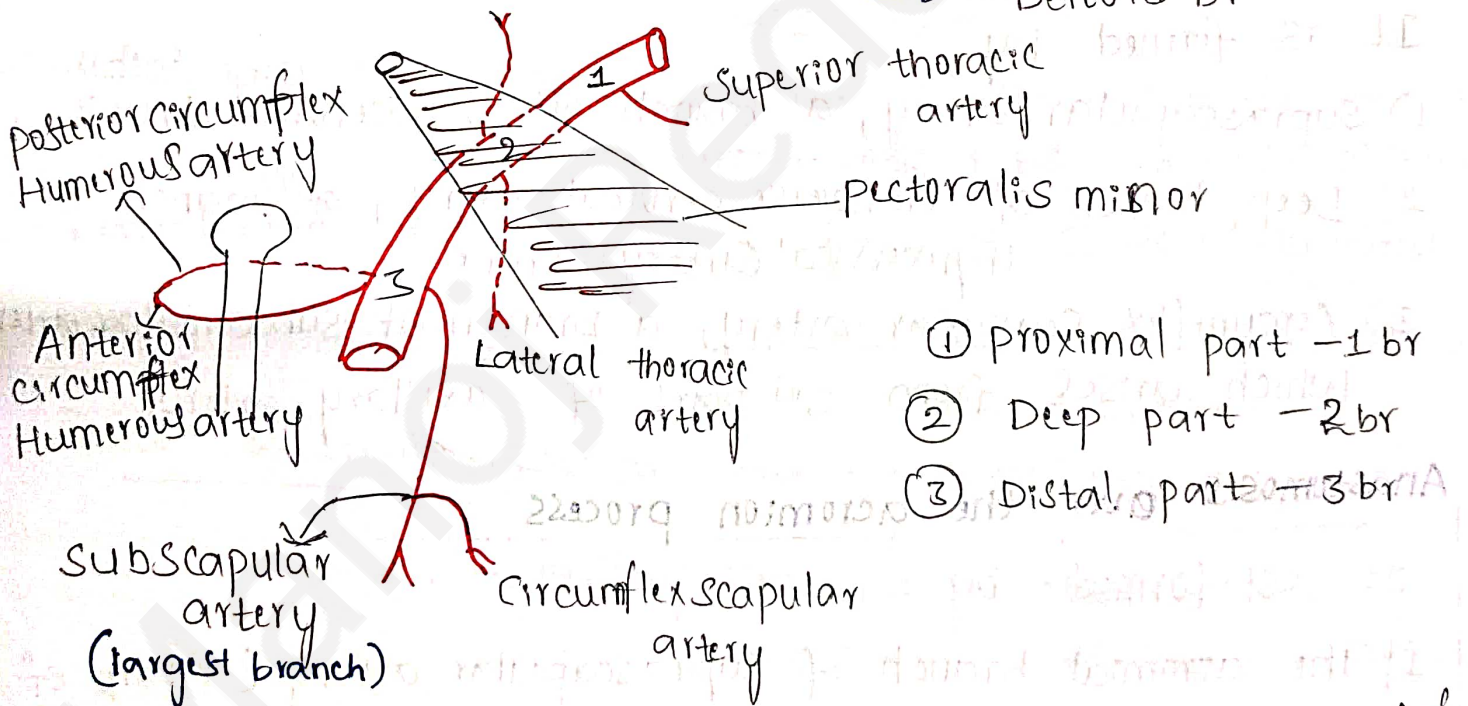
Axilla : — pyramidal space b/w the upper part of arm and chest wall



Contents of Axilla

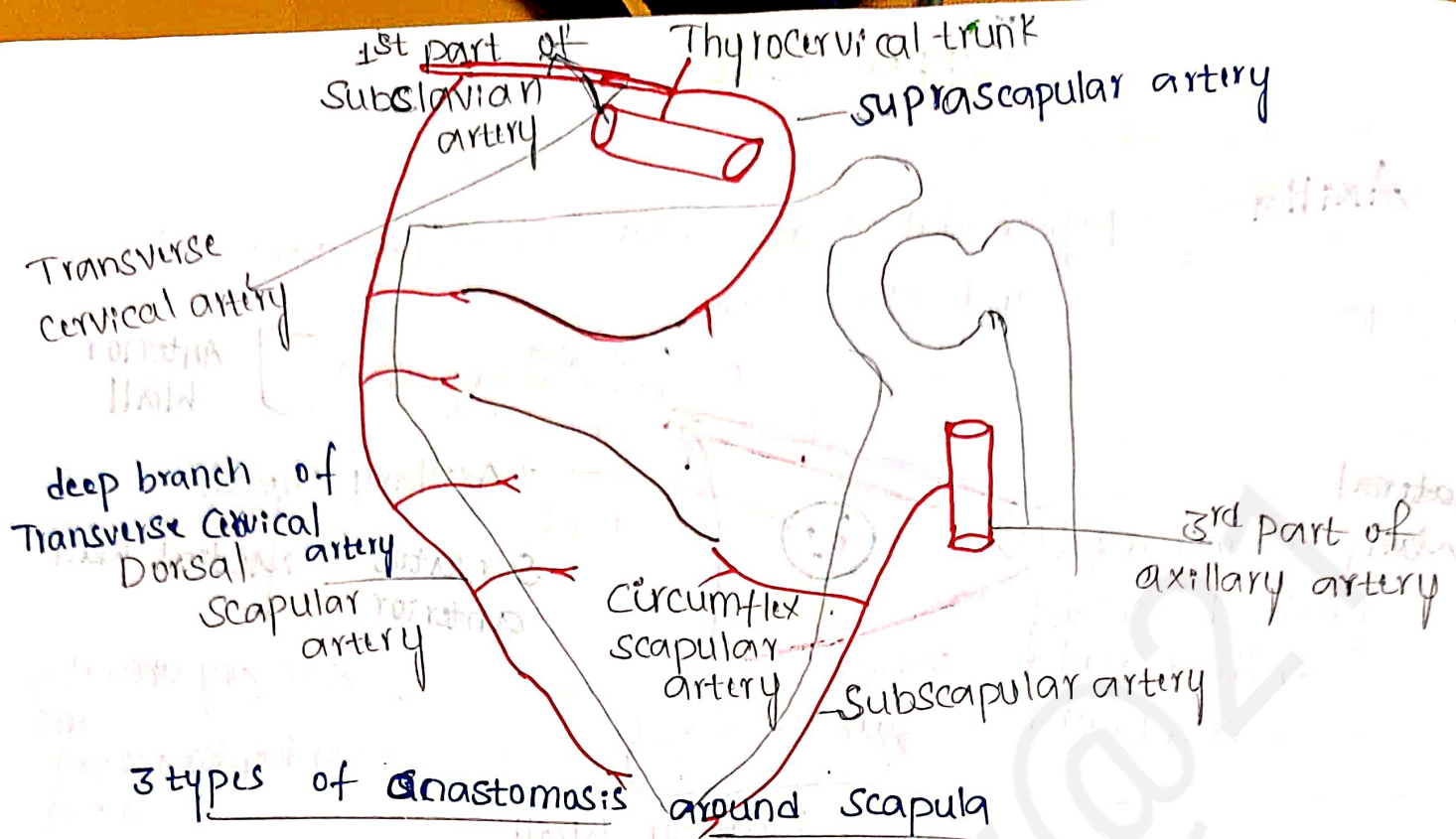
Axillary Artery (SE) — Thoracic Acromion Trunk

- A — Acromian br
- P — pectoral br
- C — clavicular br
- D — Deltoid br



Scapular Anastomoses : — branches of 1st part of Subclavian artery and 3rd part of axillary artery.

Important



Anastomosis around the body of scapula

Anastomosis occurs in three fossae — Subscapular, supraspinous & infraspinous

It is formed by

- 1) Suprascapular artery, a branch of thyrocervical trunk
- 2) Deep branch of transverse cervical artery, another branch of thyrocervical (artery) trunk
- 3) Circumflex scapular artery, a branch of subscapular artery which arises from 3rd part of axillary artery.

Anastomosis over the acromion process

It is formed by

- 1] The acromial branch of Suprascapular artery (1st part of Subclavian)
 - 2] The acromial branch of Thoracoacromial artery (2nd part of axillary)
 - 3] The acromial branch of posterior Circumflex humeral artery (3rd part of axillary)
- > Anastomosis b/w the first part of subclavian artery and branches of second and third part of axillary artery

Clinical Significance

The arterial anastomosis provides collateral circulation through which blood flows to limb when distal part of subclavian artery (or) proximal part of axillary artery is blocked.

Axilla :- pyramidal space b/w the upper part of arm & chest wall

It has (i) Base - formed skin, superficial & axillary fascia

(ii) Apex

(iii) Four walls - Anterior

- Posterior

- Medial

- Lateral

Anterior wall - Formed by pectoralis major
pectoralis minor
clavipectoral fascia

Posterior wall Formed by - Sub-scapularis
- Teres major
- Latissimus dorsi

Medial wall Formed by - Upper part of serratus anterior muscle
- Upper four ribs with intercostal muscles

Lateral wall Formed by - Upper part of shaft of humerus
- Coracobrachialis and short head of biceps brachii

Contents of axilla

1) Axillary artery and its branches

2) Axillary vein and its tributaries

3) Supraclavicular part of brachial plexus

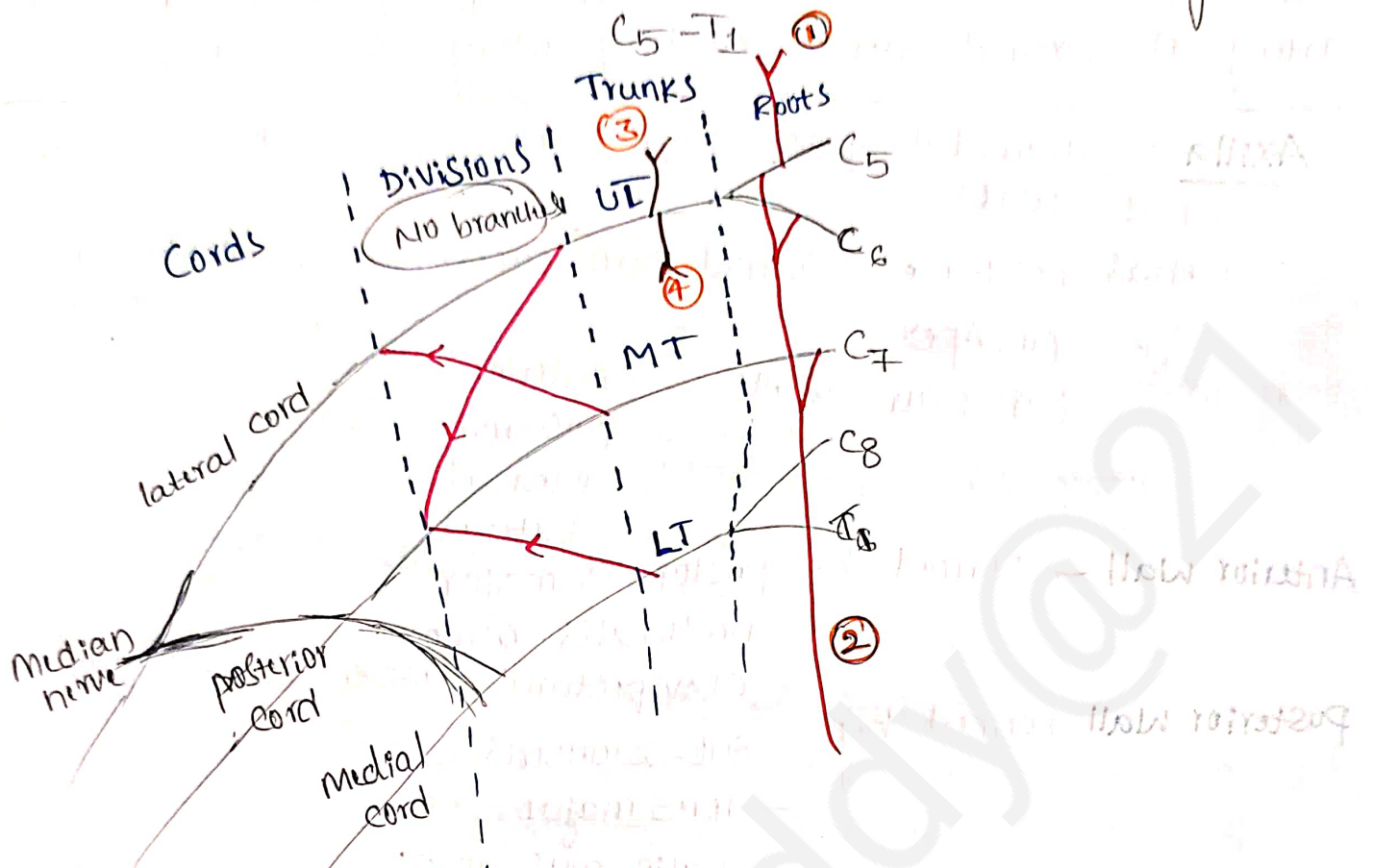
4) Long Thoracic and intercostobrachial nerves

5) Five groups of axillary lymph nodes and its associated lymphatics

6) Axillary fat & areolar tissue in which other contents are embedded.

Brachial plexus

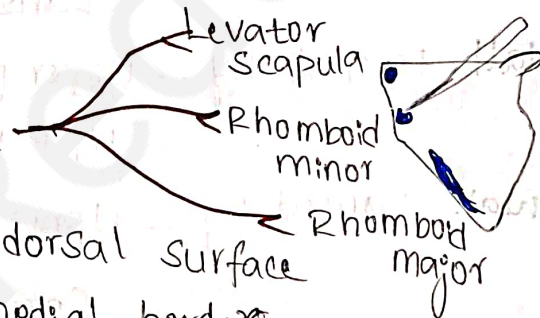
Network of nerves arise from ventral primary rami of



Branches from roots

① Dorsal Scapular Nerve (C5)

Supplies nerves to the dorsal surface of scapula along its medial border



② Long thoracic nerve (C5, C6, C7)
(Nerve of bell)

Supplies nerves to costal surface of anterior scapula



Branches from Trunk

③ supra scapular nerve — supraspinatus
— infraspinatus

④ Nerve to subclavius — subclaves

Branches of Cords

Lateral cord — LML

posterior cord — LUNAR

Medial cord — M4U

Lateral cord

L — Lateral pectoral nerve → pectoralis major

M — Musculocutaneous nerve → BBc

Biceps
Brachialis
Coracobrachialis

L — Lateral root of median nerve

posterior Cord

L — Lower subscapular nerve → subscapularis + teres major

U — Upper subscapular nerve — subscapularis

N — Nerve to latissimus dorsi (Thoracodorsal nerve)

A — Axillary nerves → Deltoid & Teres minor

R — Radial nerve

Medial cord

M — Medial pectoral nerve → pectoralis major + pect major

M — Medial root of median nerve

M — Medial cutaneous nerve of arm

M — Medial cutaneous nerve of forearm

U — Ulnar nerve

Brachial plexus constitutes roots, trunks, divisions, cords & branches

Roots

Roots of brachial plexus is formed by ventral primary rami of C5-T₁ spinal nerves.

Trunks

formed

- 1] Upper trunk → C5 & C6 roots
- 2] Middle trunk — C7 root
- 3] Lower trunk — C8 & T₁ roots

Divisions

Each trunk has anterior and posterior divisions

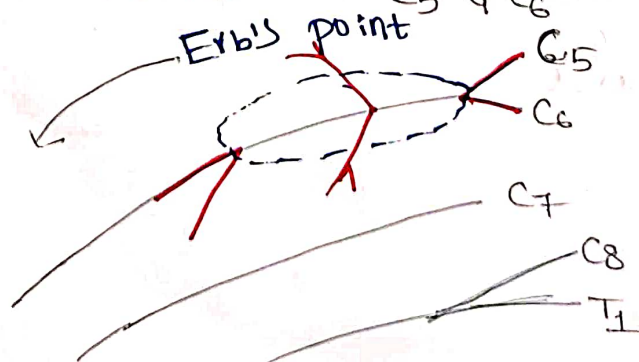
Cords

- 1] Lateral cord — formed by union of anterior divisions of upper & middle trunk
- 2] Medial cord — formed by anterior division of lower trunk
- 3] posterior cord — formed by posterior divisions of all three trunks

Injuries to brachial plexus

① ERB'S palsy: paralysis

- Injury to upper trunk of brachial plexus
- Root value involved — C5 & C6



Erb's point — point of meeting of 6 nerves

Axillary Nerve
(C5, C6)

Deltoid muscle

Function:-
Abduction of
Shoulder

Adducted Shoulder

Musculocutaneous Nerve (MCN)

(C5, C6 & C7)

Biceps, Brachialis & coracobrachialis

Flexion of elbow
Supination of
fore arm

Elbow extended
Pronate fore arm

policeman's, porters, waiters Tip hand

① Erb's paralysis

— Upper of trunk of brachial plexus is injured

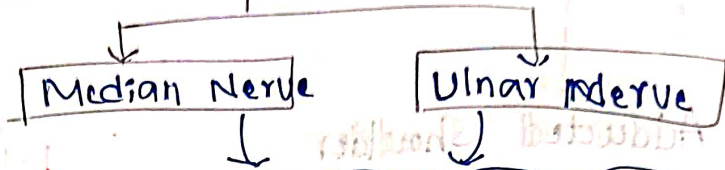
Causes of injury

- (i) Birth injury
- (ii) Fall of the shoulder
- (iii) During anaesthesia

② Klumpke's paralysis

— Injury to the lower trunk of brachial plexus

— Roots value affected — **C8 & T₁**



Function:

Flexion of MCP joints &
Extension of IP joints

supply intrinsic muscles of
Hand

Extension of metacarpophalangeal joints &
Flexion at Interphalangeal joints

Causes of injury:-

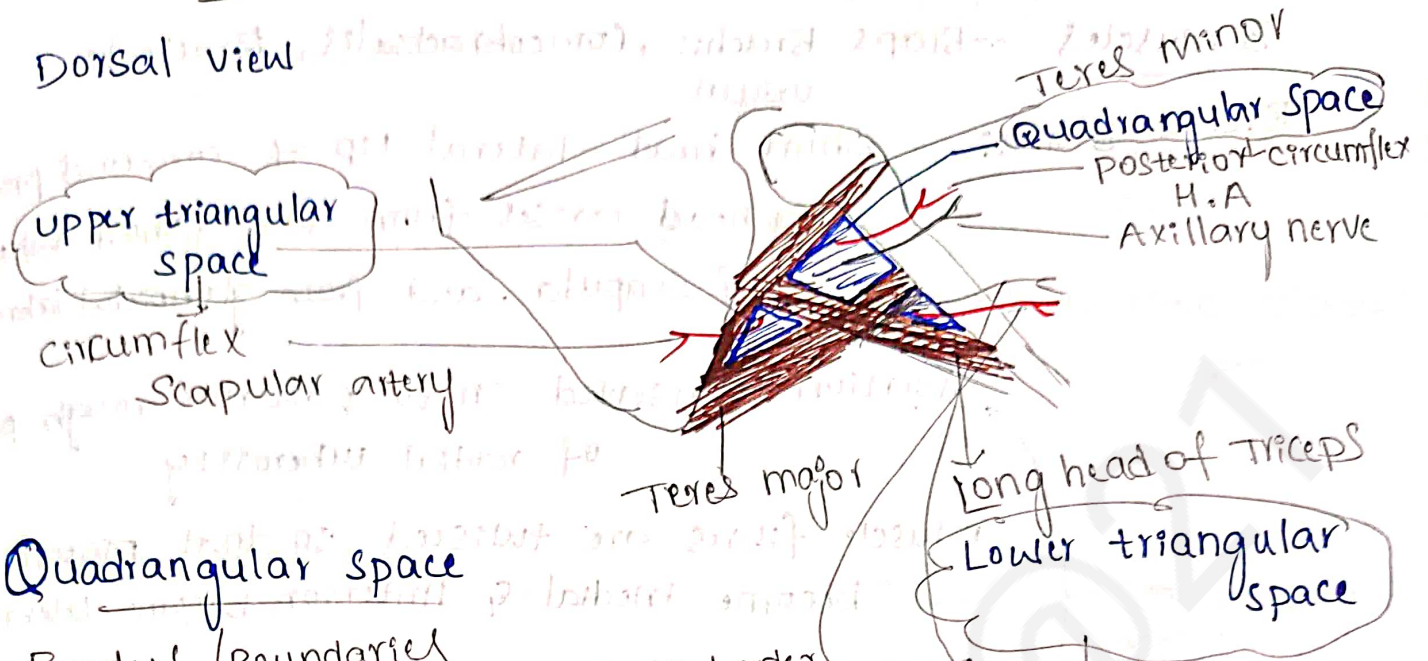
(i) Birth injury

(ii) Undue abduction of arm **Claw hand**

(iii) Clutching something in hand after we fall from height

Intermuscular scapular spaces

Dorsal view



Quadrangular space

Borders / Boundaries

superior border — Teres minor

Inferior border — Teres major

medial border — Long head of triceps

lateral border — surgical neck of humerus

Radial artery/nerve

Profunda brachii (deep) artery

Contents :-

posterior circumflex humeral artery/veins
Axillary nerve

upper triangular space

Borders / Boundaries

superior/upper border — Teres minor

Inferior border — Teres major

Medial border — Long head of triceps

Content — circumflex scapular artery

Lower Triangular space

Boundaries

Medial :- lateral border of long head of triceps

superior :- Lower border of Teres major

lateral :- Medial border of humerus

Contents :- Radial nerve

Profunda brachii vessels

Anterior Compartment of Arm

3 Muscles — Biceps Brachii, Coracobrachialis, Brachialis

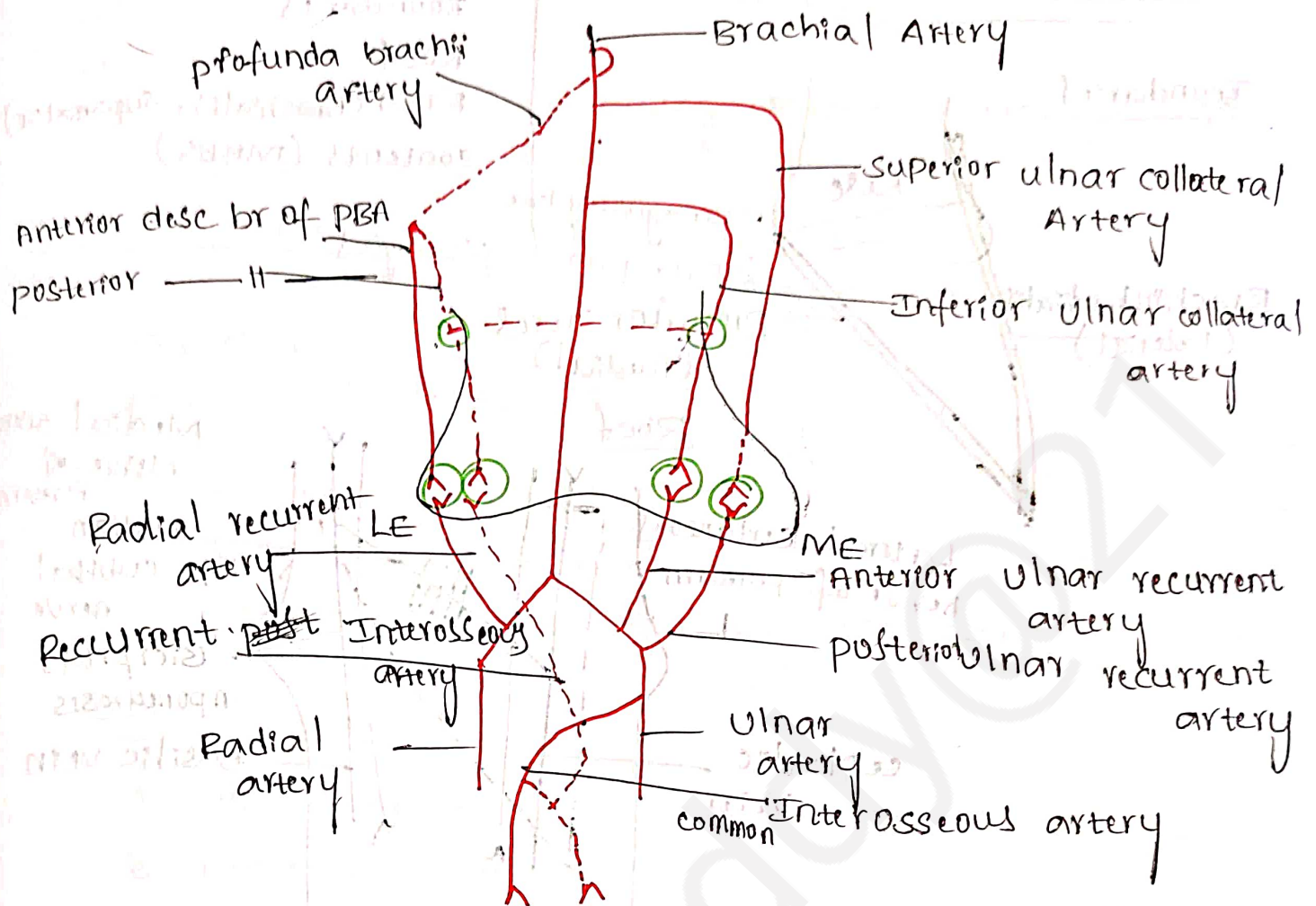
Biceps Brachii — ^{origin} Short head — lateral tip of coracoid process
Long head arises from supraglenoid tubercle of scapula and from glenoid labrum

Insertion — Inserted into posterior rough part of radial tuberosity

Muscle fibres are twisted so that posterior become medial & anterior become lateral

Bicipital aponeurosis which extends to ulna

Anastomoses around the Elbow

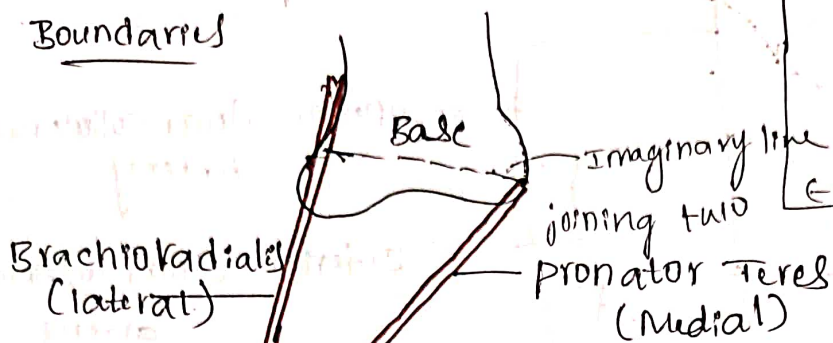


5 Anastomoses

- ① Superior ulnar collateral artery runs behind medial epicondyle and anastomose with posterior ulnar recurrent artery
- ② Inferior ulnar collateral artery anastomose with anterior ulnar recurrent artery
- ③ Anterior descending branch of profunda brachii artery anastomose with Radial recurrent artery
- ④ posterior descending branch of profunda brachii artery anastomose with recurrent interosseous artery
- ⑤

Cubital Fossa

Boundaries

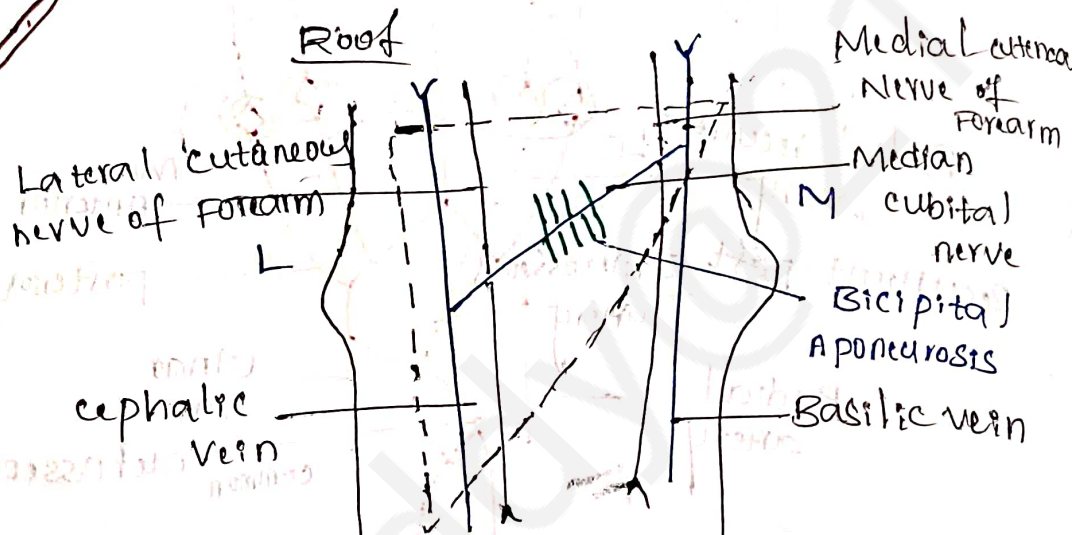


To describe Fossa

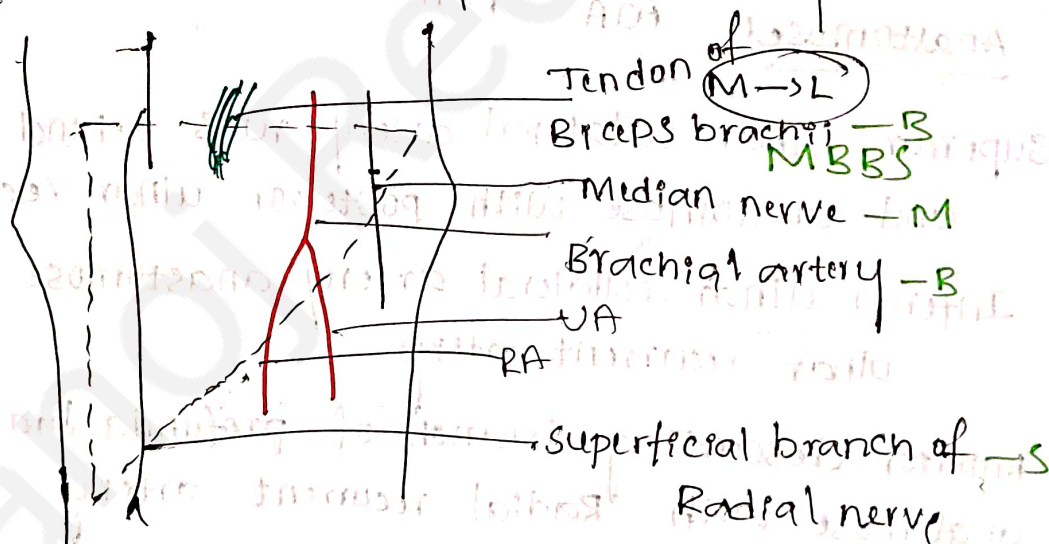
Boundaries

Roof

Floor (Brachialis, supinator)
contents (MBBS)



Contents



Boundaries

Lateral - Medial border of Brachioradialis

Medial - lateral border of Pronator Teres

Base - Imaginary line joining the front of two epicondyles of humerus

Apex - directed downwards & formed by the area where brachioradialis crosses pronator teres.

Roof of cubital fossa is formed by

- (1) skin
- (2) superficial fascia containing Basilic & cephalic vein, median cubital vein.
 - Medial cutaneous nerve of forearm
 - Lateral cutaneous nerve of forearm
- (3) Deep fascia
- (4) Bicipital aponeurosis

Floor - formed by

- Brachialis
- Supinator surrounding the upper part of radius

Contents (MBS)

M - Median nerve

B - Brachial artery

B - Tendon of Biceps brachii

S - Superficial branch of Radial nerve

NOTE :- Structure separating median nerve and ulnar artery is deep head of pronator teres

Pectoralis Region

Surface Landmarks

- 1) Jugular notch
- 2) Sternal angle - about 5cm below the jugular notch
- 3) Xiphoid process
- 4) Nipple
- 5) Coracoid process
- 6) Acromion process
- 7) Axilla
- 8) Midaxillary line
- 9) Infraclavicular fossa

Breast

- Breast is a modified sweat gland

Situation

- Breast lies in the superficial fascia except tail
- Axillary tail of Spence: a small extension of ~~from~~ upper lateral quadrant passes through opening called Foramen of Langer into deep fascia

Site for highest % of breast cancer

Extension

- vertically, it extends from 2nd to 6th ribs
- Horizontally, it extends from lateral border of sternum to midaxillary line

Relations

Superficial → skin and superficial fascia

Deep:-

1) Pectoral fascia

2) pectoralis major
serratus anterior

External oblique muscle of abdomen

Retromammary space:- space filled with loose areolar tissue which separates breast from pectoral fascia

- It facilitates free movement of breast over pectoralis major

Structure of Breast → ① Skin (Nipple & areola)

② Stroma

① Skin

③ Parenchyma (Mammary gland)

Nipple:- conical projection present at the level of 4th intercostal space

- Contains smooth muscle fibre
- Rich in nerve supply by sensory nerves

- It is pierced by 15-20 lactiferous ducts

Areola: = Darkly pigmented circular area around the nipple

- It is rich in modified sebaceous glands

- These sebaceous glands are enlarged during pregnancy and lactation to form raised "tubercles of Montgomery"

- Oily secretions of these glands provides lubrication to nipple and areola & prevents cracking during lactation.

⇒ Areola & nipple are devoid of hair & fat

② Stroma

- Forms supporting framework of the gland

Fibrous Stroma

- It forms a septa known as suspensory ligament of Cooper, which anchors skin & gland to pectoral fascia

Fatty stroma

- It forms the bulk of gland

- It is distributed all over the gland except (skin) beneath areola and nipple

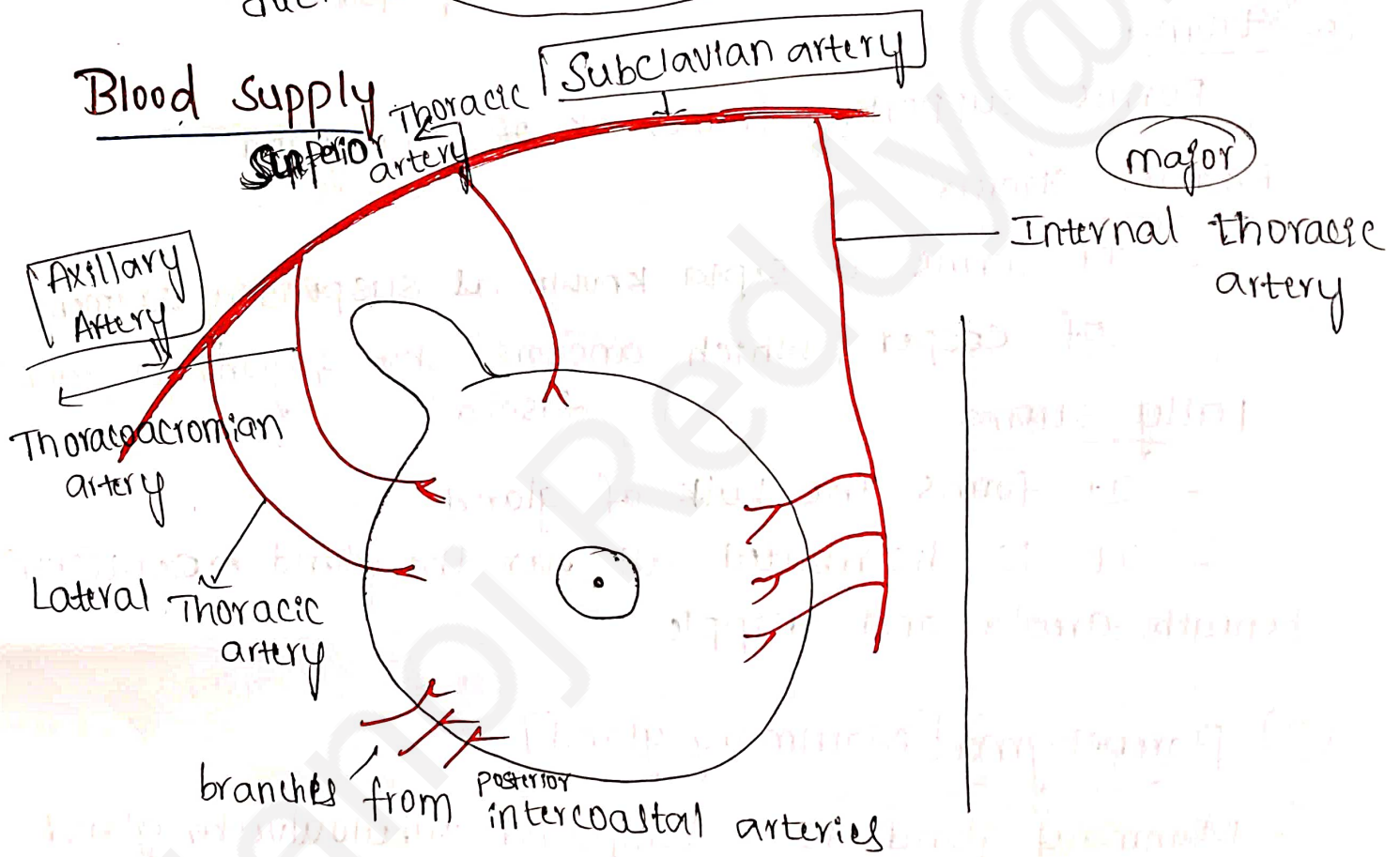
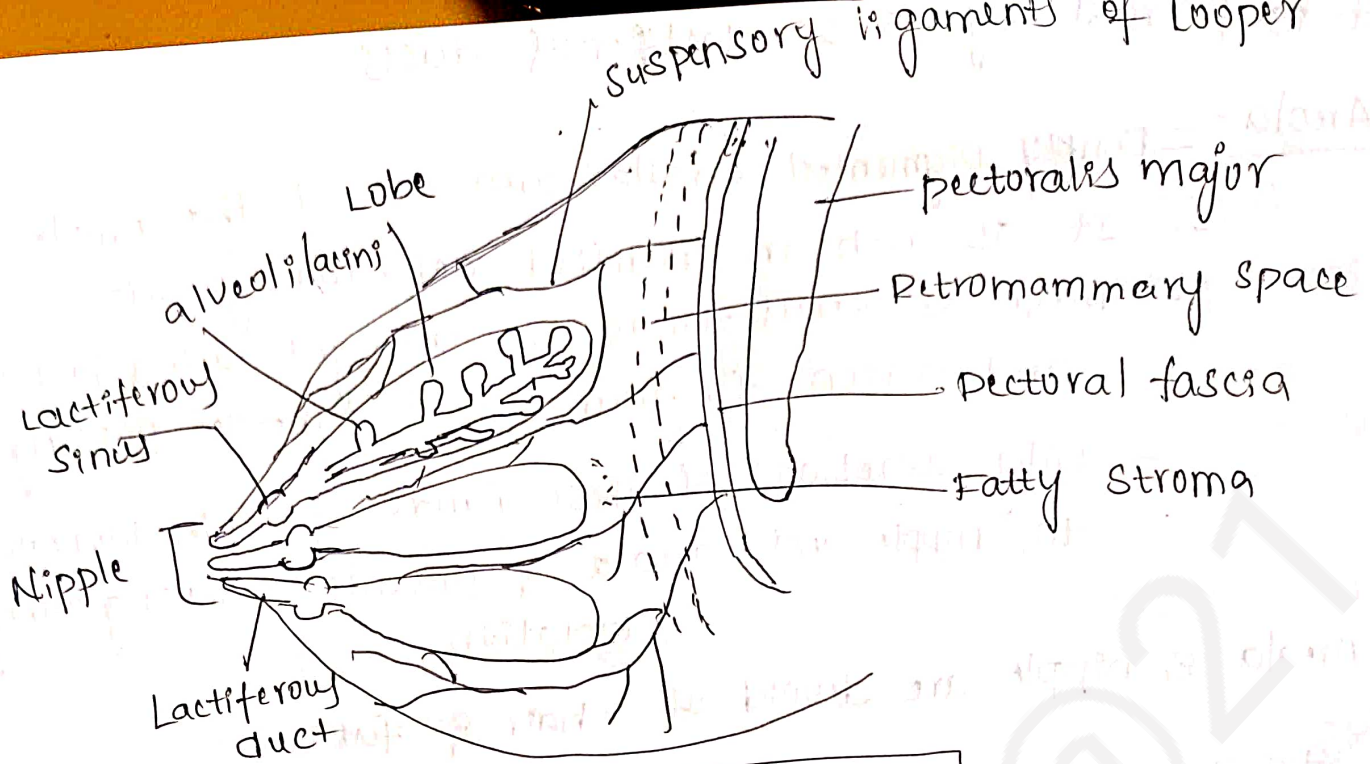
③ Parenchyma [Mammary gland]

- Mammary gland is a compound tubuloalveolar gland which secretes milk

- Mammary gland has 15-20 mammary lobes, (which are) Each lobe is cluster of alveoli and milk is drained by lactiferous duct

- Lactiferous ducts open into nipple

- Near its terminal end each duct has a dilatation called lactiferous sinus



Mammary gland is supplied by

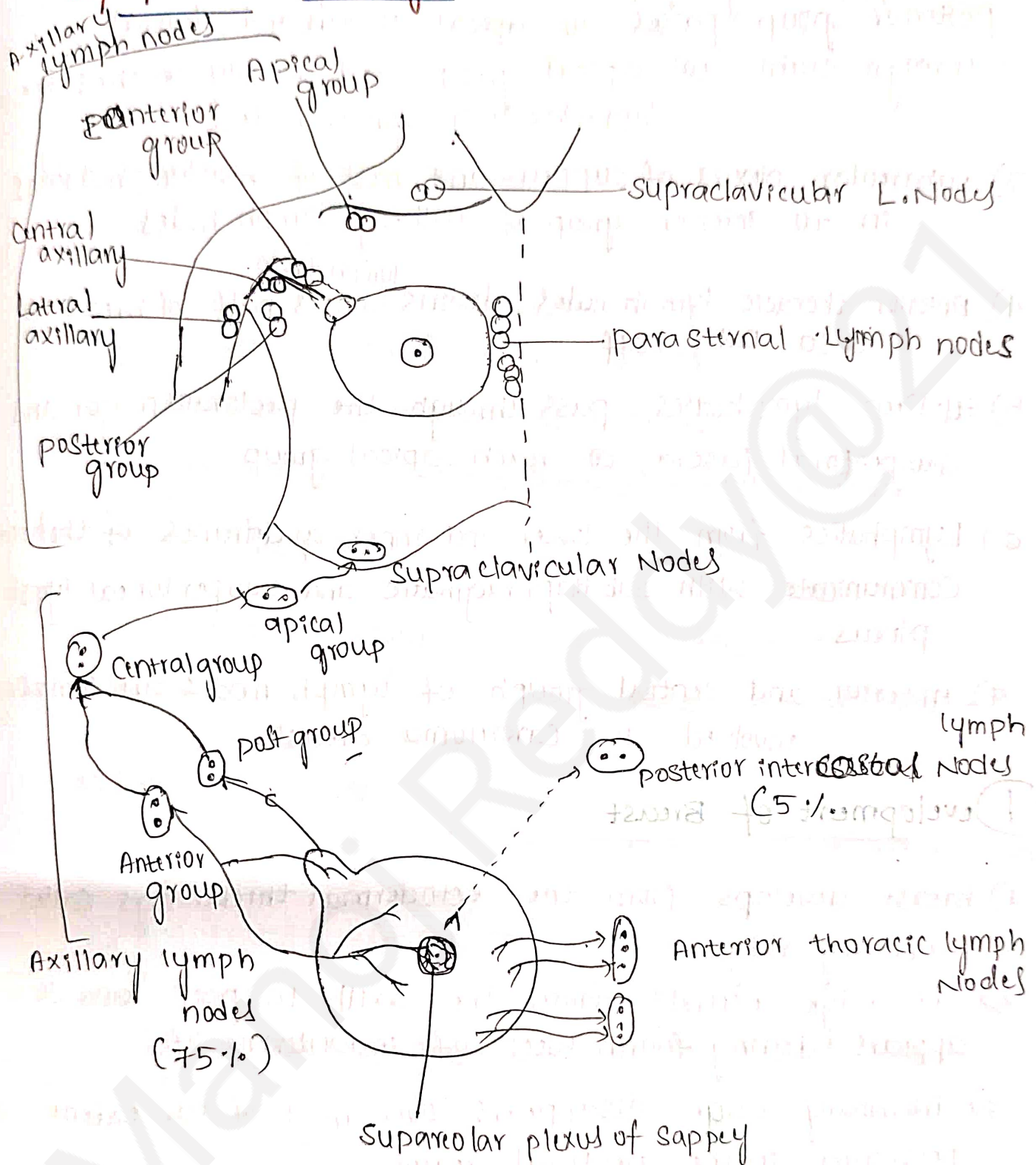
1] Internal

1] perforating branches of Internal thoracic artery, a branch of subclavian artery

2] Superior thoracic artery, a branch of axillary artery
lateral thoracic artery
Thoracoacromial artery

3] Lateral branches of posterior intercostal arteries

Lymphatic drainage



1) Superficial lymphatics drains the skin over the breast except for nipple and areola

2) Deep lymphatics drain from parenchyma and also from nipple and areola.

Some further points about lymphatic drainage

1) About 75% of lymph from the breast drains into axillary lymph nodes and 20% of lymph drains in

- to anterior thoracic nodes and 5% in to posterior intercostal lymph nodes.
- 2) Among axillary lymph nodes, lymph from anterior and posterior group passes to apical central and lateral, and through them to apical group and finally reaches the supraclavicular lymph nodes.
 - 3) Subareolar plexus of supply and most of blood lymph drains in to anterior group of axillary lymph nodes
 - 4) Anterior thoracic lymph nodes drains ^{lymph from} inner half of breast and also outer half
 - 5) ~~St~~ Deep lymphatics pass through the pectoralis major and clavipectoral fascia to reach apical group
 - 6) Lymphatics from the lower and inner quadrants of the breast communicate with subdiaphragmatic and subperitoneal lymph plexus.
 - 7) Anterior and central group of lymph nodes are commonly involved in carcinoma breast.

Development of Breast

- 1) Breast develops from the ectodermal thickenings called mammary ridge.
- 2) The ridge extends from the axilla to groin and it appears during fourth week of intrauterine life.
- 3) Mammary ridge disappears over most of its extent persisting in the pectoral region
- 4) The persisting part of ridge converts in to mammary pit.
- 5) Secondary buds (15-20) grow down from the floor of pit.
- 6) These buds divide and subdivide to form lobes of the gland
- 7) At birth (or) later, nipple everted at the site of original pit.

Joints

(caused)

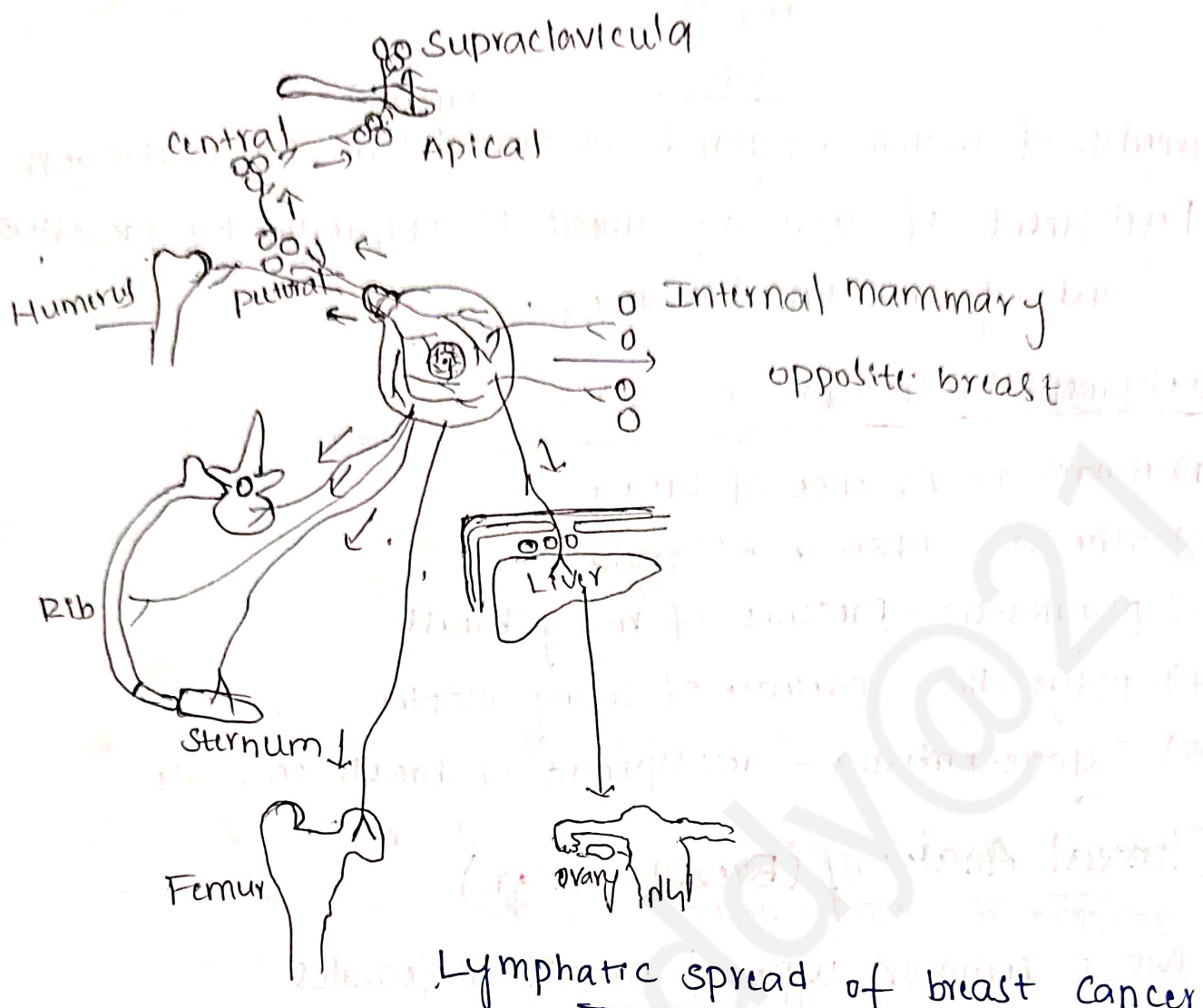
- Growth of mammary gland is stimulated by Oestrogen
- Development of secretory alveoli is stimulated by progesterone and by prolactin hormone.

Developmental Anomalies of breast

- 1) Amastia - Absence of breast
- 2) Athelia - Absence of nipple
- 3) polymastia - Presence of many breast
- 4) polythelia - Presence of many nipples
- 5) Gynaecomastia - development of breast in male

Clinical Anatomy (Breast cancer)

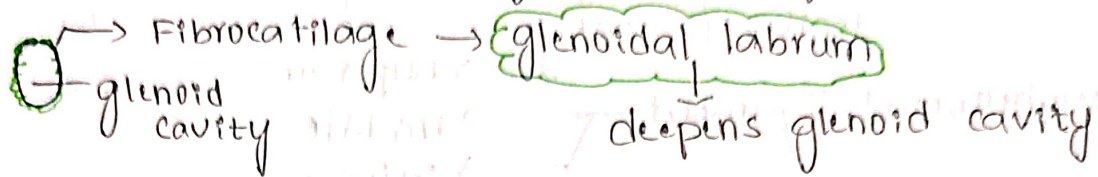
- Most common type of cancer in females
 - Usually arises from the epithelial cells of lactiferous ducts
- 1) Cancer cells infiltrate the suspensory ligaments, then breast becomes fixed and immobile. Contraction of ligaments cause retraction of skin.
 - 2) Infiltration of cancer in to lactiferous ducts and their consequent fibrosis cause retraction of nipple
 - 3) Obstruction of superficial lymphatics by cancer cells produce Dedema which leads to "Peau d Orange" appearance
 - 4) Because of communications of lymphatics with those in abdomen, cancer can spread to liver, pelvis, ovary
 - 5) Because of communication of lymphatics of breast across the midline, cancer may spread from one breast to other



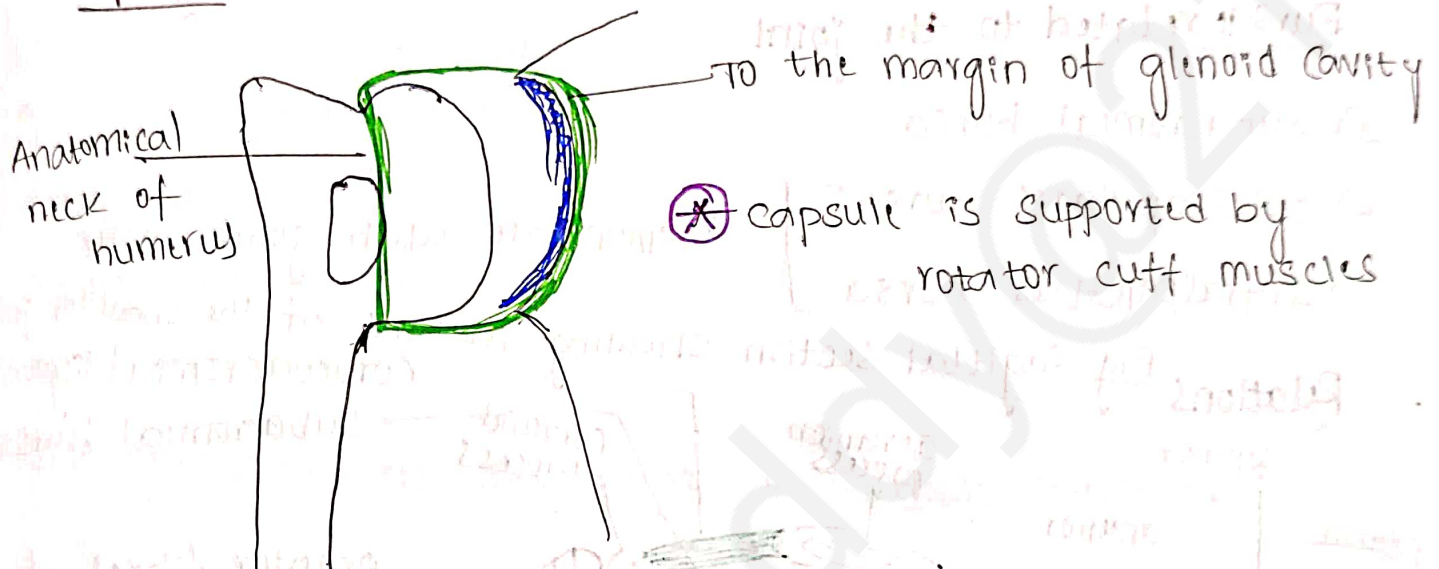
Shoulder Joint (Glenohumeral joint)

— Ball and socket type of synovial joint

Articulation — Pear shaped glenoid cavity and head of humerus



Capsule



Capsular ligament is very ~~loose~~ and permits free movement

1) Medially, capsule is attached to scapula beyond the supraglenoid tubercle and margins of the labrum

2) Laterally, capsule is attached to anatomical neck of humerus

3) Anteriorly, capsule is reinforced by superior, middle and inferior glenohumeral ligaments.

Synovial membrane lines the capsule except articular surfaces

— Synovial membrane extends as tubular sheath around the long head of biceps brachii

Ligaments

1) Coracohumeral ligament: Extends from root of coracoid process to neck of humerus opposite the greater tubercle

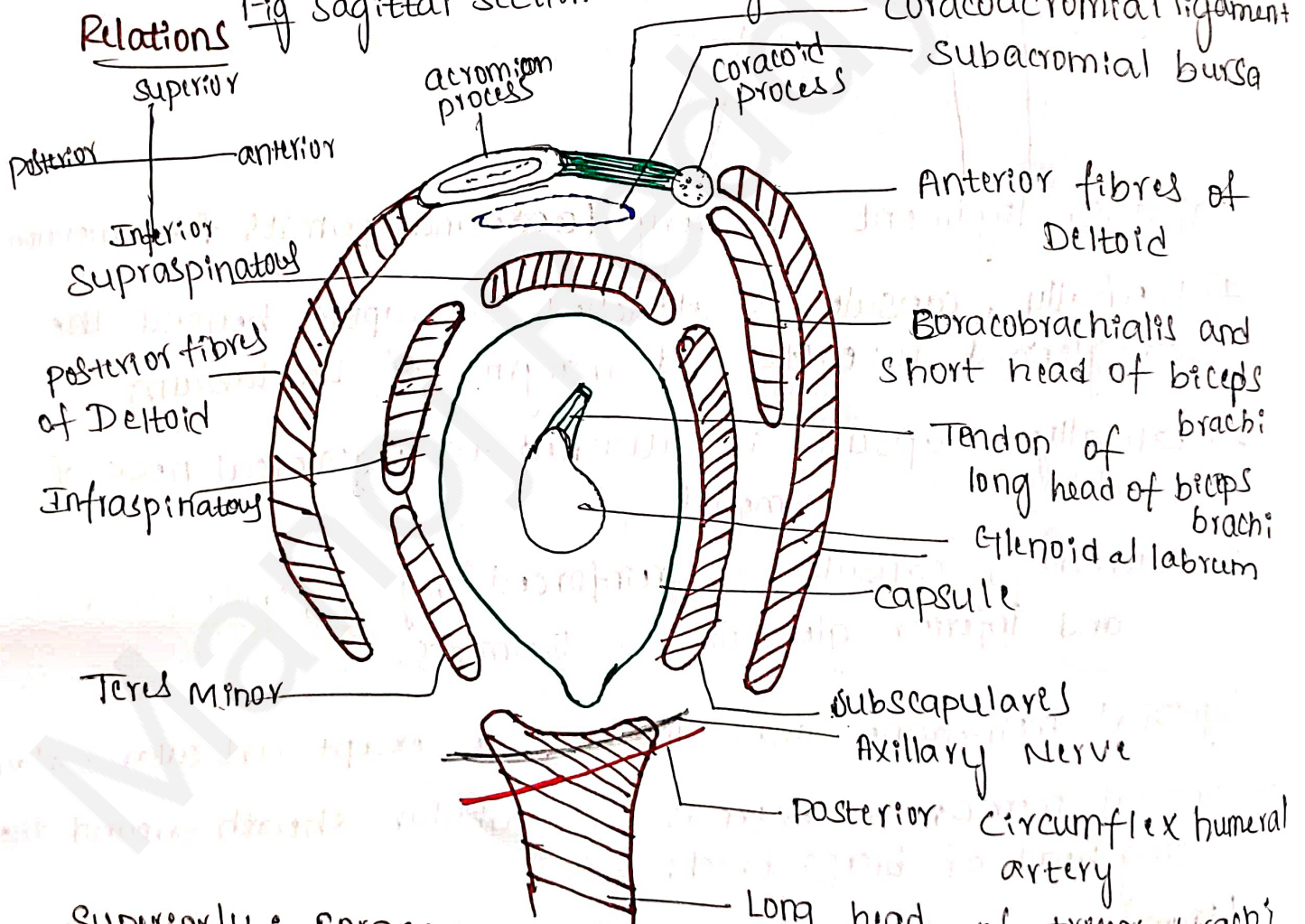
- 2) Transverse humeral ligament :- It joins greater and lesser tubercles of humerus.
- 3) Glenoid labrum :- It is a fibrocartilaginous rim which covers the margins of glenoid cavity and increases depth of cavity.
- 4) Glenohumeral ligament
 → Superior
 → middle
 → inferior
 reinforces the capsule from anterior side

Bursae related to the joint

- 1) Subacromial bursa
- 2) Subscapularis bursa
- 3) Infraspinatus bursa

Communicate with joint cavity

Relations Fig Sagittal section showing relations of the shoulder joint



Superiorly: Coracoacromial arch, Subacromial bursa, Supraspinatus

Inferiorly: Long head of triceps brachii, axillary nerve, posterior circumflex humeral artery

Anteriorly: Subscapularis, Anterior fibres of Deltoid, coracobrachialis and short head of biceps brachii

Posteriorly: Intra spinatous, Teres minor, posterior fibres of Deltoid

With in the joint: Tendon of long head of biceps brachii

Blood supply

1) Anterior circumflex humeral vessels

2) posterior circumflex humeral vessels

3) suprascapular vessels

4) Infrascapular vessels

Nerve supply

1) Axillary Nerve

2) Suprascapular Nerve

Movement of shoulder joint with their muscles

Movements

Muscles

1) Flexion

Clavicular head of pectoralis major
Anterior fibres of Deltoid

[Coracobrachialis, short head of biceps brachii]

2) Extension

posterior fibres of Deltoid

Lattissimus dorsi

Teres major

3) Abduction

0-15° - supraspinatus

15-90° - Middle fibre of Deltoid

90-180° - Serratus anterior and upper & lower fibres of trapezius

4) Adduction

Pectoralis major

Lattissimus dorsi

Short head of biceps brachii (coracobrachialis)

Long head of triceps brachii

5) Medial rotation

Subscapularis
pectoralis major
Anterior fibres of Deltoid
(Latissimus dorsi, Teres major)

6) Lateral rotation

Infraspinatus
Teres minor
Posterior fibres of Deltoid

7) Circumduction

— combination of most of the above muscles

Stability of shoulder joint is maintained by

- 1) Coracoacromial arch or secondary socket for ^{the} head of the humerus
- 2) Musculotendinous cuff of the shoulder formed by expansions from the tendons of supraspinatus (superiorly) infraspinatus, Teres minor (posteriorly) and subscapularis (anteriorly)
- 3) glenoid labrum which deepens the glenoid cavity

Clinical Anatomy

1) Shoulder joint Dislocation:-

- shoulder joint is more prone to dislocation than any other joint
- Dislocation of shoulder joint almost always occurs inferiorly because capsule of shoulder joint is not supported by any muscle inferiorly

2) Frozen shoulder :-

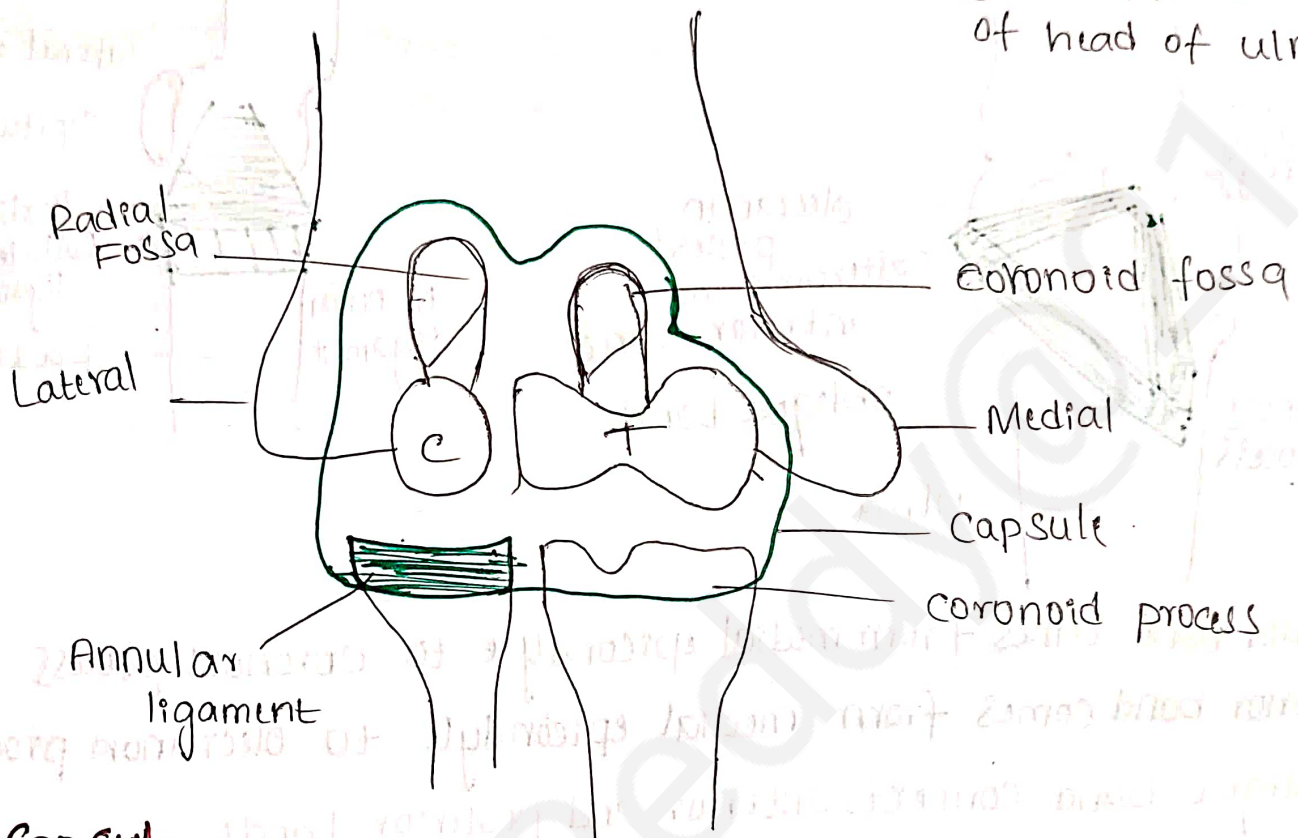
It is characterised by stiffness of joint, increasing pain in the shoulder and restricted movements particularly lateral & medial rotation, abduction.

- pathologically, two layers of synovial membrane become adherent to each other

Elbow Joint

- Hinge variety of synovial joint

Articulation :- Elbow joint is formed by the articulation of Trochlea & capitulum of humerus, Trochlear notch of ulna. (and upper surface of head of ulna)



Capsule

- 1) Superiorly, Capsule is attached to lower end of humerus such that capitulum, Trochlea, Coronoid fossa and radial fossa are intracapsular
- 2) Inferomedially, it is attached to the margins of trochlear notch of ulna
- 3) Inferiolaterally, it is attached to annular ligament of superior radioulnar joint

Ligaments

- 1) Ulnar collateral ligament

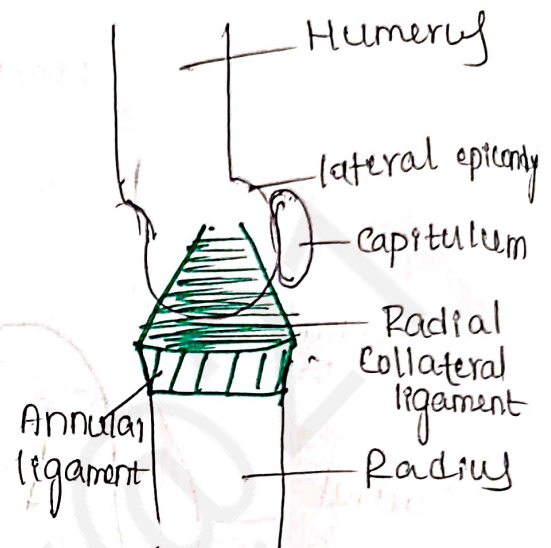
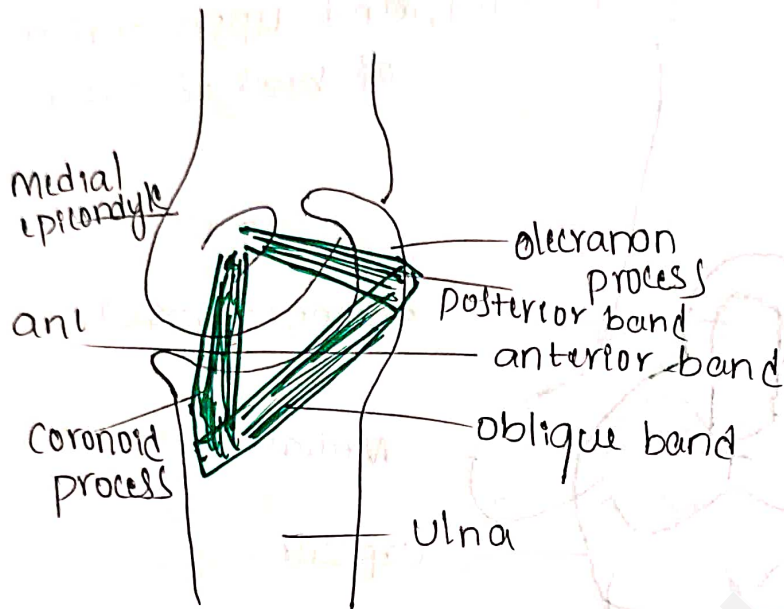
- It is triangular in shape

- apex is attached to medial epicondyle of humerus and its base to ulna.

2) Radial collateral (or) lateral ligament

It is fan shaped band extends from lateral epicondyle to annular ligament

Ulnar Collateral ligament



- Anterior band comes from medial epicondyle to coronoid process
- posterior band comes from medial epicondyle to olecranon process
- Oblique band connects anterior and posterior bands

Relations

Anteriorly: Brachialis, Median nerve, Brachial artery, Tendon of bicep brachii

Posteriorly: Triceps brachii, anconeus

Medially: ulnar nerve

Laterally: supinator, common extensors

Blood supply

From Anastomoses around the elbow joint

Nerve supply

- 1) Radial nerve
- 2) Ulnar nerve

3) Median nerve

4) musculocutaneous nerve

Movements

1) Flexion

2) Extension

Muscles

Brachialis

Biceps brachii

Brachioradialis

Triceps brachii

Anconeus

1. The first part of the book is devoted to a general survey of the history of the subject.

2. The second part is devoted to a detailed study of the various theories of the subject.

3. The third part is devoted to a critical examination of the various theories of the subject.

4. The fourth part is devoted to a study of the various methods of the subject.

5. The fifth part is devoted to a study of the various results of the subject.

6. The sixth part is devoted to a study of the various applications of the subject.

7. The seventh part is devoted to a study of the various problems of the subject.

8. The eighth part is devoted to a study of the various theories of the subject.

9. The ninth part is devoted to a study of the various methods of the subject.

10. The tenth part is devoted to a study of the various results of the subject.

Manoj Reddy@21

Anterior Compartment (Flexor)

[Supinator muscle]

[Pronator quadratus]

1) Pronator teres

2) Flexor carpi radialis

3) Flexor carpi ulnaris

4) Palmaris longus

5) Flexor digitorum profundus

Posterior Compartment (Extensor)

[Supinator muscle]

[Pronator quadratus]

1) Extensor carpi radialis longus

2) Extensor carpi radialis brevis

3) Extensor carpi ulnaris

4) Extensor digitorum

5) Extensor indicis

6) Extensor pollicis longus

7) Extensor pollicis brevis

Muscles of Forearm

Anterior Compartment (Flexor)

Superficial group

- 1) pronator teres
- 2) Flexor Carpi radialis
- 3) palmaris longus
- 4) Flexor Carpi ulnaris
- 5) Flexor digitorum superficialis

Deep group

- 1) Flexor digitorum profundus
- 2) Flexor pollicis longus
- 3) pronator quadratus

Posterior Compartment (Extensor)

Superficial muscles

- 1) Anconeus
- 2) Brachioradialis
- 3) Extensor Carpi radialis longus
- 4) Extensor Carpi radialis brevis
- 5) Extensor digitorum
- 6) Extensor digiti minimi
- 7) Extensor Carpi ulnaris

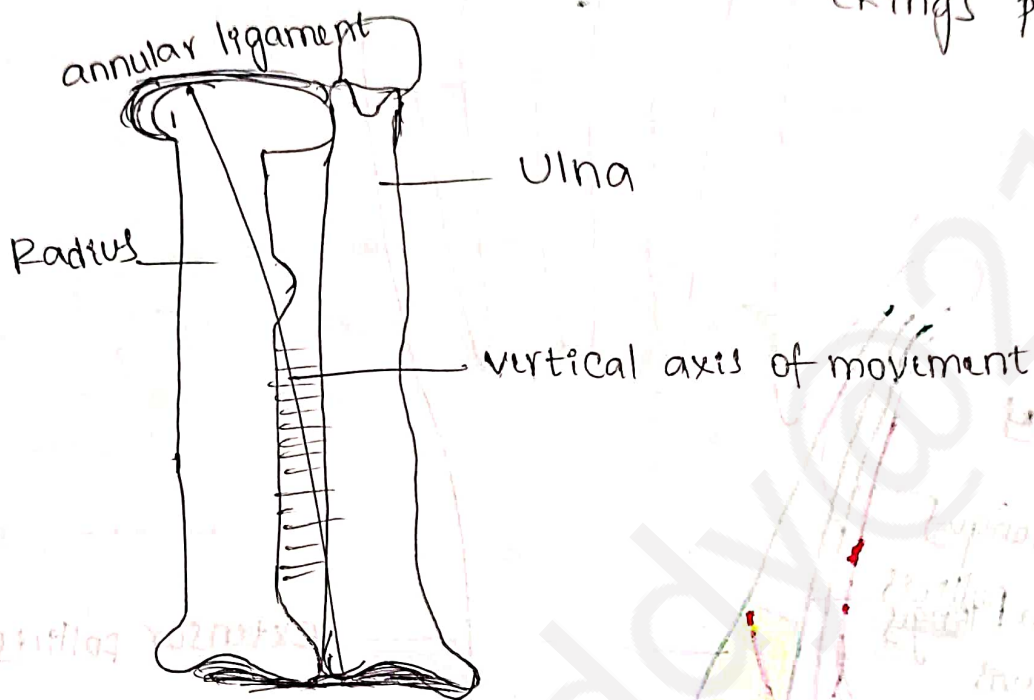
Deep muscles

- 1) Supinator
- 2) Extensor indicis
- 3) Extensor pollicis longus
- 4) Extensor pollicis brevis
- 5) Abductor pollicis longus

Supination and Pronation

supination and pronation are the rotatory movements of the forearm/hand around the vertical axis.

In supination palm turns upwards (beggars supinate)
In pronation palm turns downwards (kings pronate)



Axis: Head of humerus to articular disc of the inferior radioulnar joint

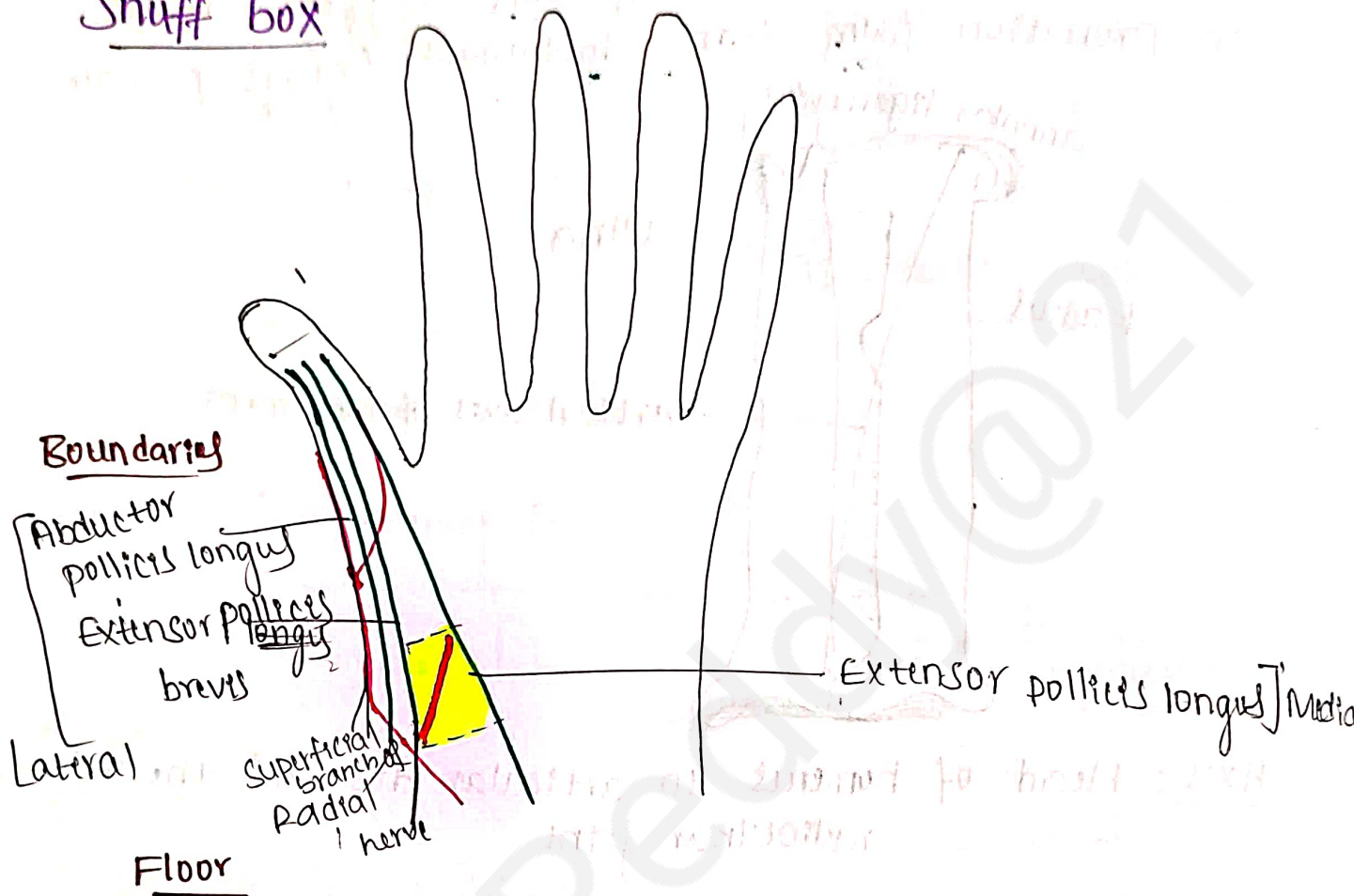
- 1) Head of radius rotates within the annular ligament
- 2) End of ulna moves forward and medially during Suping
- 3) It moves downwards and laterally during pronation
- 4) Supination is more powerful than pronation
- 5) Supination movements of the are responsible for the screwing movements of the hand

Muscles:-

Pronation: pronator quadratus
pronator teres (when movement is against resistance)

Supination :- 1) Supinator (when elbow is extended)
 2) Biceps brachii (when elbow is flexed)

Snuff box



Extensor Retinaculum

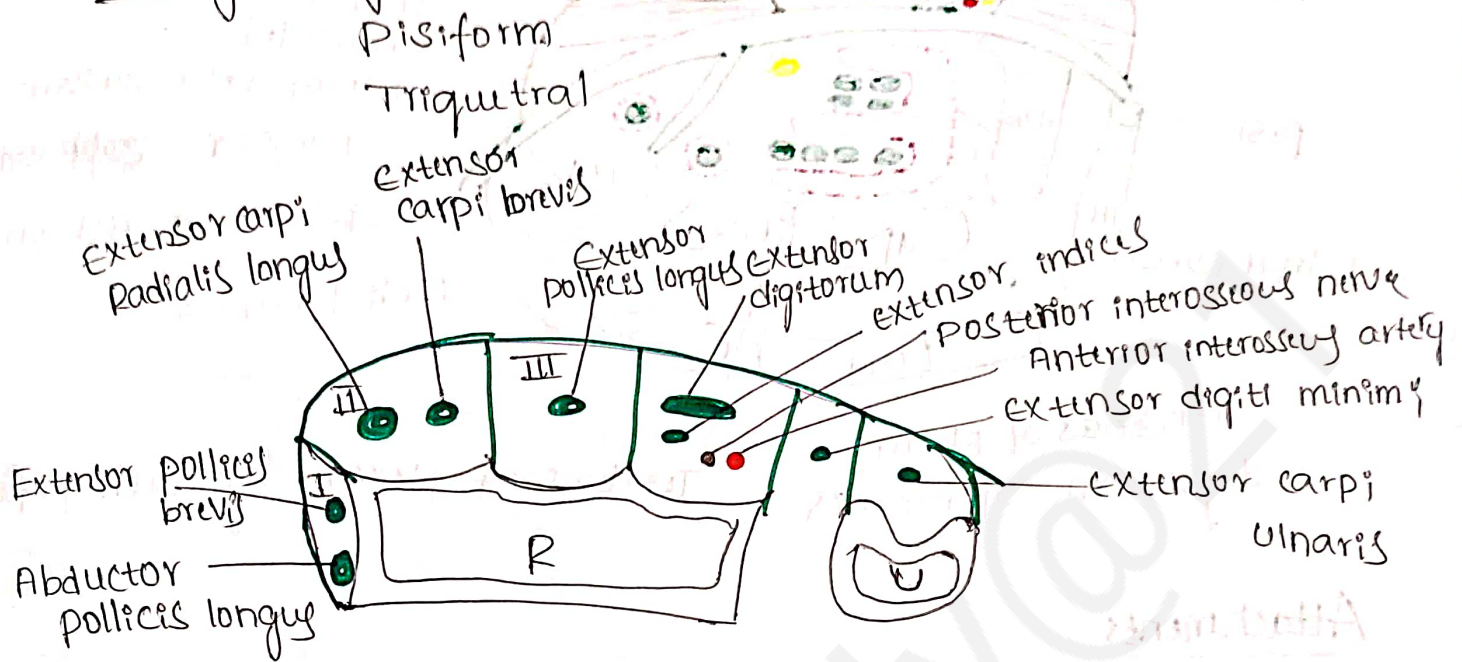
Extensor Retinaculum is a modification of deep fascia on the back of the wrist which holds Extensor tendons in place.

— It is an oblique band directed downward and medially

Attachments

Laterally: lower part of the anterior border of radius

Medially: styloid process of the ulna



Compartment

Structure

I

II

III

IV

V

VI

Flexor Retinaculum

Flexor retinaculum is a strong fibrous band that bridges the anterior concavity of carpus and converts it into carpal tunnel.

5) Tendon of palmaris longus

Thenar and hypothenar muscles arise from the retinaculum structures passing deep to the ^{flexor} retinaculum

- 1) Median nerve
- 2) Four tendons of flexor digitorum superficialis
- 3) Four tendons of flexor digitorum profundus
- 4) Flexor pollicis longus
- 5) Flexor carpi radialis
- 6) Radial bursa
- 7) Ulnar bursa

Intrinsic Muscles of Hand

Intrinsic muscles of hand helps in adjusting the hand during gripping and also for carrying skilled movements.

There are 20 muscles in the hand (5 groups x 4 muscles)

- 1) Thenar muscles (4) (Thumb pollicis)
- 2) Hypothenar muscles (4) (digit mini)
- 3) Lumbricals (4) [Worm-like]
- 4) Palmar interossei
- 5) Dorsal interossei

Ulnar nerve

① Thenar Muscles (4)

- Muscles of thenar Eminence
- 1) Abductor pollicis brevis
 - 2) Flexor pollicis brevis
 - 3) Opponens pollicis

Median nerve

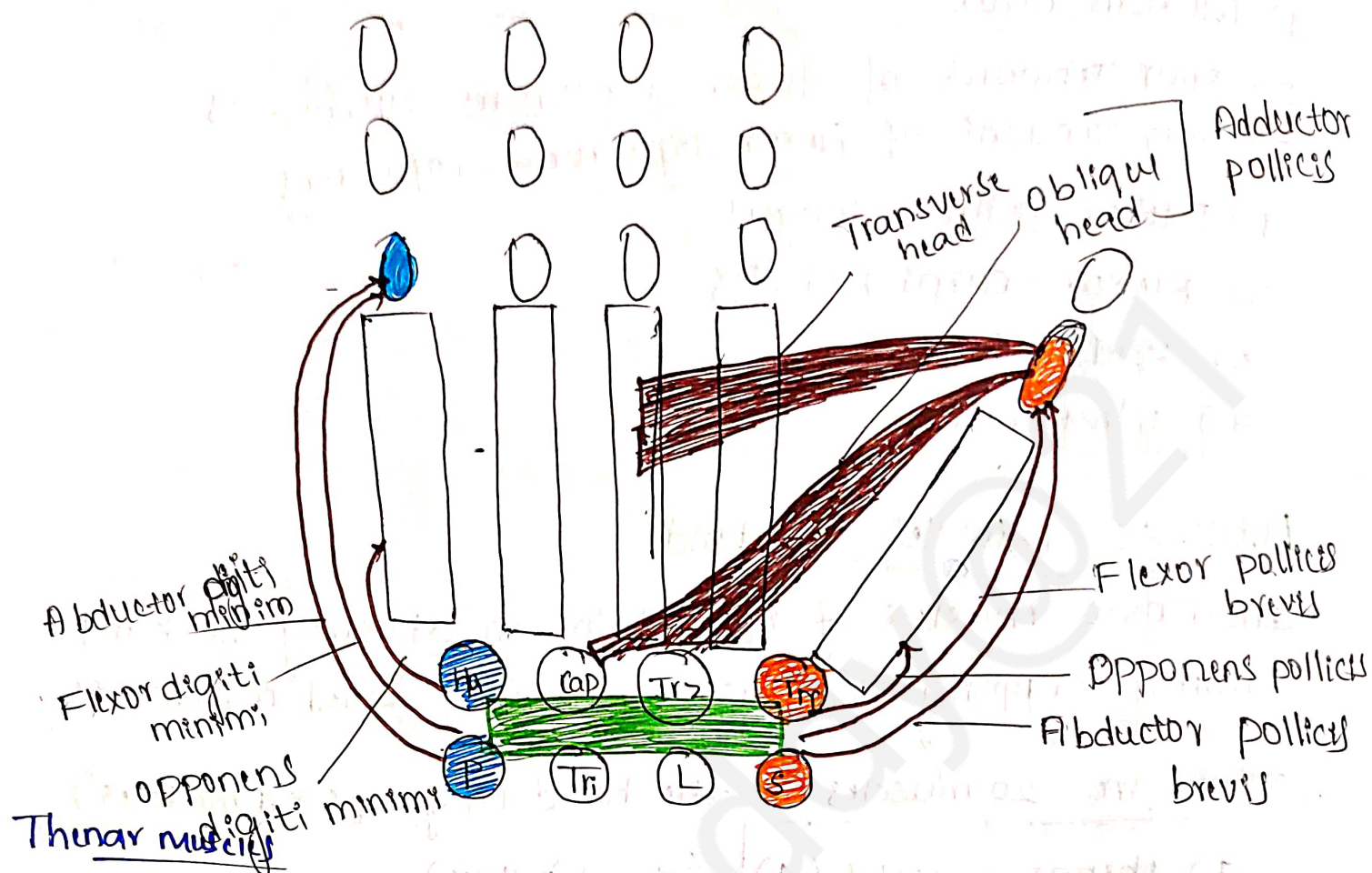
- 4) Adductor pollicis

Ulnar nerve

② Hypothenar muscles

- 1) Abductor digiti minimi
- 2) Flexor digiti minimi
- 3) Opponens digiti minimi
- 4) Palmaris brevis

Ulnar nerve



Muscle	Origin	Insertion
Abductor pollicis brevis	Tubercle of scaphoid, Crest of Trapezium, Flexor retinaculum	Base of proximal Phalanx of thumb
Flexor pollicis brevis	Crest of trapezium, Flexor retinaculum, Capitate bone	Base of proximal phalanx of thumb
Opponens pollicis	Crest of Trapezium, Flexor retinaculum	Lateral border of Shaft of 1st metacarpal bone
Adductor pollicis	Transverse head: 1 palmar surface of shaft of 3rd metacarpal Oblique head: - Base of 2nd & 3rd metacarpal & Capitate bone	

Hypothenar Muscles

Origin

Origin

Insertion

Abductor digiti minimi

Pisiform bone

Base of proximal phalanx of little finger

Flexor digiti minimi

Flexor retinaculum

Base of proximal phalanx of little finger

Opponens digiti minimi

Flexor retinaculum

Medial border of shaft of 5th metacarpal bone

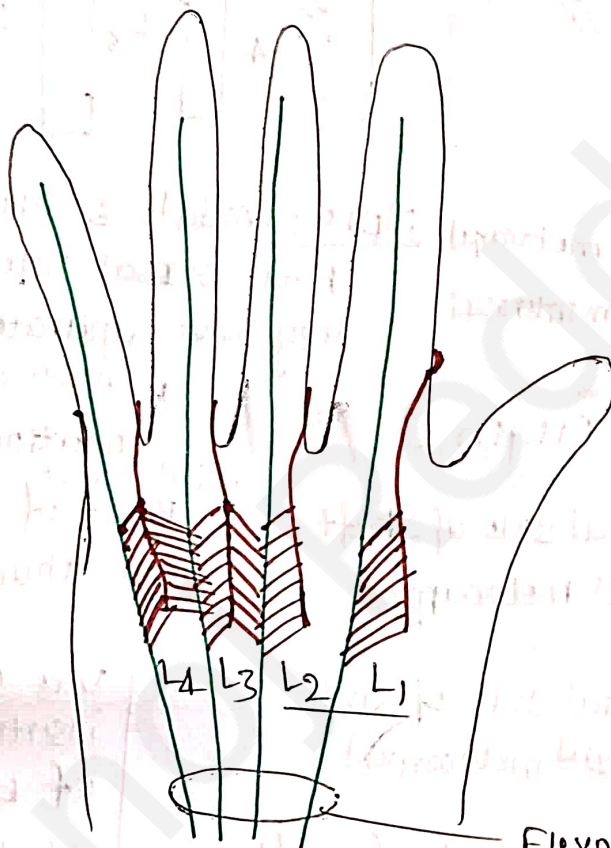
Palmaris brevis

(Superficial muscle)

Flexor retinaculum

Skin of palm on medial side

Lumbricals



Median nerve

L1, L2 - Unipennate

L3, L4 - Bipennate

Ulnar nerve

Flexor digitorum profundus

Tendons

Insertion

Muscle

Origin

1st - Lateral border of Tendon of Flexor digitorum profundus of 2nd digit

2nd - Lateral border of same FDP Tendon of 3rd digit

3rd - Adjacent sides of FDP Tendons of 3rd & 4th digits

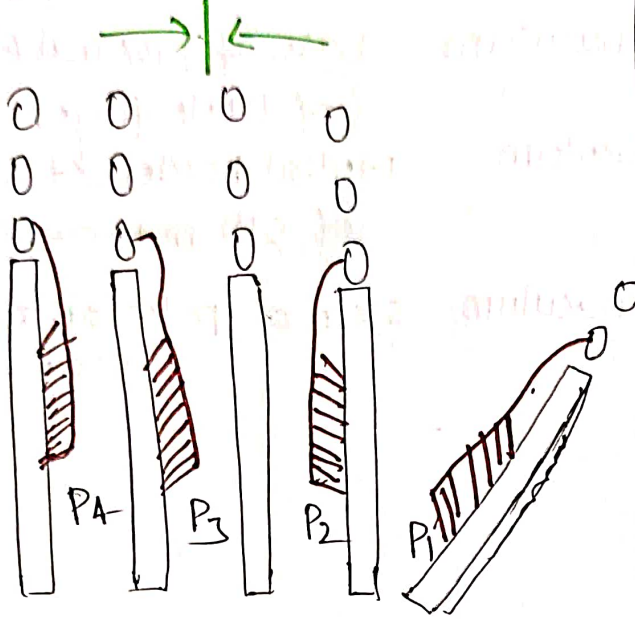
4th - Adjacent sides of FDP Tendons of 4th & 5th digits

Via Dorsal expansion inserted into dorsum of base of digital phalanges

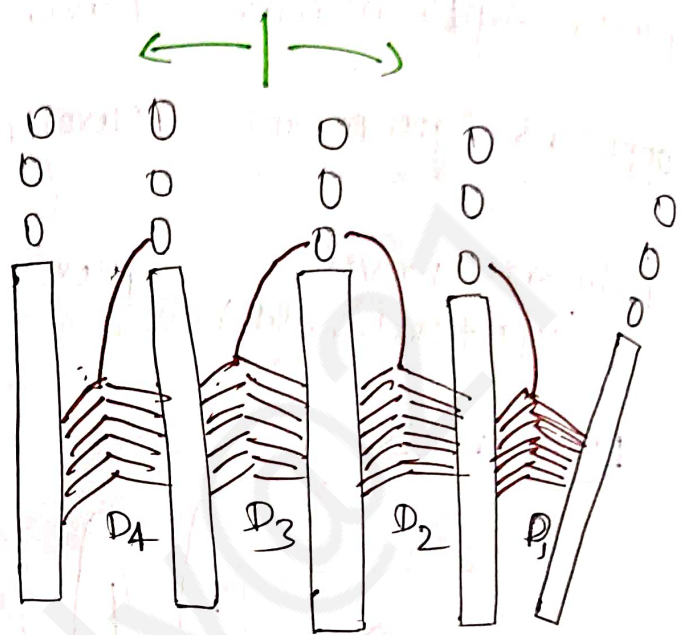
Interossei (8) Palmar Interossei (Unipennate) Dorsal Interossei (Bipennate) Dinar nerve

P-AD **D-AB**

palmar interossei



Dorsal interossei



Note: Middle finger / 3rd metacarpal does not have palmar interossei

Note: Middle & little finger ^{do not} have Dorsal interossei because they have separate muscles for Abduction

Name

Origin

Insertion

palmar Interossei

- 1st - Medial side of shaft of 1st metacarpal

medial side of Base of proximal phalanx of thumb

- 2nd - medial side of shaft of 2nd metacarpal

- 3rd - lateral side of shaft

- 4th of 3rd & 4th metacarpals

Via extensor expansion inserted into dorsum of bases of distal phalanges of 2nd & 5th digits

Dorsal Interossei

- 1st - Adjacent sides of 1st & 2nd Mc

- 2nd - Adjacent sides of shaft of 2nd & 3rd Mc

- 3rd - Adjacent sides of shaft of 3rd & 4th Mc

- 4th - Adjacent sides of shaft of 4th & 5th Mc

Via extensor expansion inserted into bases of distal phalanges of 2nd, 3rd, 4th and 5th digits

Diagram of a flower showing the following parts:

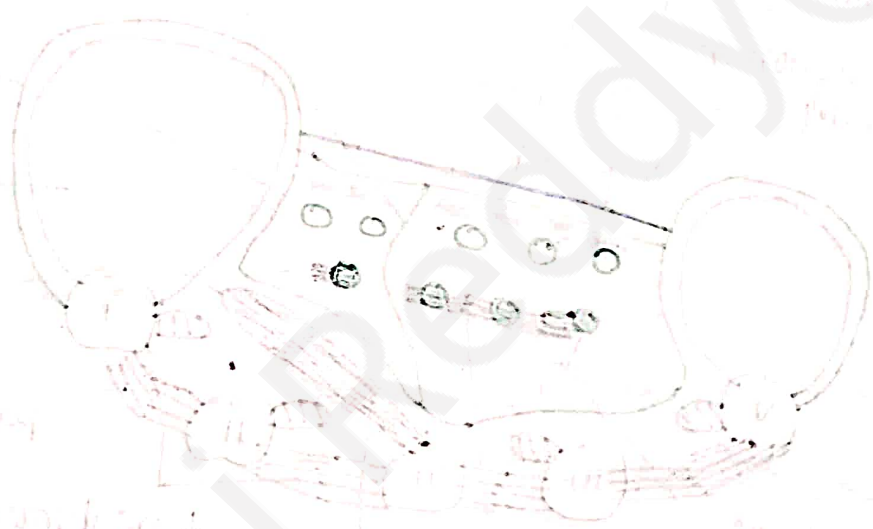


Diagram of a flower showing the following parts:

- Petal
- Stamen
- Ovary
- Style
- Stigma
- Corolla
- Receptacle

Diagram of a flower showing the following parts:

- Petal
- Stamen
- Ovary
- Style
- Stigma
- Corolla
- Receptacle

Diagram of a flower showing the following parts:

- Petal
- Stamen
- Ovary
- Style
- Stigma
- Corolla
- Receptacle

Diagram of a flower showing the following parts:

- Petal
- Stamen
- Ovary
- Style
- Stigma
- Corolla
- Receptacle

Diagram of a flower showing the following parts:

- Petal
- Stamen
- Ovary
- Style
- Stigma
- Corolla
- Receptacle

Diagram of a flower showing the following parts:

- Petal
- Stamen
- Ovary
- Style
- Stigma
- Corolla
- Receptacle

Diagram of a flower showing the following parts:

- Petal
- Stamen
- Ovary
- Style
- Stigma
- Corolla
- Receptacle

Diagram of a flower showing the following parts:

- Petal
- Stamen
- Ovary
- Style
- Stigma
- Corolla
- Receptacle

Diagram of a flower showing the following parts:

- Petal
- Stamen
- Ovary
- Style
- Stigma
- Corolla
- Receptacle

Fascial spaces of Hand

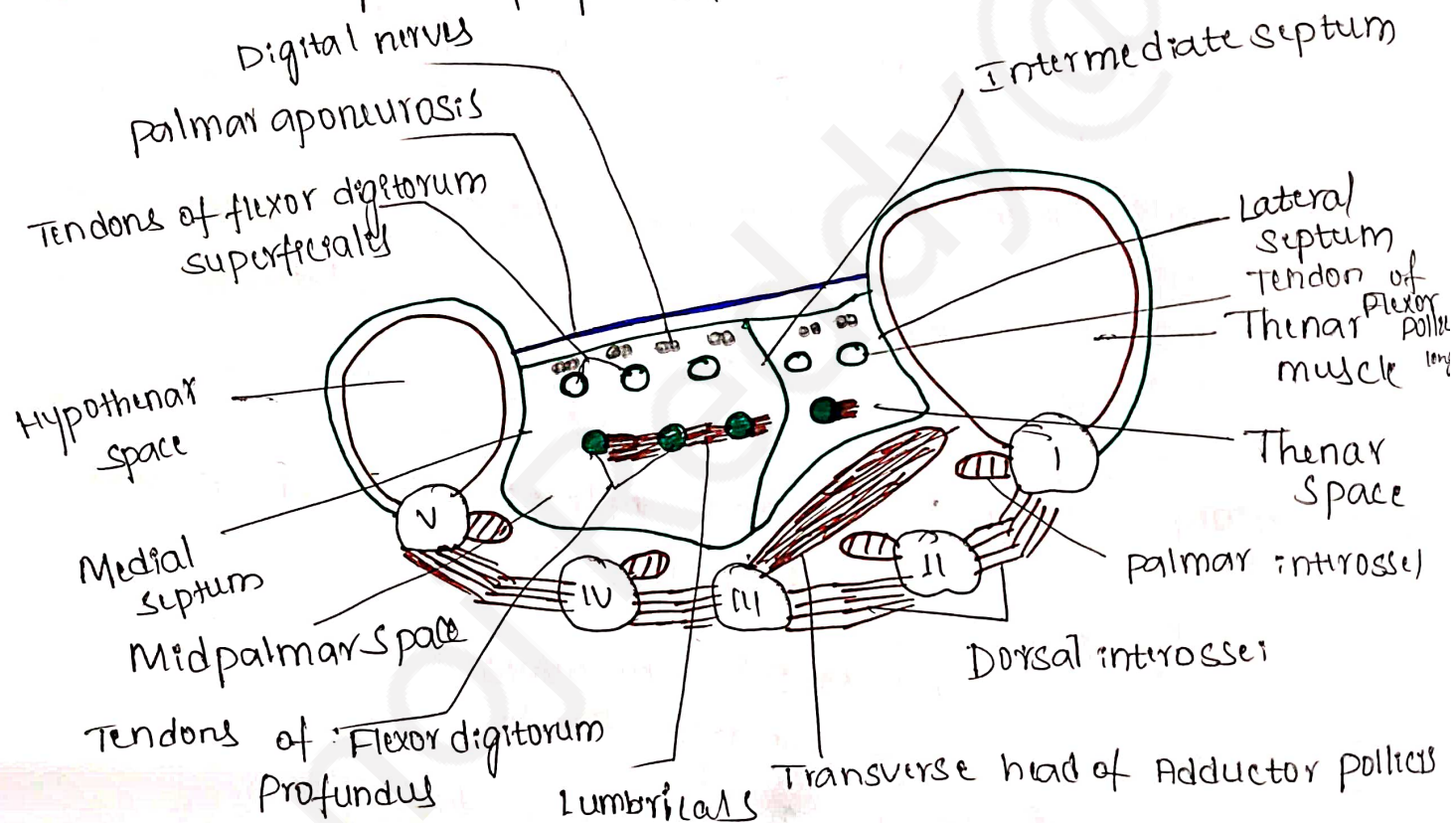
(A) Palmar spaces

- 1) Thenar space
- 2) midpalmar space
- 3) pulp space of the fingers

(B) Dorsal spaces

- (1) Dorsal Subcutaneous space
- 2) Dorsal Subaponeurotic space

(c) Forearm space of : parona



palmar spaces

① Mid palmar space

- Triangular space situated under the inner half of the hollow of palm

- Boundaries

Anterior — Palmar aponeurosis

- Flexor tendons of 2nd, 4th 5th digits
- Lumbricals of 2nd, 3rd, 4th)

- posterior — Fascia covering Interossei and metacarpals
- Medial — Medial palmar septum
- lateral — Intermediate palmar septum

Communications:-

proximal — Forearm space of Parona

Distal — Fascial sheaths of 3rd & 4th lumbricals

Drainage — Incision in either 3rd or 4th web spaces

(Infections of MPIS are drained by incising 3rd & 4th web spaces)

② Thenar Spaces

Triangular space situated under the outer half of the hollow of ^{the} Palm

Boundaries

Anterior — palmar aponeuroses

— Flexor tendons of index finger

— First lumbrical

Posterior — (Fascia covering)

~~Transverse~~ Transverse head of Adductor pollicis

Medial — Transv. Intermediate palmar septum

Lateral — Lateral palmar septum

Communications

proximal — Forearm space of Parona

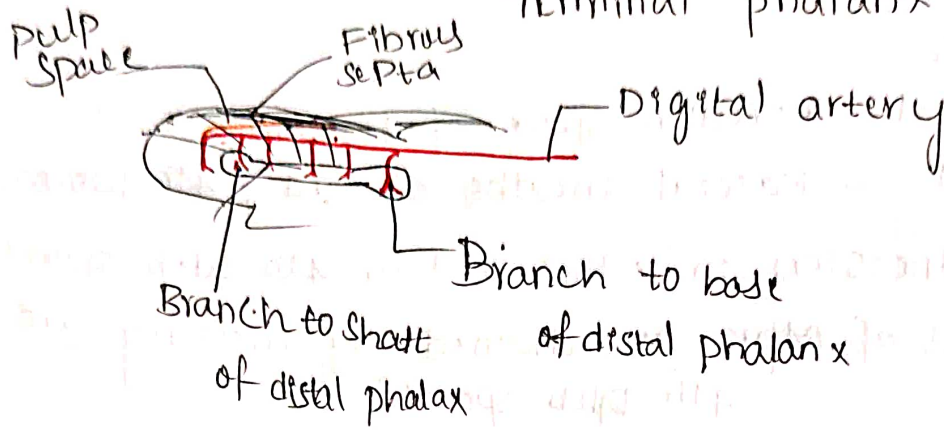
Distal — Fascial sheath of 1st lumbrical

Drainage : Infections of Thenar spaces are drained by incising 1st web space

③ Pulp Space of the Fingers

It is the space at the tips of fingers and thumb which contain ^{subcutaneous} Fat arranged in the tight compartments formed by fibrous septa which pass from the skin to periosteum at terminal phalanx

Infection of pulp space of fingers is called "Whitlow"
↳ causes Avascular necrosis of distal $4/5^{th}$ of Terminal phalanx

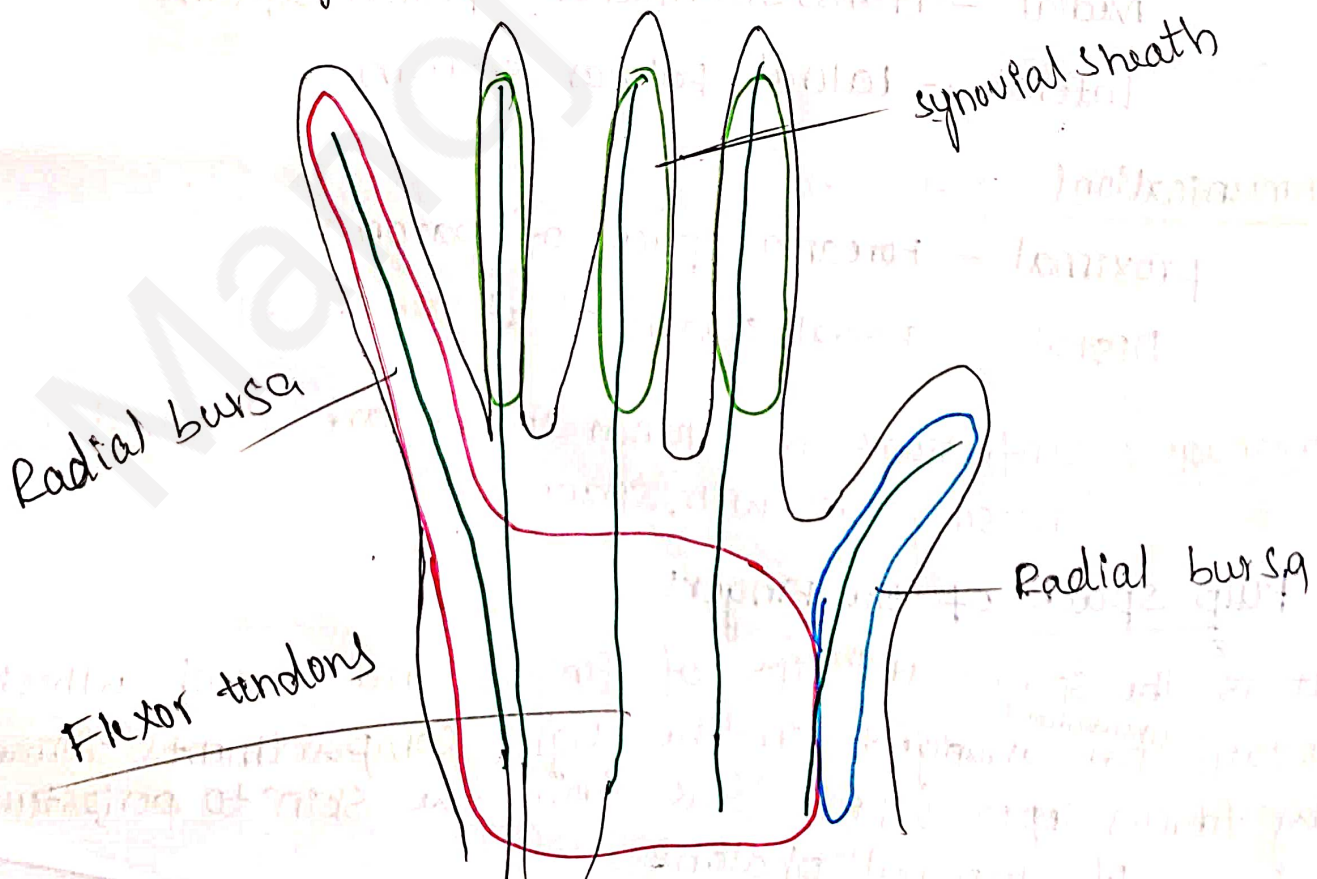


Forearm space of Arm

It is a rectangular space situated deep in the lower part of forearm just above the wrist.
It lies in front of pronator quadratus and deep to long Flexor tendons.

Digital synovial sheaths

Many tendons entering the hand are surrounded by synovial sheath



- synovial sheaths of 2nd, 3rd & 4th digits are independent
and proximally terminate at the level of head of ^{metacarpals}
- ⇒ synovial sheath of little finger is continuous proximally with ulnar bursa
 - ⇒ synovial sheath of thumb finger is continuous with radial bursa
 - ⇒ Infection of these little finger & thumb finger are very dangerous because they can spread to palm and forearm space of Parona, even 2.5 cm above the wrist

Palmar Aponeurosis

The first part of the paper is devoted to a study of the
 properties of the function $f(x)$ defined by the equation

$$f(x) = \int_0^x \frac{1}{1+t^2} dt$$
 It is shown that $f(x)$ is an increasing function and that
 its range is the interval $(0, \frac{\pi}{2})$. The second part of the
 paper is devoted to a study of the function $g(x)$ defined by the equation

$$g(x) = \int_0^x \frac{t}{1+t^2} dt$$
 It is shown that $g(x)$ is an increasing function and that
 its range is the interval $(0, \frac{\pi}{4})$.

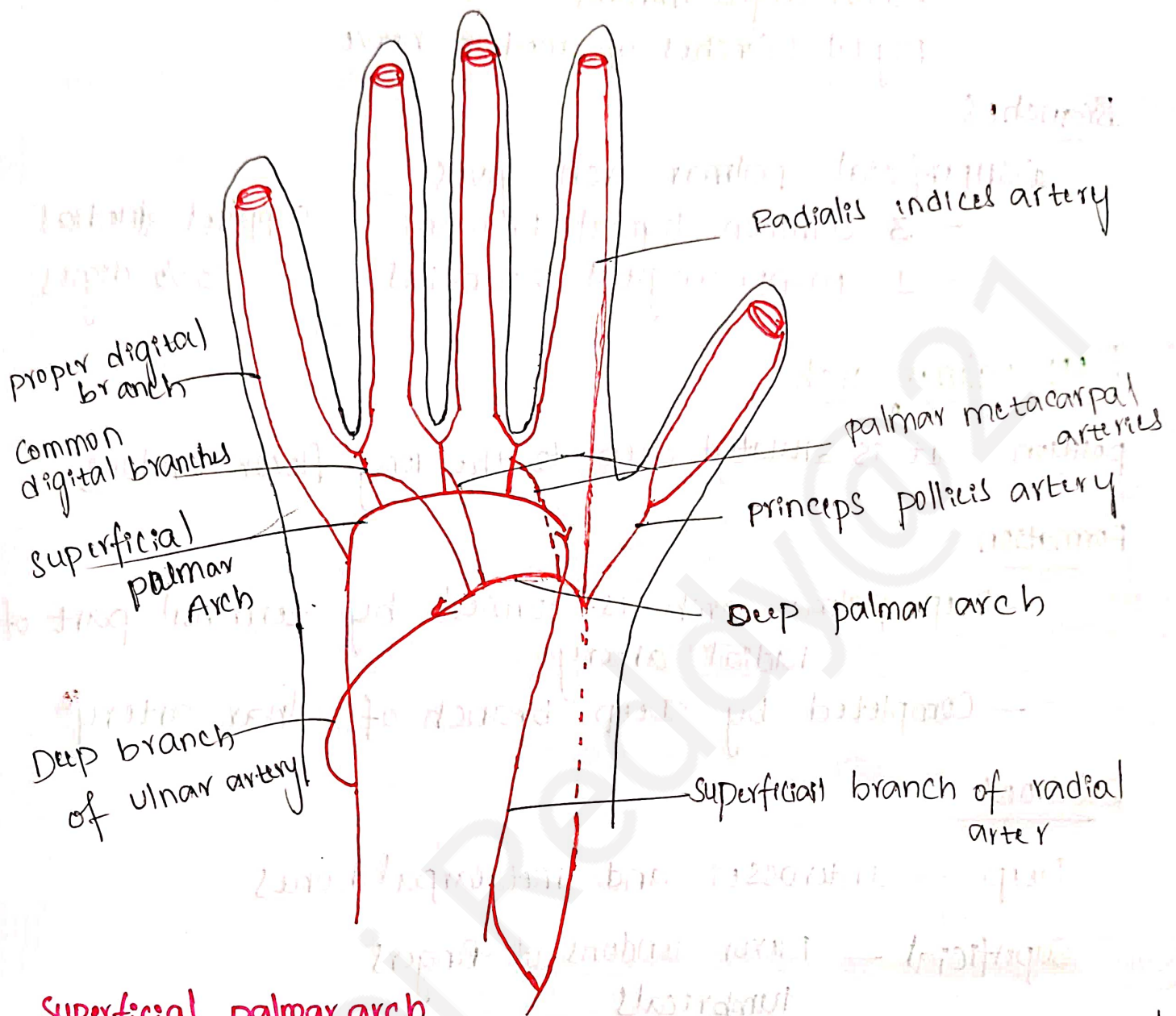
$$\begin{array}{r}
 1.5708 \\
 \hline
 4 \overline{) 6.2832} \\
 \underline{4} \\
 2 \\
 \underline{8} \\
 0
 \end{array}$$

The third part of the paper is devoted to a study of the function $h(x)$ defined by the equation

$$h(x) = \int_0^x \frac{t^2}{1+t^2} dt$$
 It is shown that $h(x)$ is an increasing function and that
 its range is the interval $(0, \frac{\pi}{4})$. The fourth part of the
 paper is devoted to a study of the function $k(x)$ defined by the equation

$$k(x) = \int_0^x \frac{t^3}{1+t^2} dt$$
 It is shown that $k(x)$ is an increasing function and that
 its range is the interval $(0, \frac{\pi}{4})$.

palmar Arches



Superficial palmar arch

Position — Convexity of arch lies towards fingers and its most distal point is situated at the level of distal border of fully extended thumb

Formation

Superficial palmar arch is formed by the superficial branch of ulnar artery
 — It is completed by the superficial branch of radial artery

Relations

Superficial — palmaris aponeurosis
 — palmaris brevis

Deep — Flexor tendons of fingers
lumbrical
Flexor digiti minimi
Digital branches of median nerve

Branches

- 1) Superficial palmar arch gives
- | | |
|---|-----------------------------|
| <ul style="list-style-type: none">— 3 common digital branches— 1 proper digital branches | } supplies medial 3½ digits |
|---|-----------------------------|

Deep palmar arch

position — It is situated deep to the long flexor tendons

Formation —

- Deep palmar arch is formed by terminal part of radial artery
- Completed by deep branch of ulnar artery

Relations

Deep — Interossei and metacarpal bones

Superficial — Flexor tendons of fingers

— lumbricals

— Oblique head of adductor pollicis

Branches

Deep palmar arch gives

1) Convex portion Three palmar metacarpal arteries which anastomose with common digital branches of superficial palmar arch

2) Dorsal portion Three perforating digital arteries which pass through medial three interosseous spaces to anastomose with dorsal metacarpal arteries

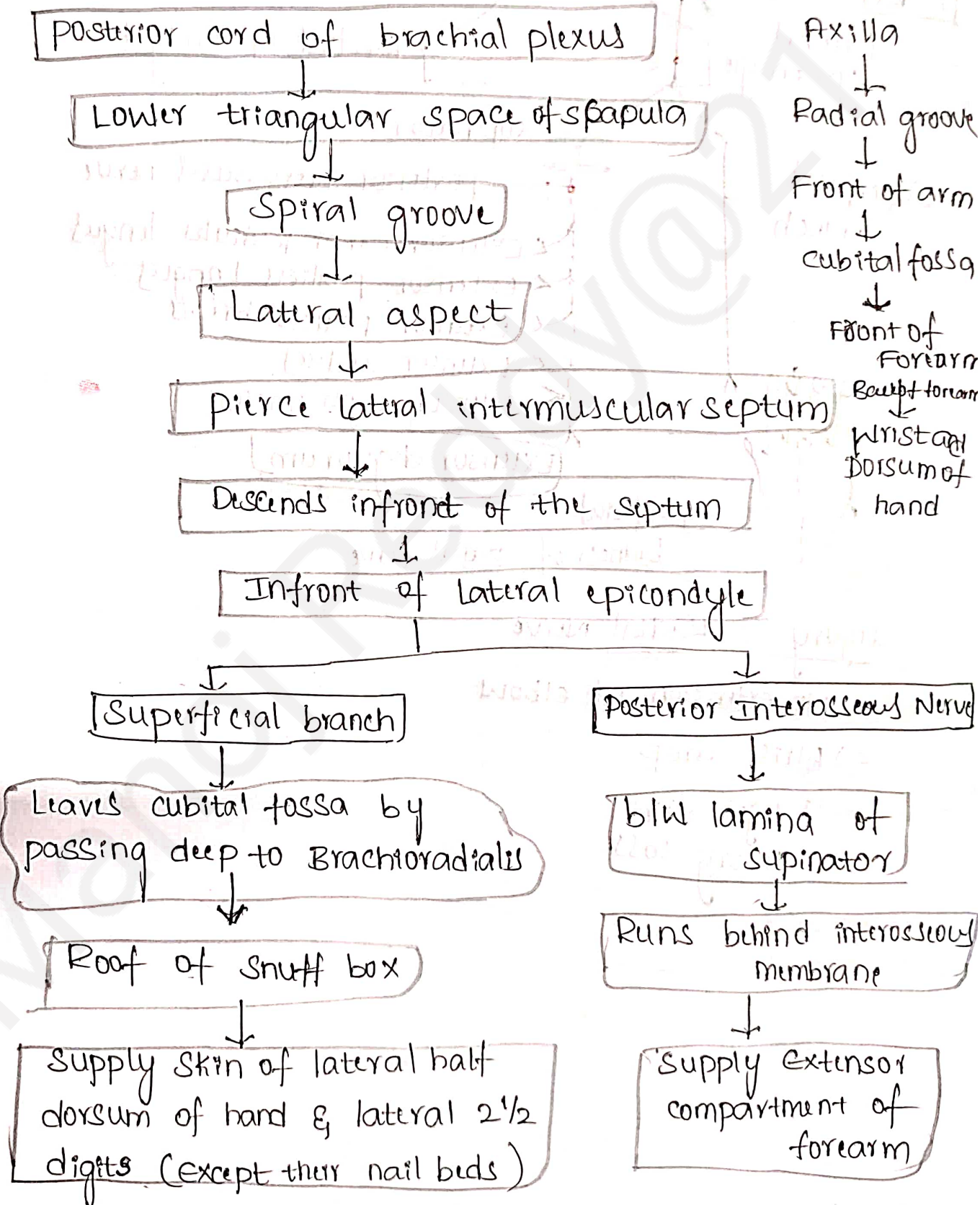
3) Concave portion Recurrent branches which supply to carpal bones and joints

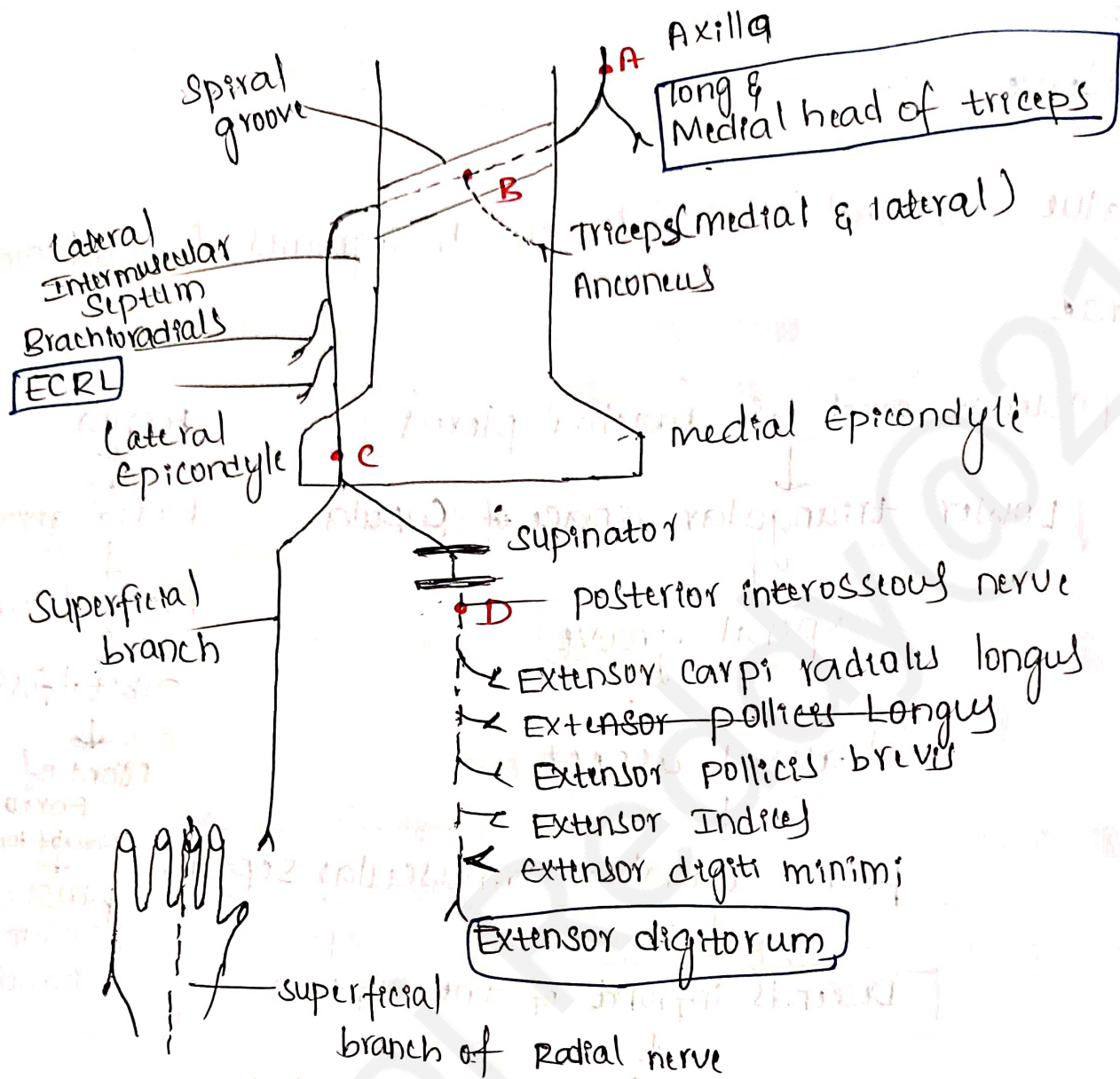
Nerves

Radial Nerve

Root value : Ventral rami of C5 - T₁ segments of spinal cord

Course





Injury to Radial Nerve

⇒ No extension of elbow

⇒ Wrist drop

⇒ Finger drop

⇒ Sensory loss

Median Nerve

ventral rami of
Root value :- C5-T1 segments of spinal cord

Course & Relations

originates from medial & lateral cord of brachial plexus

Descends in arm lateral to brachial artery

crosses from lateral to medial side of brachial artery

Forms most medial content of cubital fossa

Leaves cubital fossa by passing b/w two heads of pronator teres

Anterior interosseous Nerve

Supply to Deep muscles of flexor compartment of Forearm

passes to superficial flexor digitorum

Superficial Flexors

5cm proximal to Flexor retinaculum median nerve emerges lateral to Flexor digitorum Superficial tendon

Superficial palmar cutaneous branch of median nerve

Supply to Lateral 3/2 of palm

passes deep to Flexor retinaculum to enter palm

palm

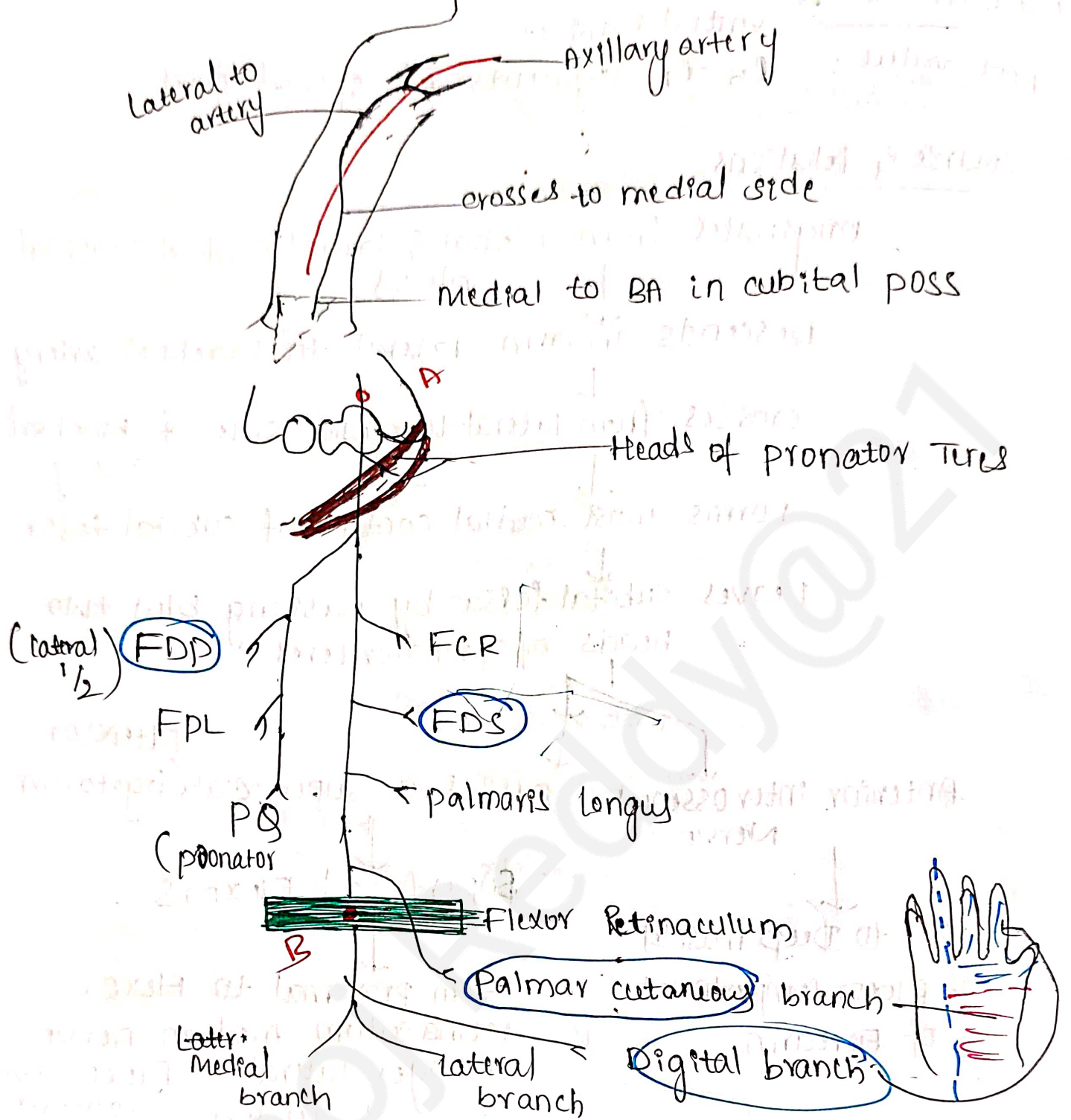
lateral branch

Digital branch

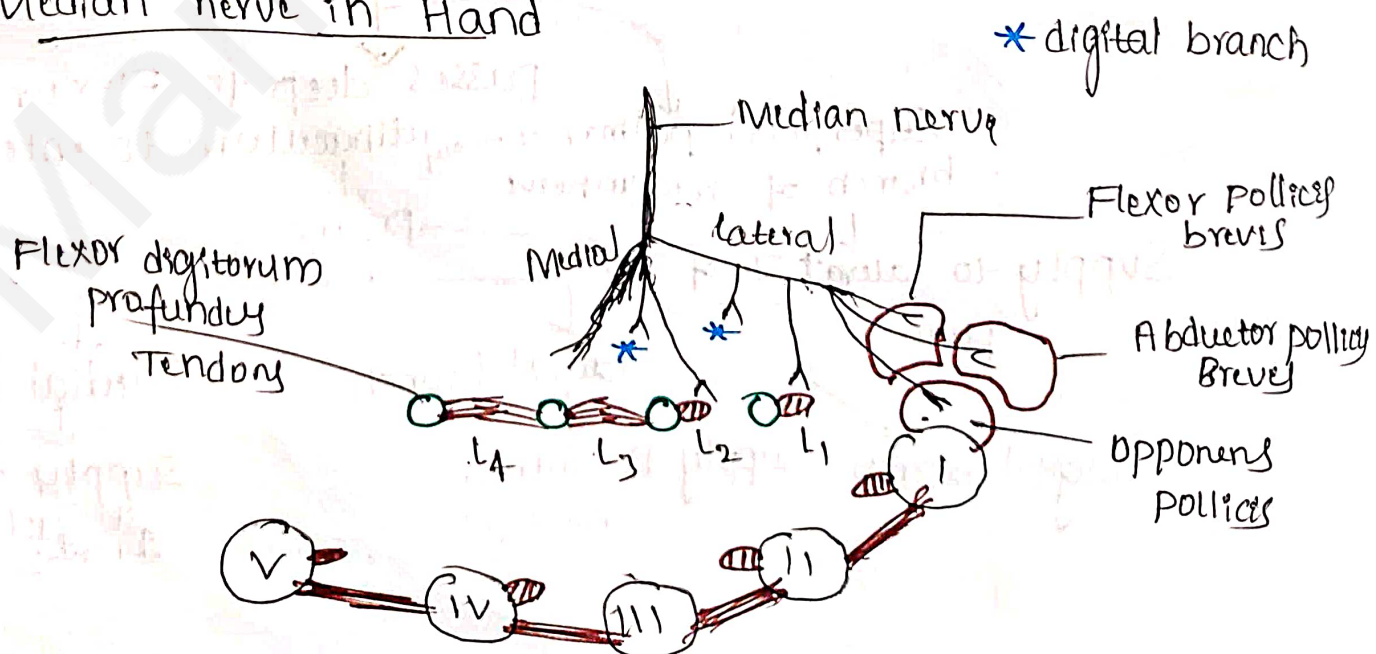
Supply to Thenar muscles

Medial branch

Supply to 1st & 2nd lumbricals



Median nerve in Hand



A) Higher Injury

- supracondylar fracture
- pronator teres syn
- struther's syn
- * Opponens pollicis muscles involved — Ape Thumb deformity
- * FDS & Lat. 1/2 of FDP involved — pointing index finger (While making fist)
- sensory loss of lateral 3 1/2

B) Lower Injury — carpal tunnel syndrome

- Ape Thumb deformity
- FDS & FDP are spared — No pointing index finger
- Palmar cutaneous branch is spared

↓
No sensory loss of lateral 3 1/2 pt palm

- sensory loss of lateral 3 1/2 fingers

Ulnar Nerve

ventral ramus
Root value : C7-T1

originate from medial cord of brachial plexus

↓
Continuous medial to Brachial artery

↓
pierces medial intermuscular septum

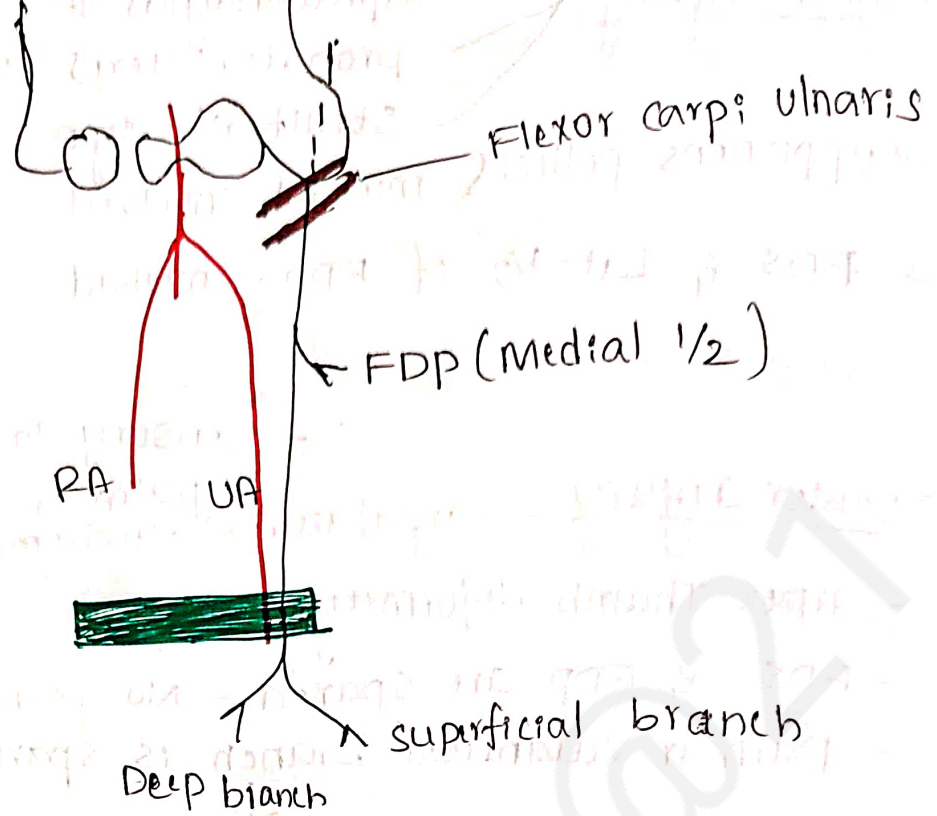
↓
Behind medial epicondyle

↓
passes b/w two heads of Flexor carpi ulnaris

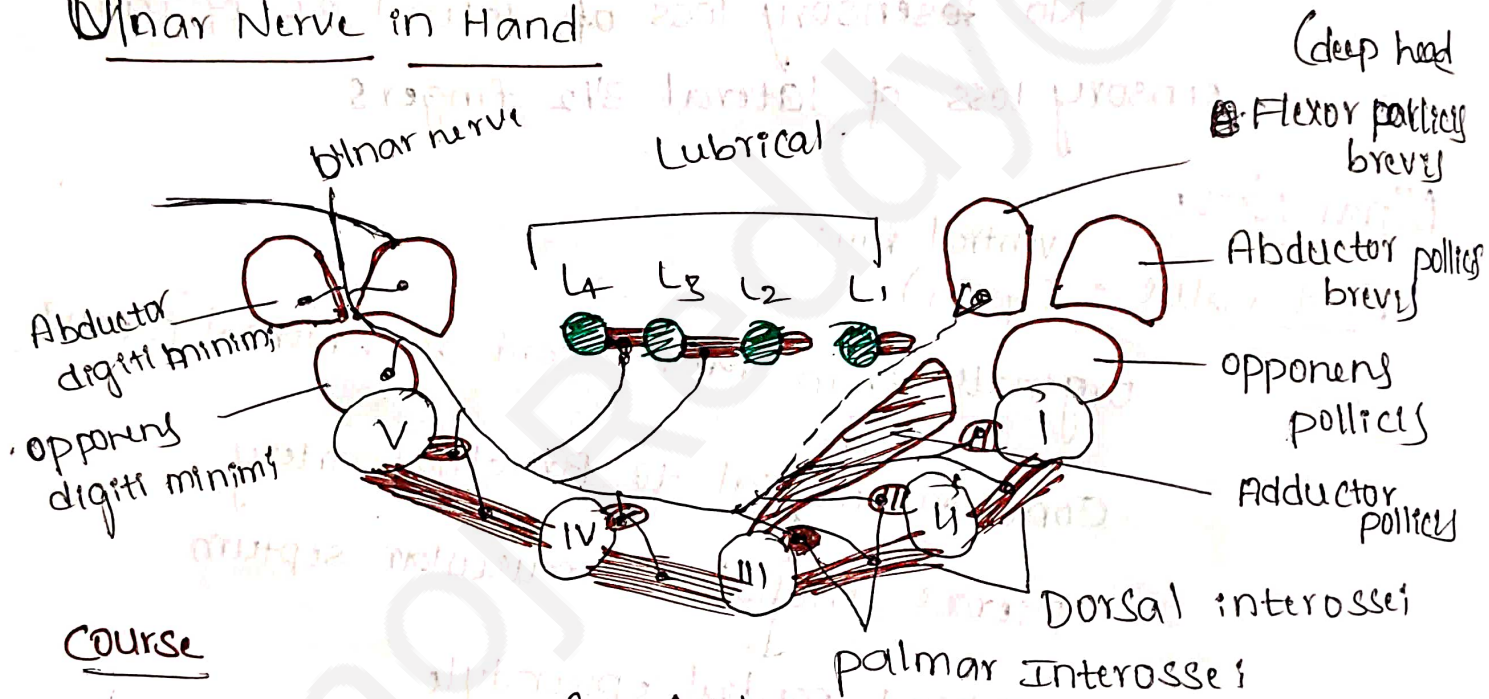
↓
Descends in b/w Flexor digitorum superficialis & Flexor digitorum profundus medial to Ulnar artery

↓
Passes superficial to Flexor Retinaculum

↓
Superficial branch Deep branch



Ulnar Nerve in Hand



Course

Ulnar nerve passes ^{superficial} deep to Flexor retinaculum and terminates by dividing into superficial and deep branch

— superficial branch is subcutaneous

— Deep branch passes through hypothenar muscles, runs laterally and ends in Adductor pollicis

Relations

1) Ulnar nerve passes superficial to Flexor retinaculum and terminates into superficial and deep branches

- 2) Superficial terminal branch supplies to palmaris brevis and gives two digital branches to supply medial $\frac{1}{2}$ fingers
- 3) Deep terminal branch passes between Flexor digiti minimi & Abductor digiti minimi then b/w opponens digiti minimi and Fifth metacarpal. Finally it ends in adductor pollicis

Branches

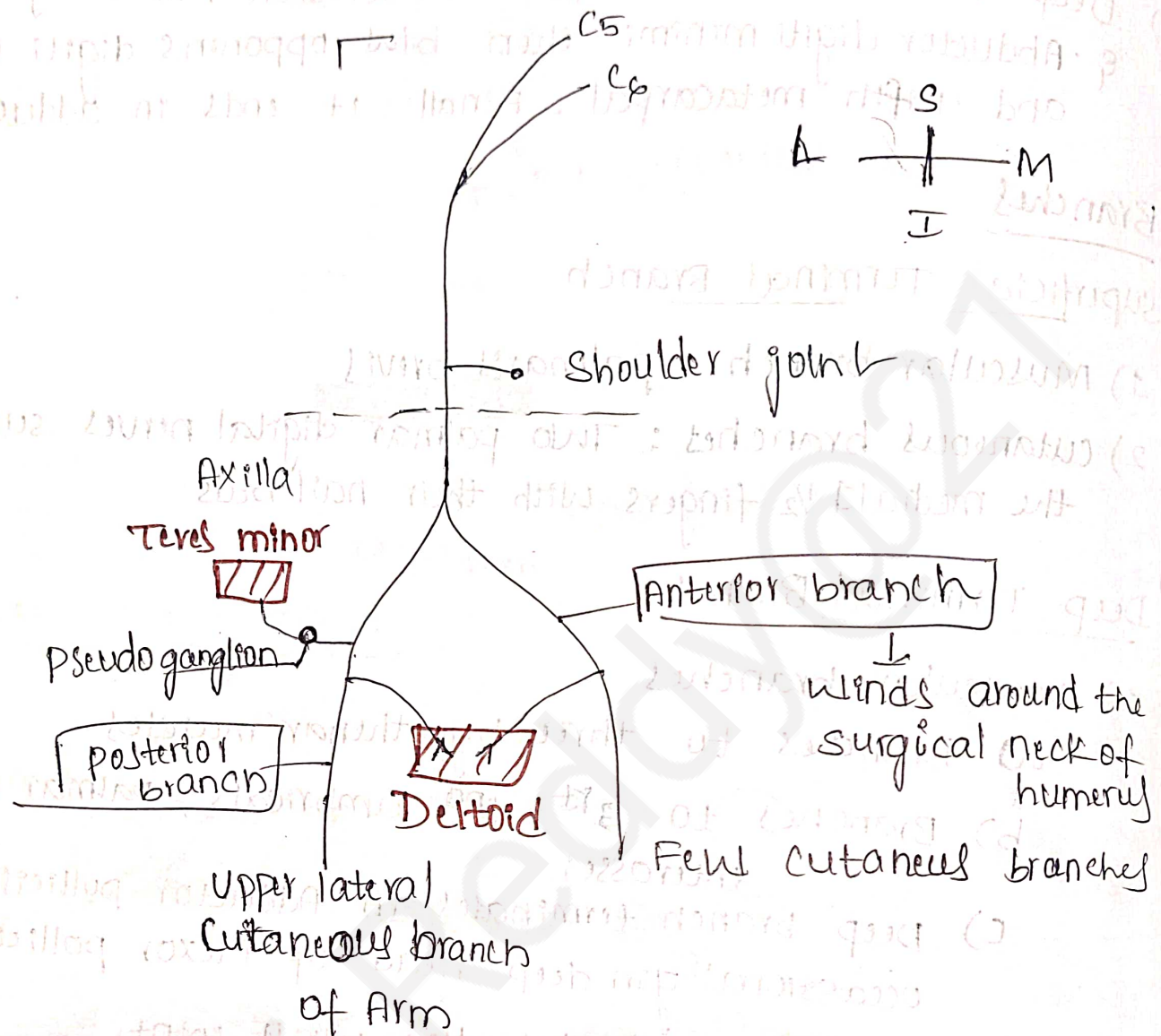
Superficial Terminal Branch

- 1) Muscular branch : palmaris brevis
- 2) Cutaneous branches : Two palmar digital nerves supply the medial $1\frac{1}{2}$ fingers with their nail beds

Deep Terminal Branch

- 1) Muscular branches
 - a) Branches to three hypothenar muscles
 - b) Branches to 3rd & 4th lumbricals, palmar & dorsal interossei
 - c) Deep branch terminates in Adductor pollicis and occasionally in deep head of Flexor pollicis brevis
- 2) Articular branch supplies the wrist joint.

Axillary Nerve



- # Injury** → Adducted Shoulder
- loss of sensation over lower half of Deltoid.