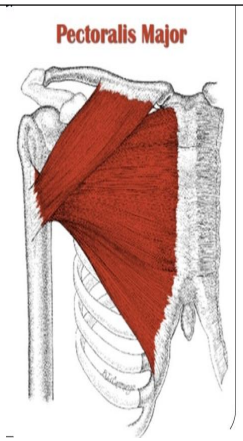
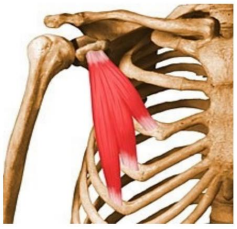
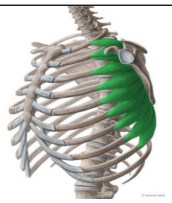
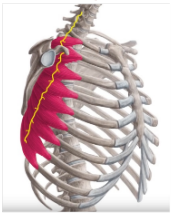
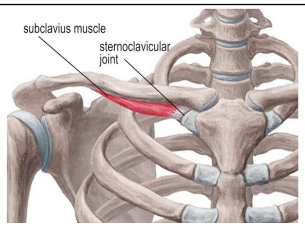
- Any muscle Attached to bicipital groove : Adduction & medial rotation.

Pectoral Region Muscle

		Origin	Insertion	Action	Nerve Supply
Pectoralis Major		**. Clavicular head** Anterior border, medial 2/3 clavical **.Sternocostal head** Anterior border of sternum & Upper 6 costal cartilages	Lateral lip of bicipital groove .	. Medial rotation & Adduction for Arm . Flexion for the Arm . Raise the trunk in climbing – sternocostal head .	Medial & Lateral Pectoral Nerves .
Pectoralis Minor		Outer surface of the 3rd ,4th , 5th ribs – close to their costal cartilages	Coracoid process of the scapula	. Protraction for the scapula . Depresses the shoulder . Elevates the ribs if the scapula is fixed	Medial Pectoral Nerve
Serratus Anterior **Any paralysis in this muscle cause → Winging of the scapula** 		Outer surface of the upper 8 ribs .	Ventral lip of the medial border of the scapula	. Protraction of the scapula . Rotate the scapula upward during raising the arm above the head > 90	Long Thoracic Nerve . 
Subclavius muscle		----------	----------	. Depresses the clavicle . Steadies the clavical during movements of the shoulder girdle .	**Nerve to subclavius** from the upper trunk of brachial plexus

nerve to serratus anterior.

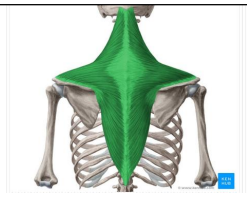
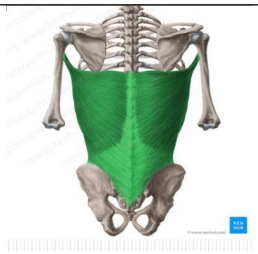
* Clavipectoral Fascia: - is the strong sheet of connective tissue.

- Attachement: Above: to clavicle.

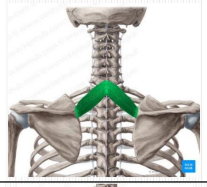
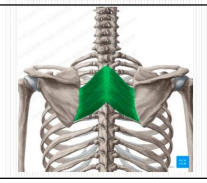
Below: it split to enclose the pectoralis minor muscle & continue downward as [ligament of axilla].

It form (arm pit) when arm is abducted.

Back Muscle – Superficial Layer

		Origin	Insertion	Action	Nerve Supply
Trapezius Paralysis in this muscle cause→ Dropping of the shoulder 	 	.External occipital protuberance  .Ligamentum Nuchea  .All the thoracic spines	. Posterior border, lateral third of clavicle . Medial border of Acromion . Upper border of the spine	. Elevation . Rotate the scapula . Retract	. Spinal accessory Nerve 
Latisssmus Dorsi		. Lower six thoracic vertebra . Iliac crest of hip bone . Inferior angle of the scapula	Floor of the bicipital groove	. Adduction . Medial rotation . Extension of the arm -Swimming .	.Thoracodorsal Nerve (C6,7,8)

Back Muscle – Deep Layer

		Nerve Supply	Action
Levator Scapula		Dorsal Scapular Nerve	. Retraction & Elevation . when shoulder is fixed the muscle laterally flexes the neck
Rhomboids Minor		Dorsal Scapular Nerve	. Retraction
Rhomboids Major		Dorsal Scapular Nerve	. Retraction

The Axilla: lies between the upper humerus & thorax / It has: floor / apex / 4 walls.

Apex: toward root of the neck. continue with posterior triangle of neck through (cervico-axillary canal).

- base: is formed by the skin & fascia.

walls

Anterior: Pectoralis major / minor / subclavius.

Posterior: subscapularis (teres major & latissimus dorsi.

medially: serratus anterior / Ribs

Laterally: Humerus / biceps & coracobrachialis muscle.

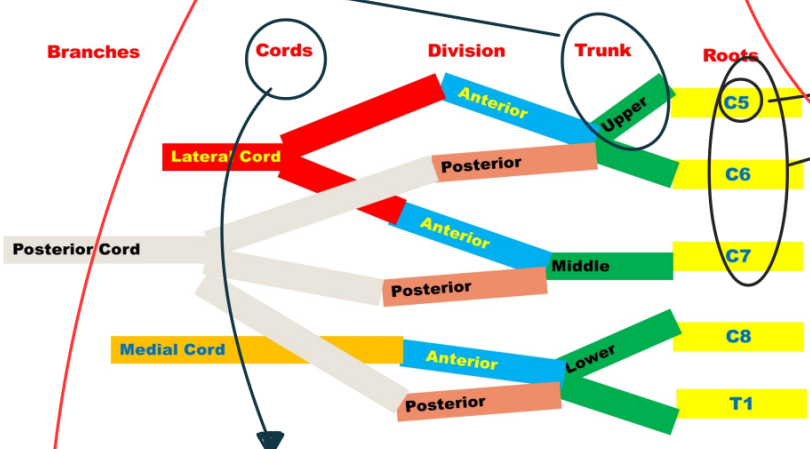
- The anterior axillary fold: Pectoralis major.

- The posterior axillary fold: latissimus dorsi & teres major

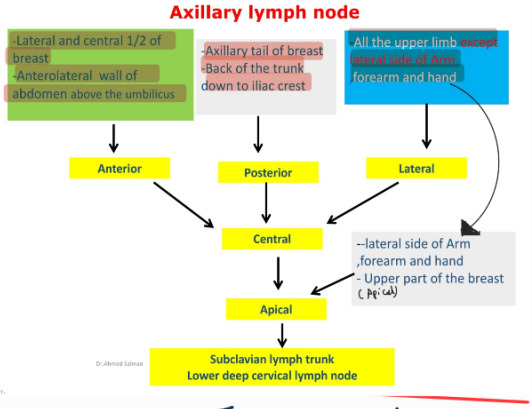
- content of it: Axillary Artery / vein / lymph node / Brachial plexuses / Axillary tail of breast).

Branches of upper trunk: (5, 6)
- suprascapular nerve.
- nerve to subclavius.

- It is formed from ventral rami of C5, 6, 7, 8, T1
- 4 stages: Roots → Trunk → Division → Cords.



Division from Roots:
- Dorsal scapular nerve.) medial border of scapula.
- Long thoracic nerve.



Branches of cords:

Lateral cord	Medial cord
1-Lateral Pectoral nerve C5, 6, 7	1-Medial Pectoral nerve C8, T1
2-Lateral root of Median nerve C5, 6, 7	2-Medial root of Median nerve C8, T1
3- Musculcutaneous nerve C5, 6, 7	3-Medial cutaneous nerve of the arm C8, T1
	4-Medial cutaneous nerve of the forearm C8, T1
	5-Ulnar nerve C7, 8, T1

- Posterior cord:

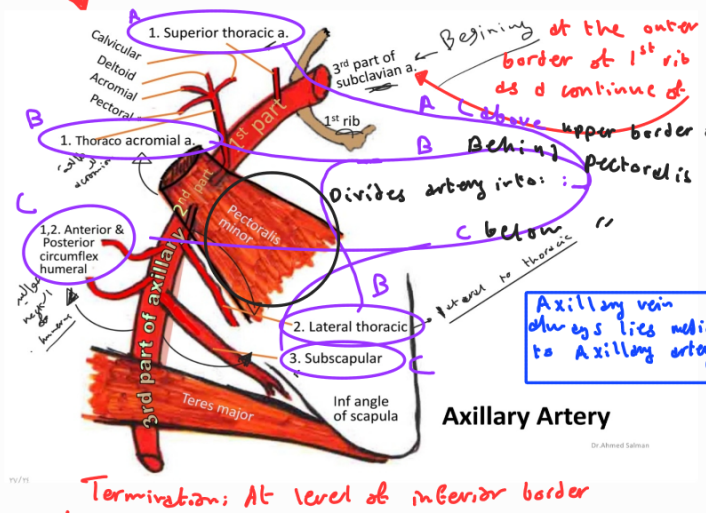
① upper subscapular nerve: C5, 6

② lower subscapular nerve: C5, 6

③ Axillary nerve: C5, 6

④ Thoracodorsal nerve: C6, 7, 8

⑤ Radial nerve: C5, 6, 7, 8, T1



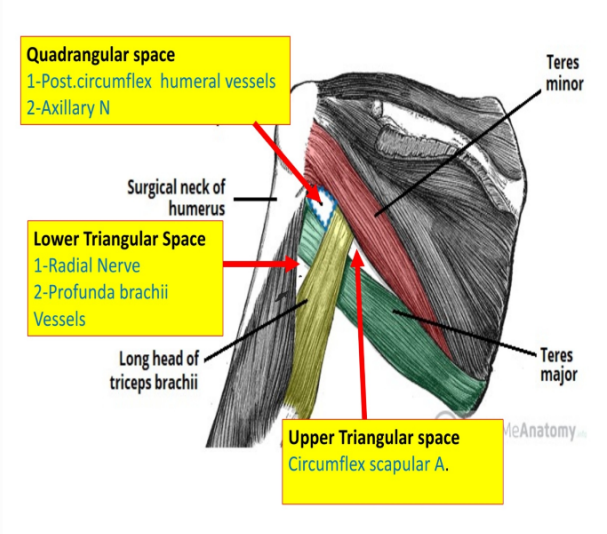
A Beginning at the outer border of 1st rib as a continue of subclavian a.
A Above upper border of pectoralis minor.
B Behind pectoralis minor.
C below " ".
Divides artery into: :
Lateral to thoracic

Axillary vein always lies medial to Axillary artery

Termination: At level of inferior border of teres major to be brachial artery.

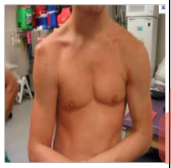
A / B ⇒ are related to: cords of brachial plexus.
C ⇒ is " " branches of cord of ".

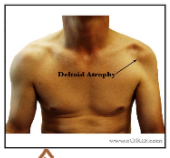
spaces around the shoulder:

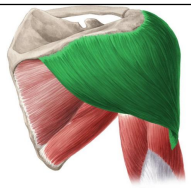
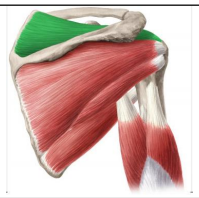
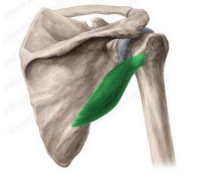


3

Muscles of the shoulder





		Origin	Insertion	Action	Nerve supply
Deltoid **Deltoid muscle paralysis :** . Atrophy of the shoulder . Unable to abduct the arm to 90.		*opposite insertion of trapezius . .Lower border of the spin of scapula . Lateral border of acromion . Anterior border of the lateral half of the clavicle	. Deltoid tuberosity in humerus .	. Anterior fiber: flexes & medial rotates the arm . . Middle fibers: Abduction of the arm (15 - 90) . Posterior fiber : Extents & laterally rotates the arm	. Axillary Nerve
Supraspinatus		. Supraspinous fossa	. Greater tuberosity of the humerus – upper impression .	Initiates abduction of the arm (0- 15)	. Suprascapular Nerve
Infraspinatus		. Infraspinous fossa	. Greater tuberosity – middle impression .	. Lateral rotation of the arm .	.Suprascaoular Nerve
Teres Minor		. Dorsal aspect of lateral border of the scapula – upper 2/3 thirds .	. Greater tuberosity – lower impression .	. Adduction & lateral – external- rotation of the arm .	. Axillary Nerve
Teres Major		. Dorsal surface of the scapula above the inferior angle.	. Medial lip of the bicipital groove .	. Medial rotation & Adduction	. Lower subscapular Nerve
Subscapularis		. Subscapular fossa	. Lesser Tuberosity	. Adduction & Medial rotation of the arm .	. Upper and lower subscapular Nerve

-Rotate cuff: muscle attached to greater & lesser tuberosities / They blends with capsule of shoulder joint to strength it.

1. Supraspinatus.
2. Infraspinatus
3. Teres minor
4. Subscapularis.

– Rotator cuff tendinitis:

- pain & swelling in shoulder area.
- limited motion of arm.
- weakness of arm.

– It occur mostly in athletes playing sports that require lifting their arm over their head as:
- swimmer's shoulder.
- pitcher's shoulder.
- tennis shoulder.

– Sub acromial Bursa:

– situated between:
- Above: A- coracoacromial arch. B- Deltoid muscle.
- Below: A - supraspinatus tendon B- Greater tuberosity.

– Function: 1- Protection (supraspinatus).
2- Helping (Abduction).

زي كتفي لما تنزله بوجع ولما ترفعو لفوق (زي لما بدك تشارك) بروح الوجع.

– Subacromial Bursitis: through: Dawbarn's test : Arm by side ⟹ Pain.
Arm angle abduction ⟹ No pain

– Abduction of the Arm:

① 0 – 90 (movement of humerus):
- 0 – 15 : Supraspinatus.
- 15 – 90 : Deltoid.

② 90 – 180 (Rotation of scapula):
- Trapezius.
- Serratus anterior.

– Axillary Nerve:

- It arise from posterior cord of brachial plexus
- winds arounds surgical neck of humerus
- ends under Deltoid muscle by dividing into:
  - Anterior: (Motor): Deltoid & teres minor muscle.
  - Posterior (sensory): To skin over the lower half of Deltoid muscle.

* Axillary Nerve injury:

① Causes:
- compression by cruch.
- Fracture of surgical neck of humerus.

② manifestations:
Loss of power of abduction of the shoulder.

③ Deformity: تشوه
Atrophy of the shoulder.

Origin and insertion for shoulder muscles

MUSCLE	ORIGIN	INSERTION
Deltoid	Opposite insertion of trapezius	Deltoid tuberosity
Supraspinatus	Supraspinous fossa	**Greater Tuberosity**
Infraspinatous	Infraspinous fossa	**Greater Tuberosity**
Teres minor	Dorsal,lateral ,scapula	**Greater Tuberosity**
Teres major	Dorsal,inferior angle ,scapula	Medial lip bicipital grove
Subscapularis	Subscapular fossa	lesser Tuberosity

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Nerve supply and action for shoulder muscles

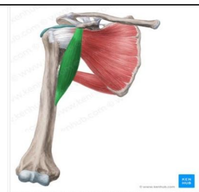
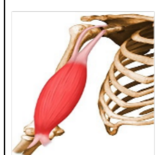
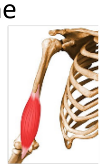
Supraspinatus (ABDUCTION) 0- 15	Suprascapula Nerve
Infraspinatous *(Lateral Rotation)*	
Teres minor *(Lateral Rotation)*	Axillary Nerve
Deltoid (ABDUCTION) 15-90	
Subscapularis **Teres major** **(Medial Rotation ,adduction)**	**Subscapular Nerve**

Dr. Ahmed Salman

	Origin	Insertion	Nerve Supply	Action
Deltoid	opposite insertion of trapezius	Deltoid tuberosity	Axillary	ABDUCTION
Supraspinatus	supraspinatus fossa	greater tuberosity	suprascapular nerve	ABDUCTION
Infraspinatus	infraspinatus fossa	greater tuberosity	suprascapularis nerve	lateral rotation
Teres Minor	Dorsal	greater tuberosity	Axillary	lateral rotation
Subscapularis	subscapularis fossa	lesser tuberosity	subscapularis nerve	Adduction & medial rotation
Teres Major	Dorsal inferior angle	medial lip of bicipital	subscapularis nerve	Adduction & medial rotation

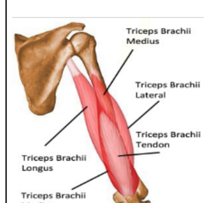
Muscles of the arm – Front ⟹ flexor

- All are supplied By: Musculocutaneous nerve.

		Origin	Insertion	Action	Nerve supply
Corachbrachialis		. Coracoid process of scapula	. Middle of the medial border of the humerus	. Flexion of the arm	. Musculocutaneous Nerve
Biceps brachii		Two head : .Short (medial) head : coracoid process .Long (lateral) head : supraglenoid tubercle *within the capsule of the shoulder joint*	. Radial tuberosity of radius . 	. Flexion of the arm . Flexion of the elbow . supinator of the semi-flexed forearm . (زي لما تفتح برغي)	. Musculocutaneous Nerve
Brachialis (humerus)		. Lower ½ of the front of the humerus 	. Coronoid process of the ulna and ulnar tuberosity	. Main flexor for the forearm	. Musculocutaneous Nerve . Radial nerve supplied the lateral fibers

Muscles of the arm – Back (extensor)

humerus is supplied by Radial nerve.

		Origin	Insertion	Action	Nerve supply
Triceps brachii		Has 3 heads: . Long head : Infraglenoid tubercle . . Lateral & medial head : posterior surface of the humeral shaft .	. Olecranon process of the ulna	. Main extensor of the forearm	. Radial Nerve 

- cubital fossa: Triangular area in front of elbow joint.
- laterally: brachioradialis muscle.
- medially: pronator teres muscle.
- Apex: brachioradialis overlapping pronator teres.
- Base: An imaginary line from the medial & lateral epicondyles.
- Floor: Brachialis medially & supinator laterally.
- Roof: skin & superficial fascia containing basalic, cephalic & medial cubital vein.

content:
- median nerve.
- Biceps tendon.
- Radial nerve.
- Termination of brachial artery & begining of radial & ulnar arteries.

ulnar (cubital) tunnel: is a fibro-osseous space located on the posteriomedial aspect of the elbow.

هو اللي بنقل ulnar nerve من ال Arm لل Forearm

-General Rule for the front compartment:

insertion in Radius ⇐ Pronation

① Pronation means medial rotation of forearm by movement of Radius at radioulnar joint.

② Origin: All superficial & intermediate: originate from common flexor origin (front of medial epicondyle).
Except: Pronator teres / flexor digitorum superficialis & flexor carpi ulnaris ⇒ additional origin.

③ insertion:- Carpi ⇒ into carpal or metacarpal bone.
- Digitorum ⇒ medial 4 finger.
- Pollicis ⇒ Thumb.

Muscles of the Anterior compartment of the forearm – Superficial

		Origin	Insertion	Action	Nerve Supply
Pronator teres		2 heads 1: common flexor origin – medial epicondyle . 2: from additional origin	. Lateral surface of the radius shaft	. Pronation of the forearm . يساعد . Assists in flexion of the elbow joint .	. Median Nerve
Flexor carpi radialis		-------------------	. Bases of the 2nd , 3rd metacarpal bones	. Flexion of the wrist Joint . . Abduction of the hand	. Median Nerve
Plmaris longus Palmer aponeurosis  		-------------------	-----------------	. Flexion of the wrist joint . A tensor of the palmar fascia .	. Median Nerve
Flexor carpi Ulnaris		2 heads : . Common flexor origin . Ulnar head	. Pisiform bone . Base of the 5th metacarple bone	. Adduction of the hand . Flexion of the wrist joint	. Ulnar Nerve

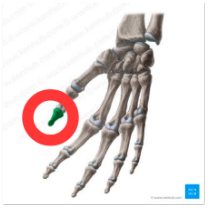
④ Action: main function: flexion / pronation / medial rotation.
- Radialis: Abduction of hand.
Ulnaris: Adduction of hand.

⑤ Nerve supply: All superficial & intermediate: By median nerve. // Deep : By Anterior interossus nerve (branch from median nerve).
Except: flexor carpi ulnaris & medial half of flexor digitorum profundus ⇒ By Ulnar nerve.
mean deep

Muscles of the Anterior compartment of the forearm – Intermediate

		Origin	Insertion	Action	Nerve supply
Flexor digitorum superficialis		2 head : . Common flexor origin . Radial head	Has 4 tendons inserted into **middle** phalanx of the medial 4 fingers	. Flexion for : . Wrist . Metacarpophalangeal .proximal interohalangeal joints for the medial 4 fingers	. Median Nerve

Muscles of the Anterior compartment of the forearm – Deep

		Origin	Insertion	Action	Nerve supply
Flexor digitorum proufundus		----------	4 tendons inserted into the bases of the **distal** phalanges of the medial 4 fingers	. Flexor for : . Wrist . Distal & proximal interphalangeal joints of the 4 medial 4 fingers	.Medial part : Ulnar Nerve . Lateral part : Anterior interosseous branch of the median nerve
Flexor pollicis longus		----------	. Base of the terminal phalanx of the thump 	. Assist in flexion of the wrist joint. . flexion of the metacarpophalangeal & interphalangeal joints of the thumb	. Anterior interosseous branch of the median nerve
Pronator Quadratus		. Anterior surface of the ulna	. Anterior surface of the radius	. Main pronator of the forearm	. Anterior interosseous branch of the median nerve

- Flexor Retinaculum: It is ethickened strong fibrous crosses in front of the carpus & converts its anterior concavity into carpal tunnel.

Lateral medial

- Attachement: STOP
  - Scaphoid
  - Trapezium
  - Pisiform
  - Os of Hamate

Structures pass superficial to flexor Retinaculum: 2U 3P

- Ulnar artery / Ulnar nerve
- Palmar cutaneous branch of Ulnar nerve.
- // // // median nerve.
- Palmaris longus.

Structures pass deep to the retinaculum

(through the carpal tunnel)

1. Tendons of flexor digitorum superficialis.
2. Tendons of flexor digitorum profundus.
3. Common synovial sheath for the tendons of flexor digitorum superficialis and profundus.
4. Tendon of flexor pollicis longus and its synovial sheath.
5. Median nerve.
6. Tendon of flexor carpi radialis in **a special compartment**

Muscles of the forearm – Lateral

Carpal Tunnel

Boundaries

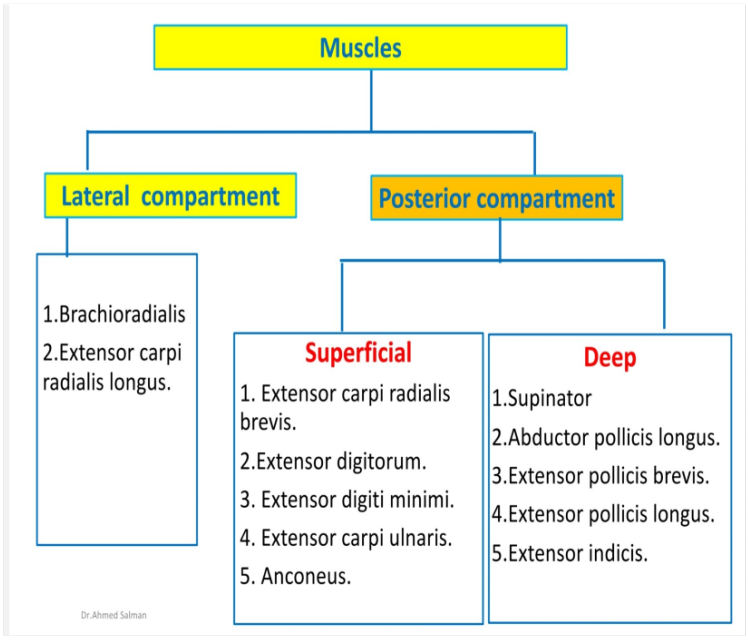
Carpals bone concavity anteriorly

Flexor retinaculum covers it

Content :

1. Tendons of flexor digitorum superficialis.
2. Tendons of flexor digitorum profundus.
3. Common synovial sheath for the tendons of flexor digitorum superficialis and profundus.
4. Tendon of flexor pollicis longus and its synovial sheath.
5. Median nerve.
6. Tendon of flexor carpi radialis in **a special compartment**

		Origin	Insertion	Action	Nerve supply
Brachioradialis		. Upper 2/3 of the lateral supracondylar ridge	. Base of the styloid process of the radius	. Flexes the elbow joint - when the forearm is in the midprone position .Initiates pronation or supination of the forearm	. Radial Nerve
Extensor carpi radialis longus		----------	. Base of the 2nd metacarpal bone	. Extension of the wrist . Abduction of the hand	. Radial Nerve



General Rules (lateral and posterior forearm)

1- Supination means Lateral rotation of the forarm by movement of radius at radioulnar joint

2-Origin

- All lateral compartment muscles originate from lateral supracondylar line
- **All superficial muscles of posterior compartment** take origin from the common extensor origin (***front of the lateral epicondyle***) ***EXCEPT*** **Anconeus (from back lateral epicondyle)**

3-Action

Is mainly extension

4-Nerve Supply

-All **lateral compartment muscles** are supplied **radial nerve**

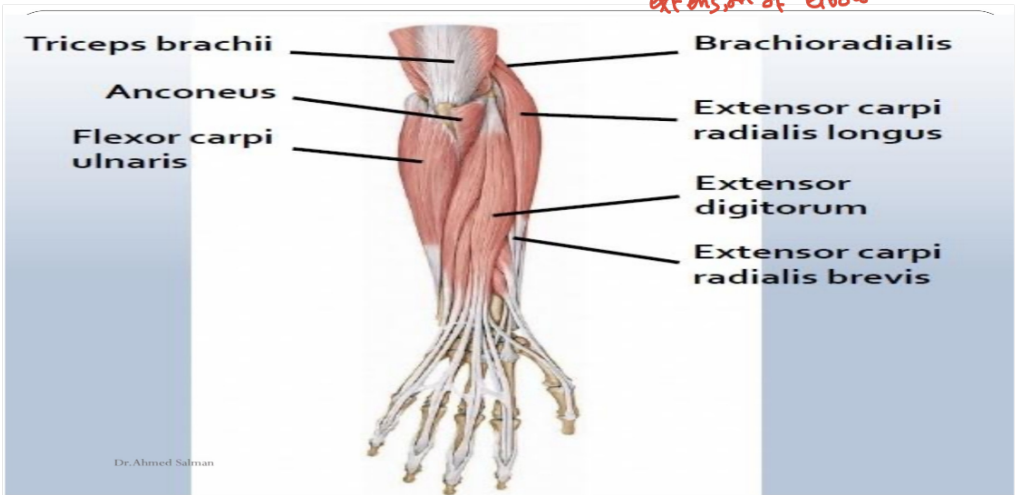
-All **posterior compartment muscles** are supplied by **deep branch of radial nerve** (posterior interosseous nerve) **EXCEPT Anconeus**

(By radial nerve)

DR AHMED SALMAN

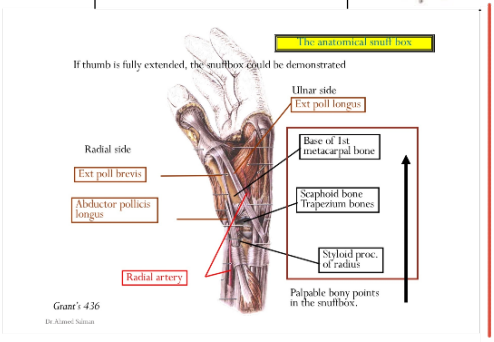
Posterior compartment muscles of the forearm – Superficial group

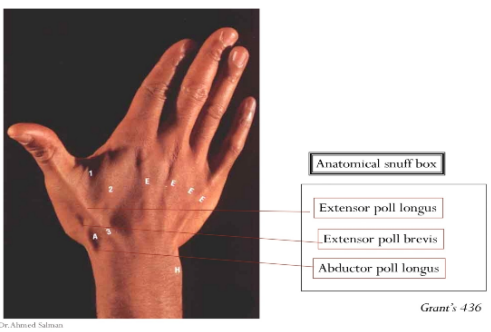
		Origin	Insertion	Action	Nerve supply
Extensor carpi radialis Brevis		----------	. Base of the 3rd metacarpal bone .	. Extension of the wrist joint . Abduction of the hand	. Deep branch of the Radial Nerve – posterior interosseous nerve .
Extensor Digitorum		----------	. 4 tendons which join the extensor expansion of the medial 4 fingers	.Help in extension of the wrist . Extends : .Metacarpophalangeal & Interphalangeal joints of the medial 4 fingers	. Deep branch of the Radial Nerve – posterior interosseous nerve .
Extensor digiti minimi		----------	. The tendon join the extensor expansion of the little finger	.Help in extension of the wrist . Extends : .Metacarpophalangeal & Interphalangeal joints of little finger.	. Deep branch of the Radial Nerve – posterior interosseous nerve .
Extensor carpi ulnaris		----------	.Base of the 5th metacarpal bone	. Extension of the wrist . Adduction of the hand	. Deep branch of the Radial Nerve – posterior interosseous nerve .
Anconeus	----------	----------	----------	Help triceps in extension of elbow	Radial nerve



Posterior compartment muscles of the forearm – Deep group

		Origin	Insertion	Action	Nerve supply
Supinator		----------	. Front & lateral and posterior surfaces of the upper 1/3 of the **radius**.	. Supination the forearm	. Deep branch of the Radial Nerve – posterior interosseous nerve . 
Abductor pollicis longus		----------	. Base of the 1st metacarpl bone	. Abducts and extends thumb	. Deep branch of the Radial Nerve – posterior interosseous nerve .
Extensor pollicis brevis		----------	. Base of the proximal phalanx of the thumb	. Extends Metacarpophalangeal joint of the thumb	. Deep branch of the Radial Nerve – posterior interosseous nerve .
Extensor pollicis longus Thumb		----------	. Base of the distal phalanx of the thumb	. Extend the distal phalanx of the thumb	. Deep branch of the Radial Nerve – posterior interosseous nerve .
Extensor Indicis index		----------	. Tendon joins the extensor expansion of the index finger	. Extends all the joints of the index finger .	. Deep branch of the Radial Nerve – posterior interosseous nerve .



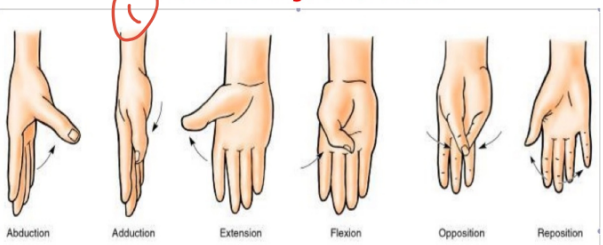


Position: it is a hollow on the lateral part of the wrist.
Boundaries: can be identified when the thumb is abducted and extended.
Laterally (anteriorly): The tendons of abductor pollicis longus and extensor pollicis brevis.
Medially (posteriorly): The tendon of extensor pollicis longus.
Floor:
Scaphoid and trapezium.
Content:
1. The radial artery
2. Beginning of the cephalic vein.
3. The superficial terminal branch of the radial nerve.

Hand

1

Thumb and fingers Movements .



(d) Metacarpophalangeal joints of the fingers (not the thumb)

2

Muscles of The Hand
20 Muscles

Lateral(Thumb)	Central	Medial (little finger)
1-Adductor Pollicis **2-Thenar Muscles** ➢Abductor Pollicis Brevis ➢Flexor Pollicis Brevis ➢Opponens pollicis	4 Lumbercalis 4 Dorsal Interossei 4 Palmar interossei	1-Palmaris Bervis **2- Hypothenar Muscles** ➢Abductor digiti minimi. ➢Flexor digiti minimi. ➢Opponens digiti minimi

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3

Nerve Supply

All Muscles of the hand are supplied by **ULNAR nerve**

EXCEPT

Thenar Muscles (Abductor Pollicis Brevis ,Flexor Pollicis Brevis ,Opponens pollicis)

1st and 2nd Lumbercalis

are supplied **by MEDIAN nerve**

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4

Action

1- By name

Abductor (Pollicis and digiti minimi) :

Flexor (Pollicis and digiti minimi) :

Opponens (Pollicis and digiti minimi) :

Adductor (Pollicis) :

2-Palmaris Brevis : Deepening the hollow of the palm

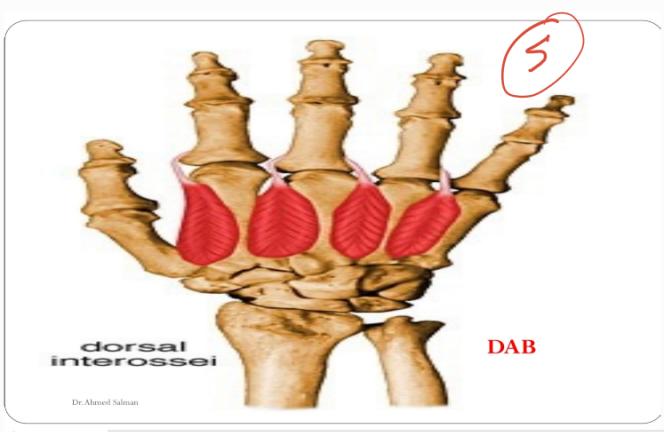
3-Palmar Interossei : PA**D** (A**D**duction of the little ,ring ,index and thumb fingers towards the middle finger)

4-Dorsal Interossei : DA**B** (A**B**duction index , ring and middle fingers)

5-Lumbercalis and Interossi : Writing position

(Flex metacarpophalngeal and extend interphalangeal joint)

5



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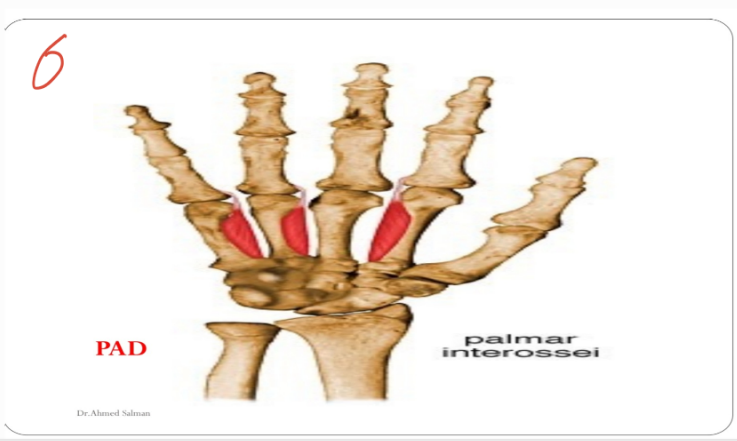

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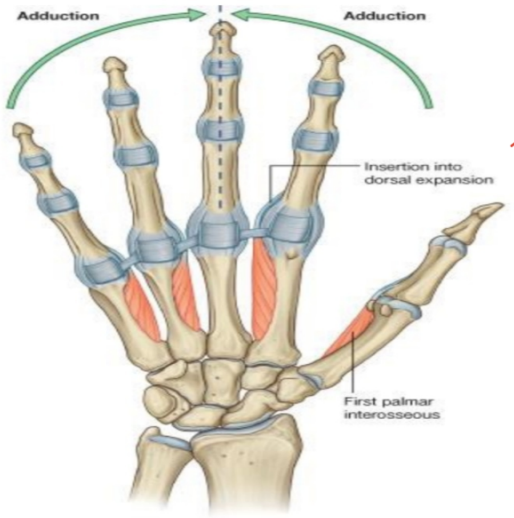

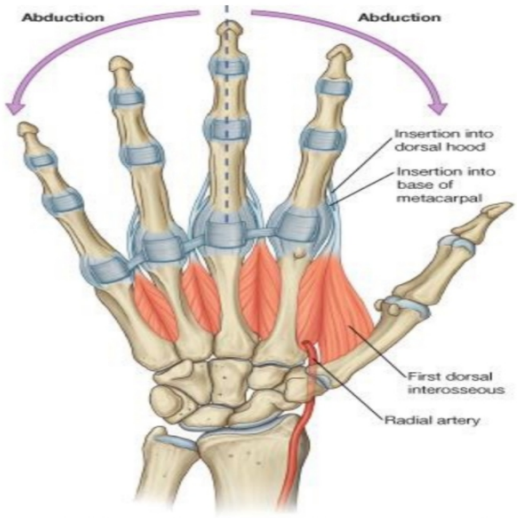

PALMAR INTEROSSEI
PAD

DORSAL INTEROSSEI
DAB

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PALMAR INTEROSSEI

All fingers
Except middle finger (WHY)

DORSAL INTEROSSEI
All fingers
Except Thumb and little finger (WHY)

٨

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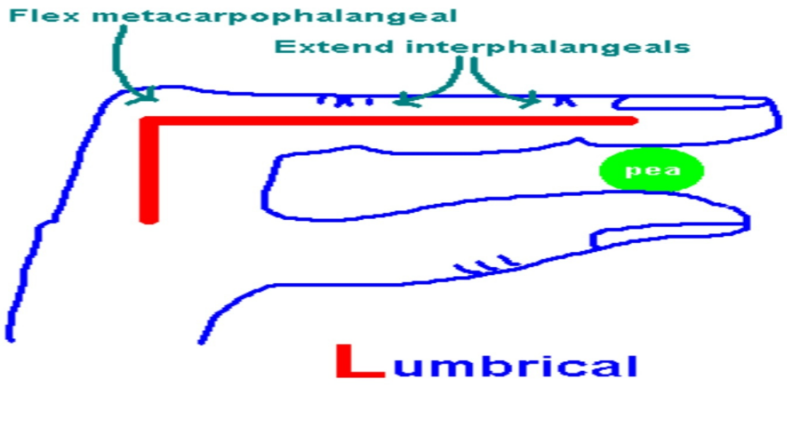
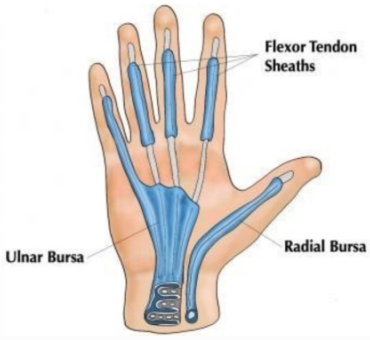


Synovial sheaths of the flexor tendons

١٠

1. The tendon of flexor pollicis longus is surrounded by synovial sheath known as **radial bursa**.
2. The 8 tendons of flexor digitorum superficialis and profundus invaginate a synovial sheath from the lateral side which is called **ulnar bursa**.



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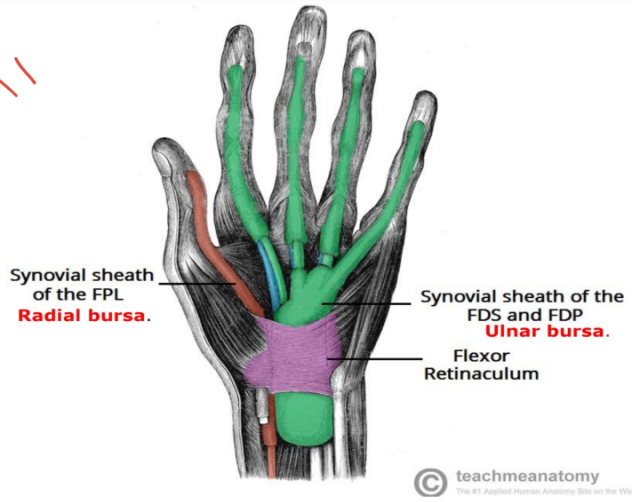

١٢

Guyon's (ulnar) canal

It is 4cm in length. It extends from the proximal aspect of the pisiform bone to the origin of the hypothenar muscles

Contents

Ulnar nerve , ulnar artery .

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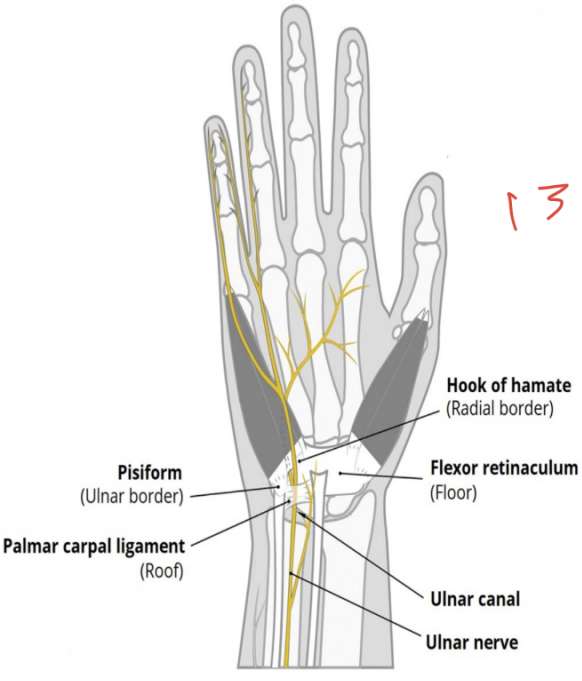

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The palmar aponeurosis

15

Shape:

Triangular with an **apex** directed proximally and a **base** directed distally.

- The **apex** is attached to the distal border of the flexor retinaculum and receives the insertion of palmaris longus tendon.
- The **base** is divided at the root of the medial 4 fingers into **4 slips**

Importance of palmar aponeurosis

1.It is firmly attached to the overlying skin so improving hand gripping

2.It protects the underlying structures

Clinical note:

Dupuytren's contracture:

It is a deformity in the hand caused by Fibrosis of the medial part of the palmar aponeurosis leads to retraction and shortening which producing progressive flexion of the little and ring fingers.

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Palmar aponeurosis

Dupuytren's contracture

The palmar septa

17

- The palmar aponeurosis sends a septum into the depth of the palm , known as lateral and medial palmar septa which are attached to the 1st and 5th metacarpal bones respectively .

Fascial compartments of the palm

The lateral and medial palmar septa divide the palm into 3 main fascial compartments;

a)Lateral compartment: contains the thenar muscles.

b)Medial compartment: contains the hypothenar muscles.

c)Intermediate compartment: lies between the lateral and medial palmar septa.

It is divided by intermediate palmar septum into:

1. Lateral part (thenar compartment).
2. Medial part (mid-palmar compartment).

Pulp space :

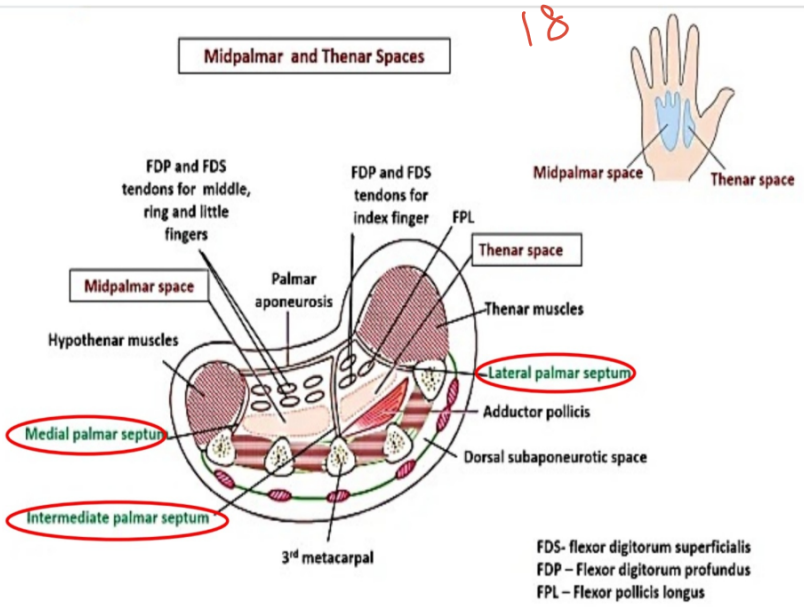
19

It is the space which lies over the palmar surface of the distal 3/4 of the terminal (distal) phalanx, just distal to insertion of tendon flexor digitorum profundus.

Clinical Anatomy

- Infection of the pulp space is very painful .
- It leads to accumulation of pus which will cause thrombosis and obstruction of the arteries inside the space causing necrosis of the distal 3/4 of the terminal phalanx.
- The base of the phalanx is not affected because it receives its blood supply from outside the pulp space.

18



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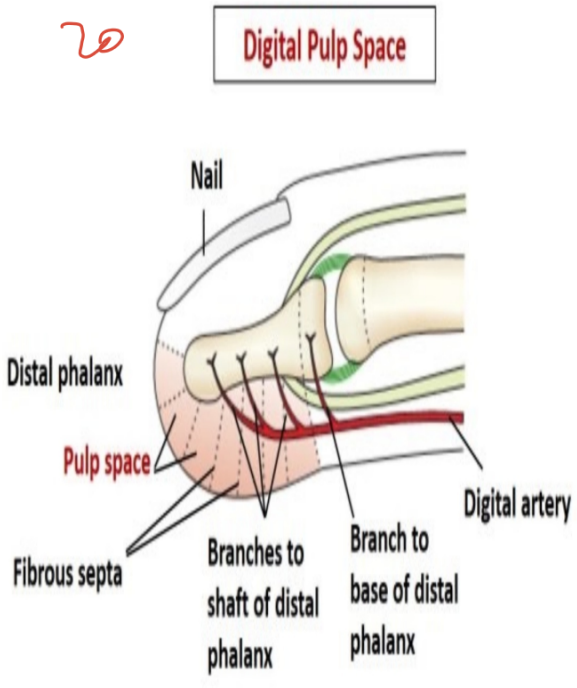

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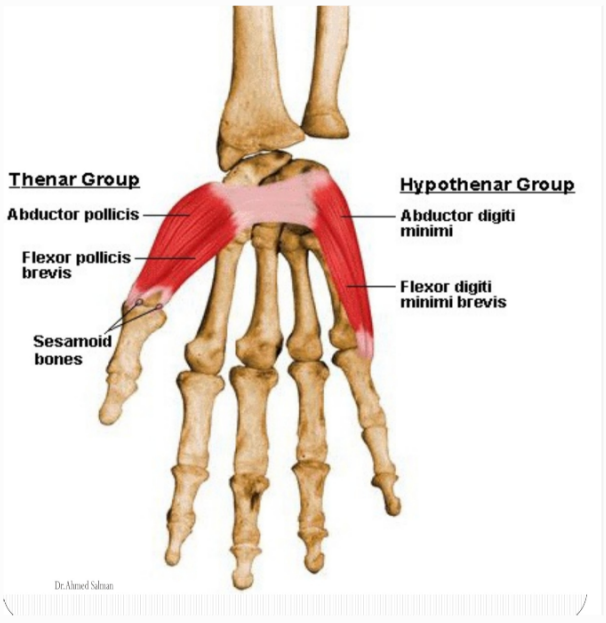
Thenar Group
Abductor pollicis
Flexor pollicis brevis
Sesamoid bones
Hypothenar Group
Abductor digiti minimi
Flexor digiti minimi brevis
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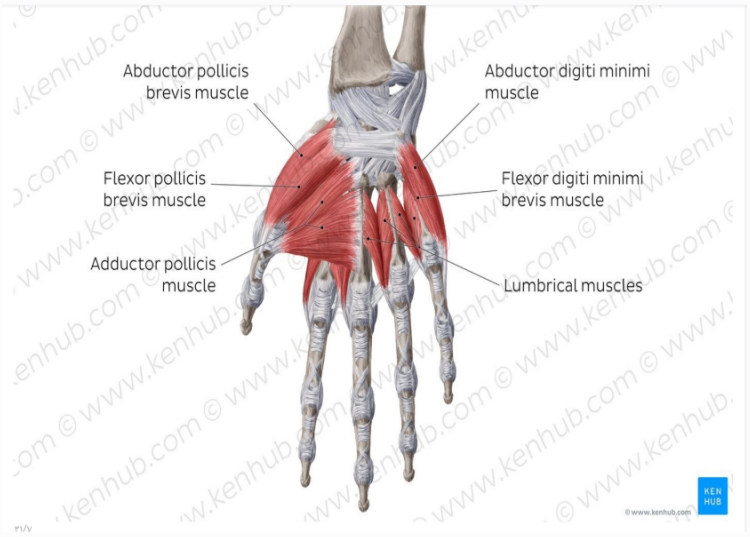
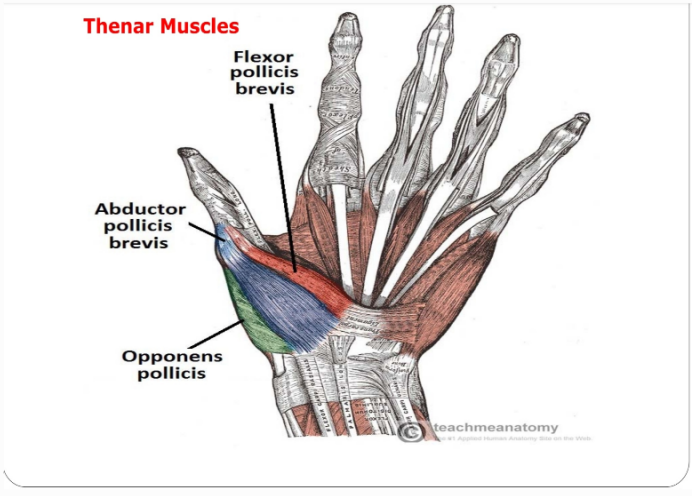
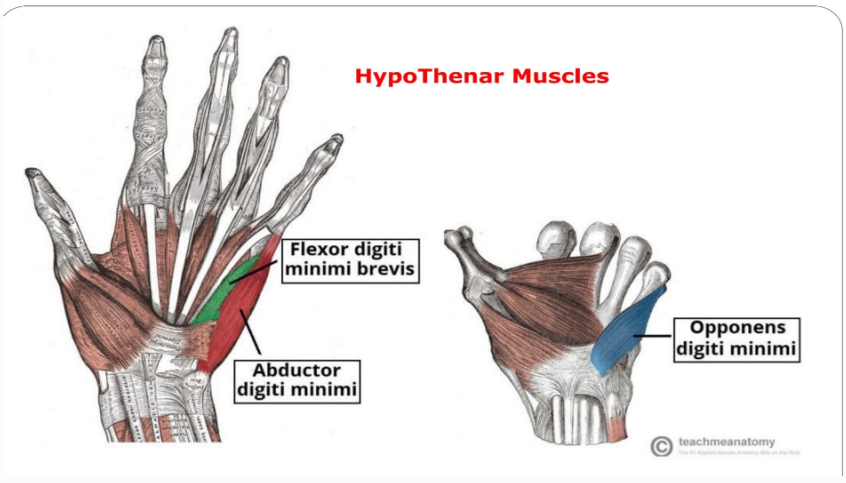

Abductor pollicis brevis muscle
Abductor digiti minimi muscle
Flexor pollicis brevis muscle
Flexor digiti minimi brevis muscle
Adductor pollicis muscle
Lumbrical muscles


Thenar Muscles
Flexor pollicis brevis
Abductor pollicis brevis
Opponens pollicis
teachmeanatomy


HypoThenar Muscles
Flexor digiti minimi brevis
Abductor digiti minimi
Opponens digiti minimi
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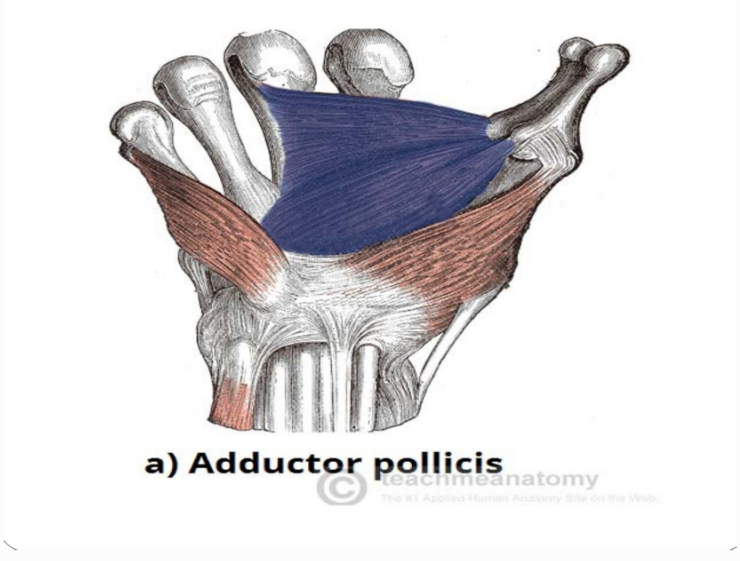
a) Adductor pollicis
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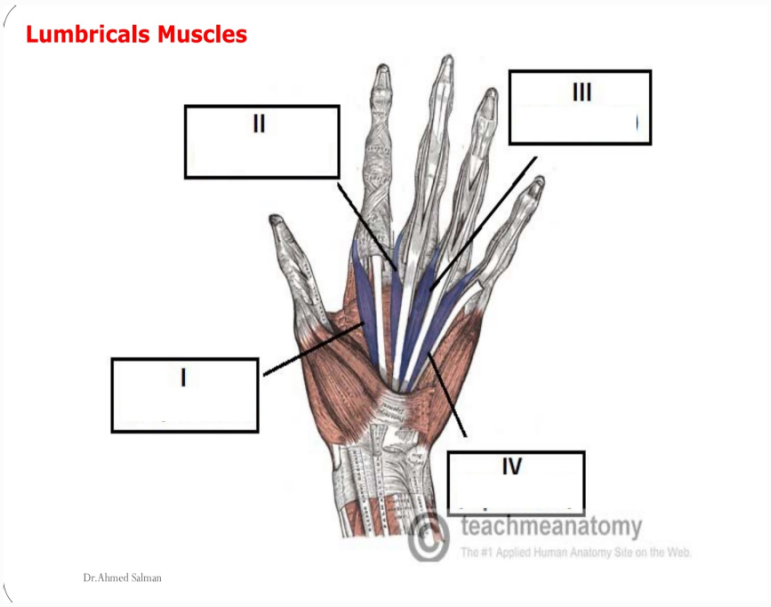
Lumbricals Muscles
II
III
I
IV
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