

In this lecture we will talk about the bones of the hand, and the muscles and contents of the forearm.

***The hand bones are:**

- Carpal bones.
- Metacarpals.
- Phalanges.



***The carpal bones (wrist bones):**

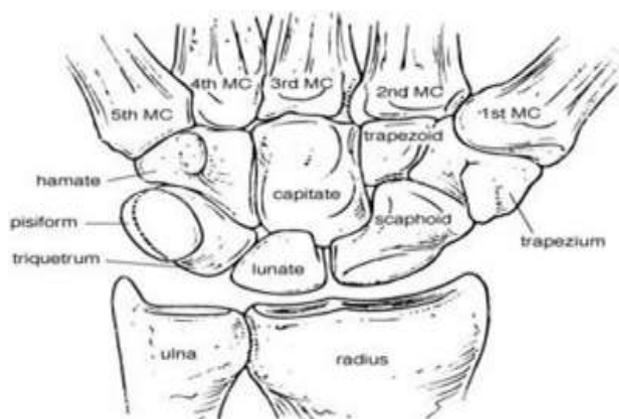
They are short bones, 8 in number, and they are arranged in two rows; proximal row consisting of 4 bones, and distal row consisting of 4 bones.

These bones are named from lateral to medial side as follows:

- Proximal row: 1- Scaphoid الزورقية 2- Lunate القمرية
3- Triquetrum المكعبة 4- Pisiform المدورة
- Distal row: 1- Trapezium المعينية 2- Trapezoid شبه المعينية
3- Capitate المشنوقة 4- Hamate [with hook].

[[Sally Leaning Towards Peter To Take Cold Hand]]

[[سالي لازم تلعب بوكر تكسب تخسر كلو هلس]]



The carpal bones are united with each other through joints, so their anterior surface is concave and their posterior surface is convex creating concavity. This concavity is changed into a passage way by a thickened part of the deep fascia that cross over the carpal bones which is called *Flexor Retinaculum* (Retinaculum means band) converting this concavity into a passage way called the *Carpal Tunnel*.

The carpal tunnel is a passage way for long flexor tendons passing from the forearm to the hand to direct their pull while in action.

*Metacarpals:

(Meta: after → metacarpals: after carpals)

They are 5 in number, and named from lateral to medial:

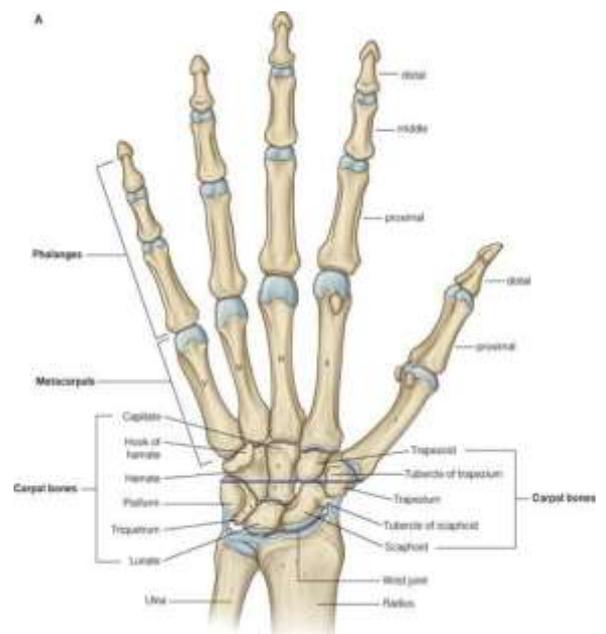
1st, 2nd, 3rd, 4th, 5th.

*Phalanges:

Proximal, middle, and distal.

** The thumb has only two phalanges:

Proximal and distal.



*Compartments of the forearm:

The forearm is covered from the outside by skin. Below the skin we have superficial fascia. Below the superficial fascia we have deep fascia; to hold the contents of the forearm.

The deep fascia will send septum to the radius, and short septum to the ulna. So by the lateral septum, medial septum, the ulna, the radius and the interosseous membrane -between radius and ulna-, the Anterior compartment and posterior compartment.

The anterior compartment:

Is called *Flexor Pronator* compartment, it contains muscles whose function is either flexion or pronation.

- Its muscles are originated from medial epicondyle of humerus (CFO).
- Nerve supply: Ulnar and Median nerves.

The posterior compartment:

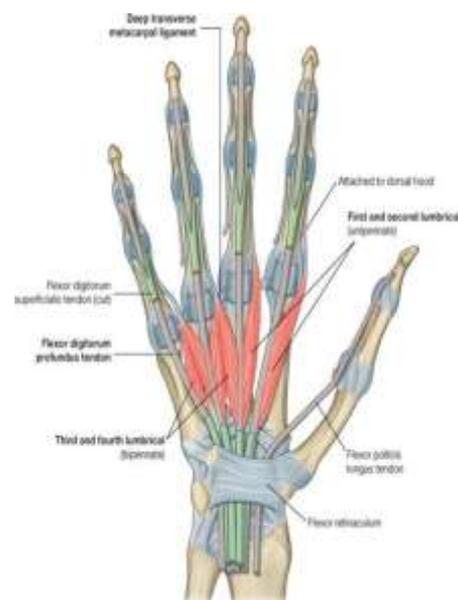
- Is called *Extensor Supinator* compartment, it contains muscles -- whose function is either extension of wrist joint or supination.

- Its muscles are originated from lateral epicondyle of humerus (CEO)
- Nerve supply: Radial nerve.

*Flexor Retinaculum:

A thickened part of the deep fascia anterior to the wrist joint, extending from lateral to medial from S-T to P-H (Scaphoid and Trapezium lateral, to Pisiform and Hamate medial), and it is bridging the concavity of the carpal tunnel.

There are 6 structures passing above the bridge and 10 structures passing below the bridge (passing below → tendons and one nerve (Median nerve)).



Function: Hold long flexor tendons to direct their pull while in action.

****Note:** A hard work using the hand like typing will cause thickening of the *Flexor Retinaculum* which will compress the underlying structures and especially the median nerve, which will make loss of sensation in the hand [Carpal Tunnel syndrome].

*Muscles of the anterior compartment of the forearm:

This compartment is divided into three layers:

1- Superficial layer → 4 muscles.

2- Middle layer → 1 muscle.

3- Deep layer → 3 muscles.

-Muscles of the superficial layer:

Muscle	Origin	Insertion	Action	Nerve supply
Pronator Teres	CFO	Midshaft of radius	Pronation of forearm	Median n.
Flexor Carpi Radialis	CFO	2 nd and 3 rd metacarpal bones	Flexion of the wrist at the radial side	Median n.
Palmaris longus	CFO	Flexor Retinaculum & Palmar aponeurosis	Flexion of the wrist	Median n.
Flexor Carpi Ulnaris	CFO	Pisiform, Hamate and 5 th metacarpal bones	Flexion of the wrist at the ulnar side	Ulnar n.

- Palmaris aponeurosis is a triangular shaped aponeurosis formed of thickened deep fascia to protect the underlying structures.

- The radial artery is located between the brachioradialis and flexor Carpi radialis; so to locate the radial artery we find it lateral to flexor Carpi radialis and medial to brachioradialis.

- The median nerve is lateral to the Palmaris longus.
- The ulnar artery is lateral to ulnar nerve which is lateral to flexor Carpi ulnaris.
- The radial artery supplies the flexor Carpi radialis.

**Note: falling on glass may cause a *cut wrist*, and in order to treat it you should know what are the structures involved in the injury; which are medial and which are lateral.

Muscles of the intermediate layer:

Consists of 1 muscle: Flexor digitorum superficialis.

(Flexor: flexion, digitorum: digits=fingers, superficialis: superficial), so it is the superficial muscle that flexes the fingers.

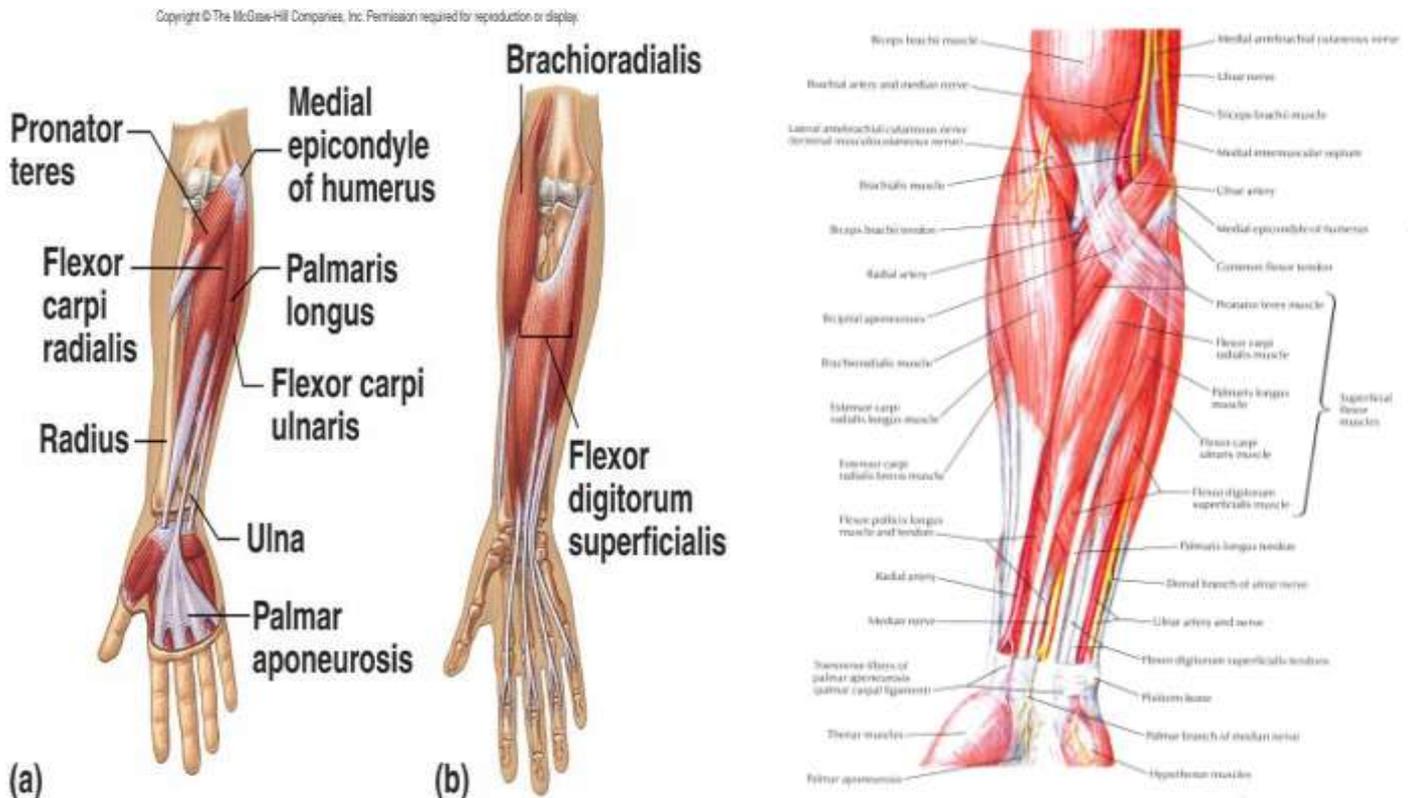
Origin: Medial epicondyle of the humerus, ulna, and radius (3 origins).

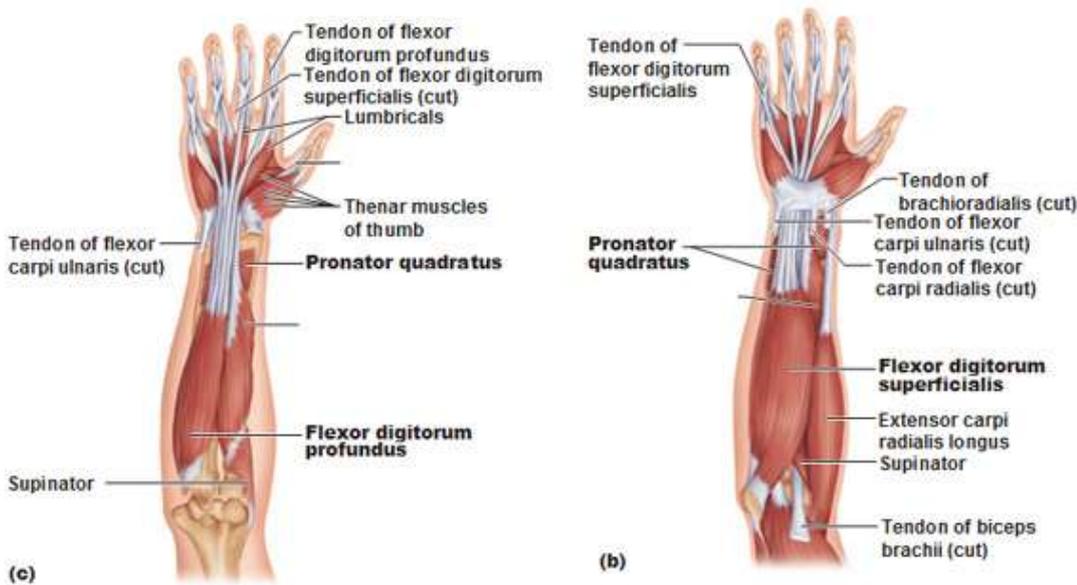
Insertion: The muscle divides into 4 tendons to pass below flexor Retinaculum, then they will go to the medial 4 fingers (index, middle, ring, and little fingers), to insert into the middle phalanges of the medial 4 fingers.

Action: Flexion of the middle phalanges of the medial 4 fingers.

Nerve supply: Median nerve.

[Now there are 4 tendons passing below the flexor Retinaculum]





Muscles of the deep layer:

Muscle	Origin	Insertion	Action	Nerve supply
Flexor digitorum profundus	Ulna and interosseous membrane	Divide into 4 tendons to pass below flexor Retinaculum to insert on the distal phalanges of the medial 4 fingers	Flexion of the distal phalanges of the medial 4 fingers (to form a firm grip)	2 tendons at the ulnar side: ulnar nerve. 2 tendons at radial side: median nerve.
Flexor pollicis longus	Radius and interosseous membrane	pass below flexor Retinaculum to insert on distal phalanx of the thumb	Flexion of the distal phalanx of the thumb	Median nerve
Pronator quadratus	Distal quarter of ulna	Distal quarter of radius	Pronation (the radius cross the ulna)	Median nerve

- Now 9 tendons pass below the flexor Retinaculum.
- All the muscles in the anterior compartment of the arm are supplied with the median nerve except a muscle and a half which are the flexor Carpi ulnaris muscle, and 2 tendons of the ulnar side (little and ring fingers) of flexor digitorum profundus muscle.



"إذا رفضت كل ما هو دون مستوى القمة فإنك دائما تصل إليها"

سومرست موم

