

## Muscles:

### II Upper limb:

#### a) Pectoral Region:

- |                     |                            |
|---------------------|----------------------------|
| 1) Pectoralis major | med./lat. pectoral nerves. |
| 2) Pectoralis minor | med. pectoral nerve        |
| 3) Subclavius       | nerve to subclavius.       |
| 4) Deltoid          | axillary nerve             |

#### b) Shoulder:

- |                      |  |
|----------------------|--|
| 1) Supraspinatus     | supra scapular nerve                     |
| 2) Infraspinatus     | supra scapular nerve.                    |
| 3) Subscapularis     | upper + lower subscapular nerve          |
| 4) Teres minor       | Axillary nerve.                          |
| 5) Teres major       | lower subscapular nerve                  |
| 6) Serratus anterior | long thoracic nerve → winging of scapula |

#### c) Anterior Compartment of Arm

- main supinator of arm. **II Biceps**
- Prime flexor of elbow joint. **II Brachialis** (small lateral part by radial nerve) → Musculocutaneous nerve
- penetrated by **III Coracobrachialis**
- musculocutaneous nerve.

#### d) Posterior Compartment of Arm

- Triceps brachii      Radial nerve by profunda brachii artery.

#### e) Anterior Compartment of forearm:

##### II Superficial layer:

- |                          |                |
|--------------------------|----------------|
| 1) Pronator teres        | } median nerve |
| 2) Flexor carpi radialis |                |
| 3) Palmaris longus       |                |
| 4) Flexor carpi ulnaris  | ulnar nerve    |

##### II Intermediate layer

- Flexor digitorum superficialis.      median nerve.

##### III Deep layer

- |                               |                             |
|-------------------------------|-----------------------------|
| 1) Flexor digitorum profundus | ulnar median + radial nerve |
| 2) Flexor pollicis longus     | median nerve                |
| 3) Pronator quadratus         | median nerve                |

## F) Posterior Compartment of forearm.

### 1) Superficial layer:

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

Radial nerve

radial nerve

### 2) Deep layer:

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

radial nerve

### g) Short muscles of the thumb

Flexor pollicis brevis

Abductor pollicis brevis

Opponens pollicis

median nerve

two heads

Adductor pollicis

Ulnar nerve

### h) Short muscles of little finger

Flexor digiti minimi

Abductor digiti minimi

Opponens digiti minimi

Ulnar nerve

### I) Lumbricals

1, 2 → Median

3, 4 → Ulnar

J) Palmar interossei → deep ulnar nerve.

k) Dorsal interossei → deep ulnar nerve.



## Veins and Arteries:

### \* Upper Limb

- Superficial:
- Cephalic vein → lateral
  - Basilic vein → medial
- end into axillary vein.
- \* they are connected by the median cubital vein

**Axillary artery:** - branched from subclavian artery

- gives a branch: brachial artery. (continues as)
- Starts from the level of the 1<sup>st</sup> rib → ends at the lower border level of teres major (lower border)
- Crossed by pectoralis minor dividing it to 3 parts each giving branches according to its number
- Related directly to brachial plexus throughout its course.

**Axillary vein:** - begins at the union of basilic vein and veins of brachial artery → lower border of teres major.

- medial to axillary artery
- Ends at the 1<sup>st</sup> rib as subclavian vein.
- Receives cephalic vein at the end.

**\*note:** axillary vein ends where axillary artery begins and vice versa.

**Brachial artery:** - Begins at the lower border of teres major and ends at the neck of radius to give → radial and ulnar arteries.

- Branches:

- 1 Profunda brachii artery

- 2 Superior ulnar collateral artery

- 3 Inferior ulnar collateral artery

- 4 Nutrient
- 5 Muscular.

- Course: to the medial nerve: (the nerve is)

- 1 Upper → lateral
- 2 Middle → anterior

- 3 Lower → medial

### - Ulnar Artery :

- larger branch of brachial artery.
- begins at the neck of the radius
- Superficial branch of it is larger than deep branch.
- Above Flexor retinaculum

#### \* Branches :

Common interosseous ┌ Anterior interosseous  
└ Posterior interosseous.

### - Radial Artery :

- Smaller branch of brachial artery.
- Within cubital fossa
- Deep to brachioradialis
- Deep branch larger than superficial branch

\* You can feel its pulse.

### - Palmar arches :

#### 1] Superficial:

- Mainly from superficial ulnar artery
- level of distal border of fully extended thumb.

#### 2] Deep:

- Mainly from deep radial artery
- proximal border of fully extended thumb



**Axilla:** ① Apex: borders: Clavicle, 1<sup>st</sup> rib, scapula

② Anterior wall: - Subclavius  
- Pectoralis Minor  
- Pectoralis Major

③ Posterior wall: - Subscapularis  
- Teres Major  
- Latissimus dorsi

④ Medial wall: - Upper 4 ribs  
- Intercostal spaces  
- Serratus anterior

⑤ Lateral wall: - Bicipital groove  
- Long head of biceps muscle

\*all have 3 components except the lateral wall because it is the narrowest.

\* Contents: Axillary: ① Artery ② Vein ③ Sheath ④ Lymph nodes.  
Brachial plexus.

\* Lymph nodes of the axilla:

① Anterior (pectoral) group:

- lateral 1/2 of the breast
- Abdominal wall above umbilical

② Posterior (Subscapular) group:

- the back down to the iliac crest

③ Lateral group:

- most upper limb except lateral side.

④ Central group: (at the center of axilla)

- From all previous groups

(between deltoid and pectoralis major) ⑤ Infraclavicular (deltopectoral) group

- From superficial parts of hand, arm, forearm

⑥ Apical group (at the apex)

- From all previous groups

\* Sends to subclavian lymph trunks.

\* we have: ① Thoracic duct ② Right lymphatic trunk.

### \* Spinal Cords

- Extend from base of skull → superior border of L2
- 3 coverings :
  - 1) Dura matter
  - 2) Arachnoid matter
  - 3) Pia matter.
- 2 enlargements :
  - 1) Cervical enlargement
  - 2) Lumbar enlargement → give plexuses

### \* Spinal segment : 31 in spinal cord

- two parts : (1) Inner Grey matter → Neurons  
(2) Outer white matter → axons

- \* Grey Matter :
  - Anterior Horn → motor cells
  - Posterior Horn → sensory cells

\* each spinal nerve leave through intervertebral foramen as a mixed nerve and outside it divides into

- anterior ramus (mixed) : anterior part of body
- posterior ramus (mixed) : posterior part of body.

- Ventral root → motor , dorsal root → sensory.

\* brachial plexus is from ventral ramus (mixed) (from C5 - T1)

### \* Brachial plexus :

- From the roots :
  - 1) Dorsal Scapular Nerve (C5)
  - 2) Long Thoracic Nerve (C5 - C7)

- From trunks :
  - 1) Suprascapular nerve
  - 2) Nerve to subclavius → Superior trunk.

Divisions : no branches

Cords :

- 1) lateral pectoral nerve (lateral cord)

### \* Terminal nerves

- |  |                                      |                    |
|--|--------------------------------------|--------------------|
| 1) Musculocutaneous nerve                | 2) Superior subscapular nerve        | → Posterior (cord) |
| 2) Median nerve → weakness in the wrist. | 3) Thoracodorsal nerve               |                    |
| 3) Radial nerve → wrist drop             | 4) Inferior subscapular nerve        |                    |
| 4) Ulnar nerve.                          | 5) Axillary nerve                    |                    |
|  | 6) Medial pectoral nerve             | → Medial cord      |
|  | 7) medial cutaneous nerve of arm     |                    |
|  | 8) medial cutaneous nerve of forearm |                    |



## Nerves:

### - Musculo-cutaneous nerve

- From lateral cord
- Pierces coracobrachialis muscle
- Sandwiched between brachialis and biceps brachii
- Continue as lateral cutaneous nerve of forearm.

Supplies: 3 muscles (anterior compartment)

- Skin
- elbow joint.

### - Ulnar nerve

- From medial cord
- Between axillary artery and vein ~~low~~
- Medial to brachial artery.
- Pierces intermuscular septum to posterior compartment and passes behind medial epicondyle.
- Accompanied by superior ulnar collateral artery
- Supplies **Nothing** in the upper arm.

### - Median nerve

- From 2 cords
- Superficial in the arm but it is deep to the biceptal aponeurosis.
- Supplies **Nothing** in the upper arm.

### - Radial nerve

- From posterior cord and is the largest branch.
- Leaves posterior compartment to pass anterior to the lateral ~~epi~~ epicondyle of the humerus
- Supplies all posterior compartment of the arm and of brachialis muscle (lateral part)

**Cubital Fossa:** - Borders: ① Laterally → Brachioradialis  
 ② Medially → pronator teres  
 ③ Base → intercondylar line.

- Floor: ① Brachialis  
 ② Supinator

- Contents: ① Median nerve  
 ② Brachial artery  
 ③ Bicipital tendon  
 ④ Radial nerve.

- Roof: Skin, Superficial fascia → Cephalic vein, basilic vein, median cubital vein  
 lateral cutaneous nerve of forearm, Bicipital aponeurosis  
 Medial cutaneous nerve of forearm.

### Carpal Tunnel:

- Carpal bones form a concave arch anteriorly bridged by a thickened band of deep fascia called Flexor retinaculum.
- It acts as a subway for long flexor tendons between forearm and hand.

### Flexor Retinaculum:

- Connection: laterally: Scaphoid + trapezium  
 Medially: Pisiform + hook of hamate.
- 6 structures pass ~~below~~ above it and 10 below it

### Snuff box:

- Borders: ① Medial: Extensor pollicis longus.  
 ② lateral: Extensor pollicis brevis  
 Abductor pollicis longus.
- Floor: Scaphoid.
- Content: Radial artery.

**Palmar aponeurosis:** Thickened deep fascia \* sends 2 septums to 5th digit  
 Apex → distal border of Flexor retinaculum  
 Base → 4 longitudinal bands → Fuse to proximal 4 medial fingers.



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- Borders:**
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  - Floor:**
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  - Contents:**
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    - ② Brachial artery
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  - Abductor pollicis longus.

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- **Content:** Radial artery.

**Palmar aponeurosis:** Thickened deep fascia \* sends 2 septums to 5<sup>th</sup> + 3<sup>rd</sup> MC

Apex → distal border of Flexor retinaculum

Base → 4 longitudinal bands → Fuse to proximal phalanx 4 medial fingers.

## Nerves in the forearm:

### [1] Median nerve:

- Enters cubital fossa
- Pierces pronator teres
- Between FDS and FDP
- below + lateral to palmaris longus
- Deep to flexor retinaculum

#### \* Branches:

- Anterior interosseous nerve

- Palmar branch → skin.

#### \* Supplies:

- All muscles in the anterior compartment except 1 + 1/2 by ulnar nerve

- Skin of the hand (lateral 2/3 of palm)
- Elbow, wrist and distal radioulnar joints.

### [2] Ulnar nerve:

- behind medial epicondyle
- between two heads of FCU
- lateral to pisiform bone and medial to ulnar artery
- Above flexor retinaculum.

#### \* Branches:

- Palmar → medial 1/3 of palm
- Dorsal → medial 1/3 of hand.

#### \* Supplies:

- 1, 1/2 muscles in anterior compartment

- Skin
- Elbow joint.

### [3] Radial nerve:

- Anterior to lateral epicondyle
- Between brachialis and brachioradialis.

#### \* Branches:

- Superficial branch
- Deep branch.

#### \* Supplies from stem:

- Brachioradialis

- Ext. Carpi radialis longus
- Elbow joint.



### \* Superficial Radial Nerve:

- within the cubital fossa
- Under brachioradialis
- posterior to the wrist

Supplies: Skin of lateral 2/3 of 2/3 of hand.  
Skin of distal phalanges of 3 1/2 fingers

### \* Deep Radial Nerve:

- Within cubital fossa
- Pierces supinator muscle
- Wind around neck of radius
- Reach posterior compartment
- Pass between superficial and deep group of muscles.

\*Supplies: - All posterior compartment except 2 muscles by stem  
- Wrist joint.