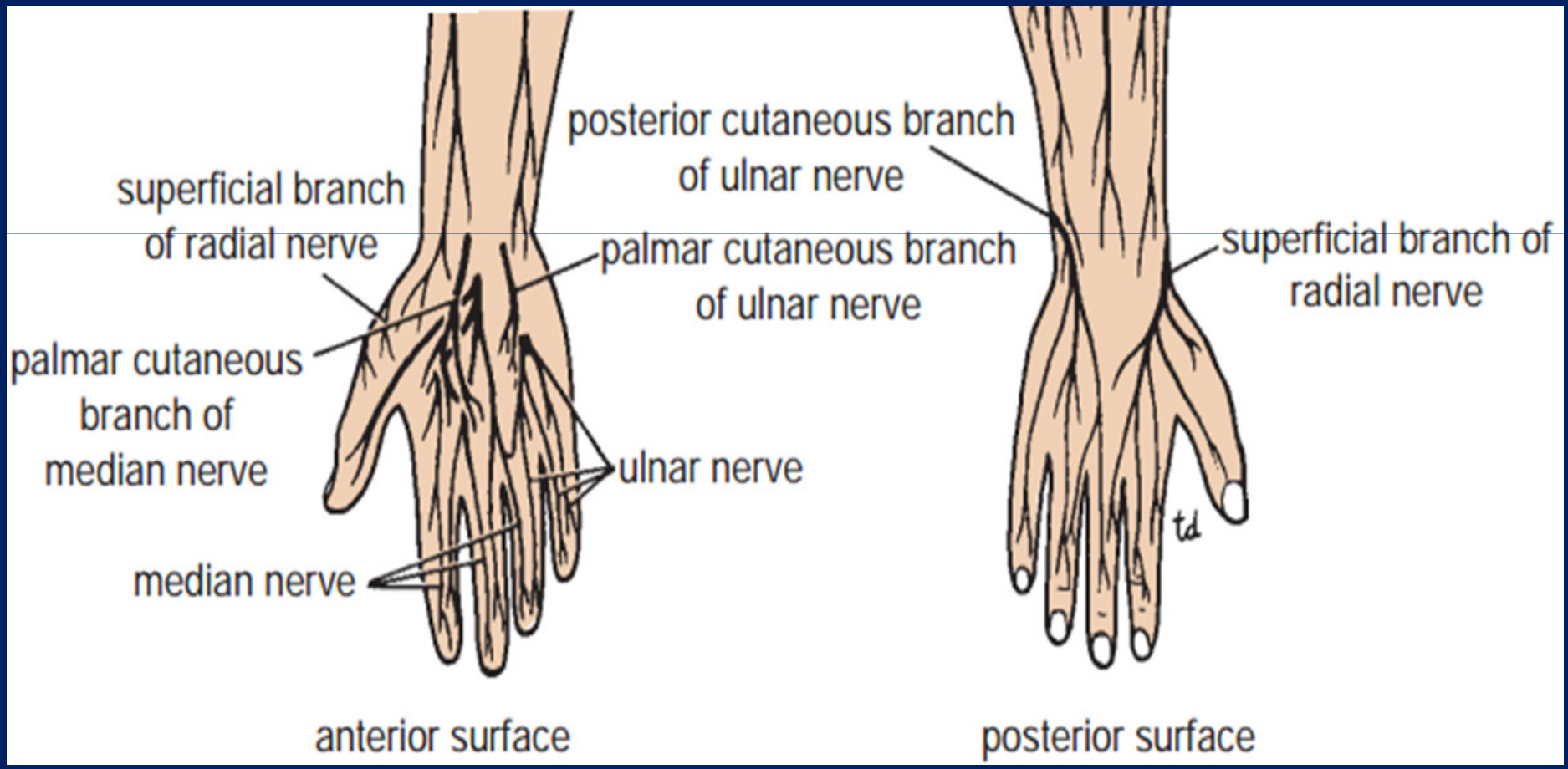
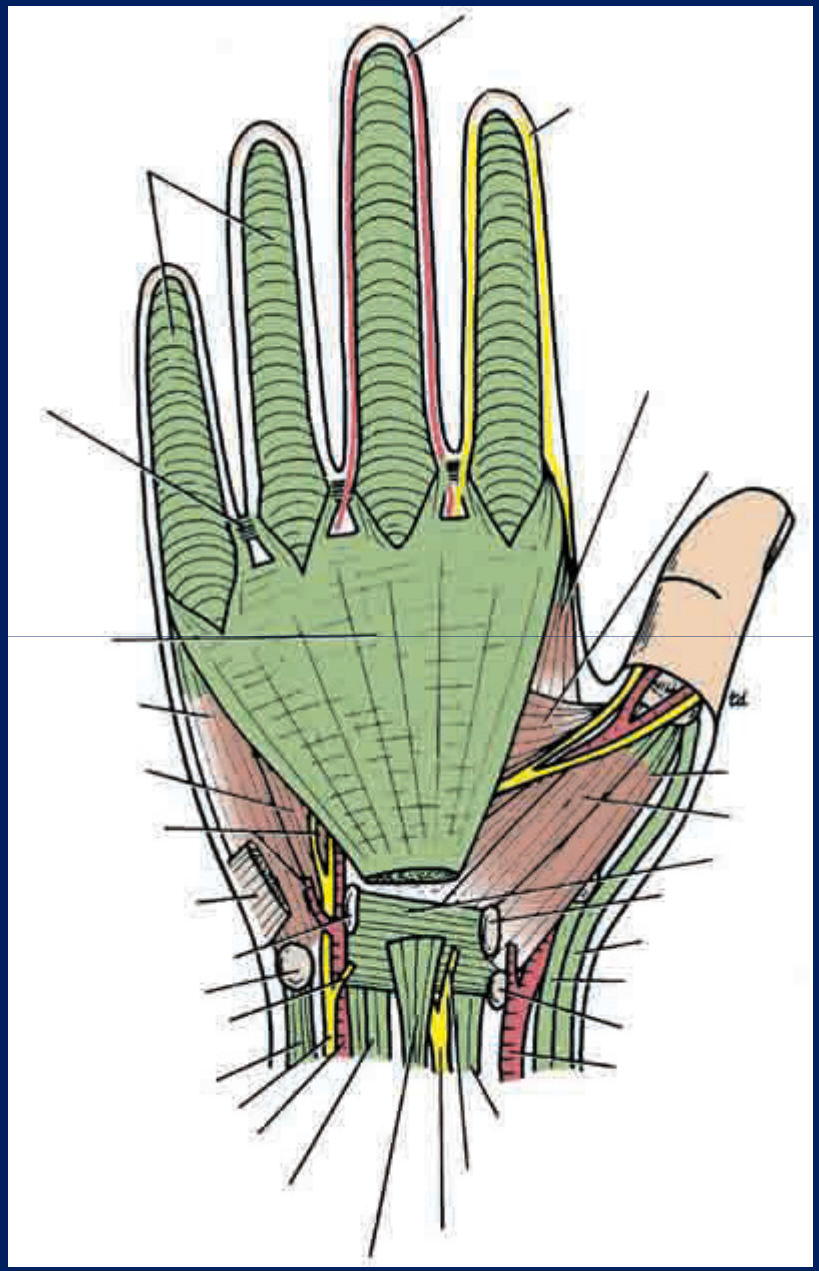
The Skin of the Hand



Deep Fascia

- The deep fascia of the wrist and palm is thickened to form
- **the flexor retinaculum**

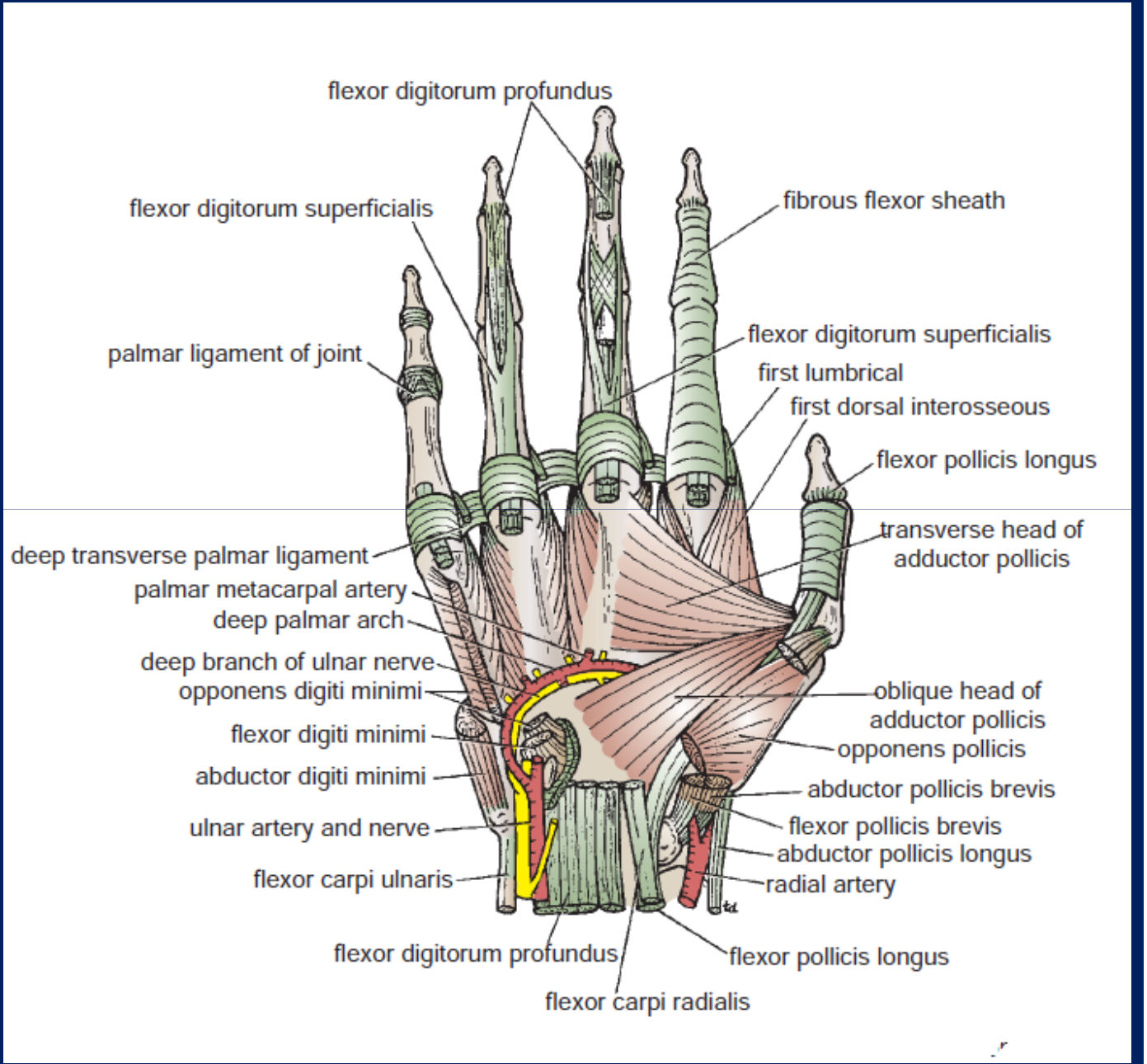
  and
- **thepalmar aponeurosis.**



Small Muscles of the Hand

The small muscles of the hand include

- the four lumbrical muscles,
- the eight interosseimuscles
- the short muscles of the thumb, and
- the short muscles of the little finger.

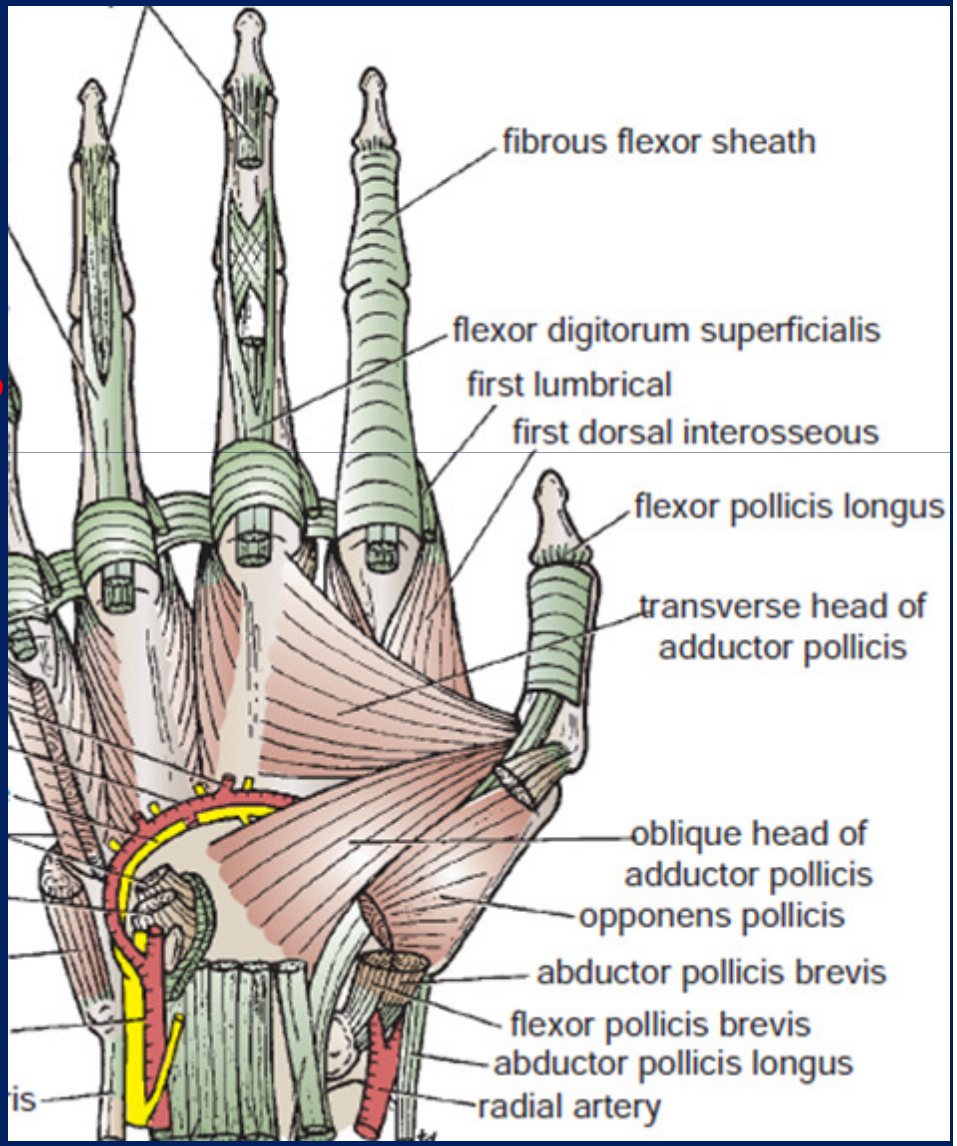


Short Muscles of the Thumb

The short muscles of the thumb are

- **the abductor pollicis brevis,**
- **the flexor pollicis brevis,**
- **the opponens pollicis, and**
- **the adductor pollicis**

The first three of these muscles form the thenar eminence.

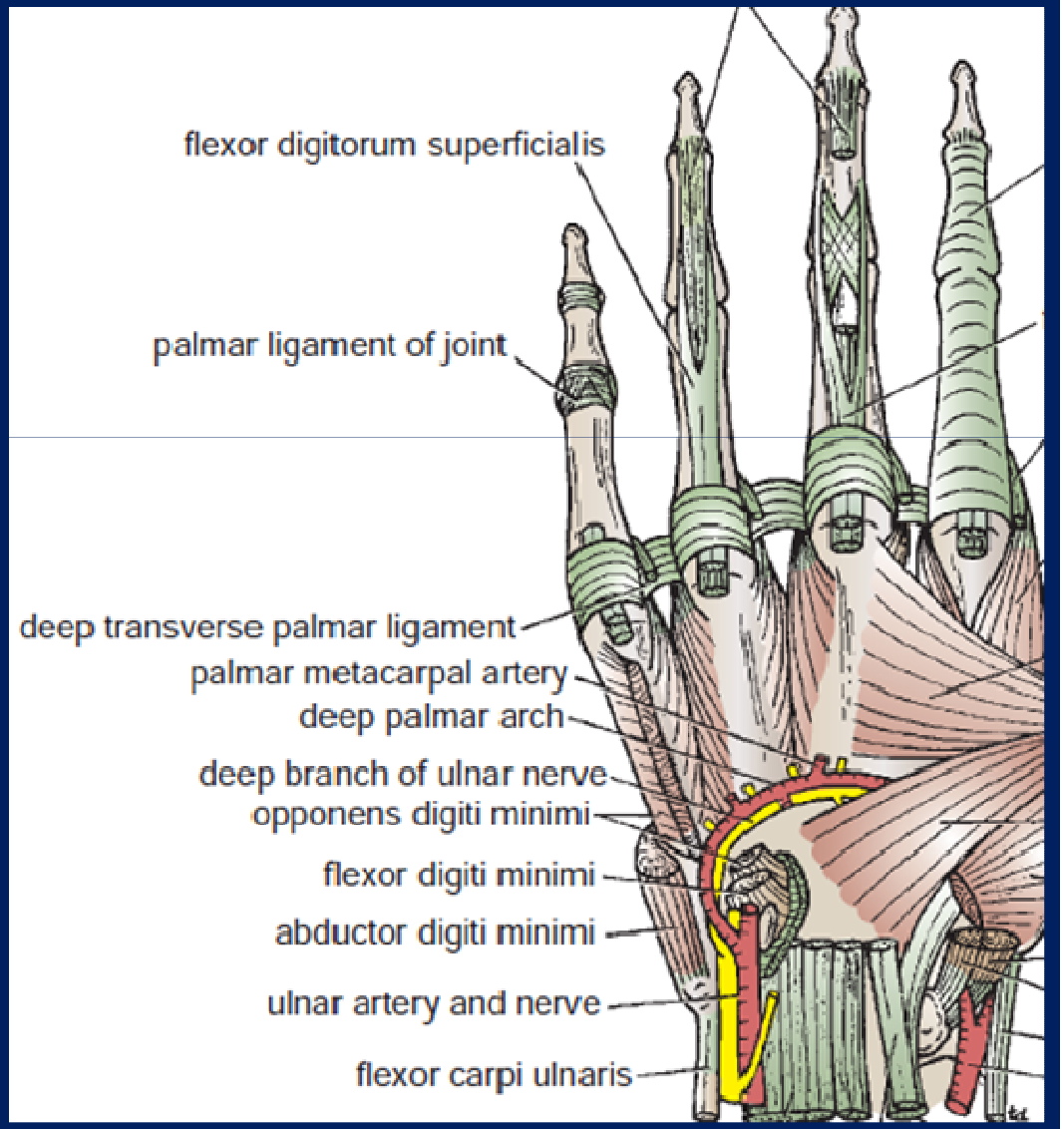


Short Muscles of the Little Finger

The short muscles of the little finger are

- **the abductor digiti minimi**
- **the flexor digiti minimi brevis, and**
- **the opponens digiti minimi,**

which together form the hypothenar eminence



Arteries of the Palm

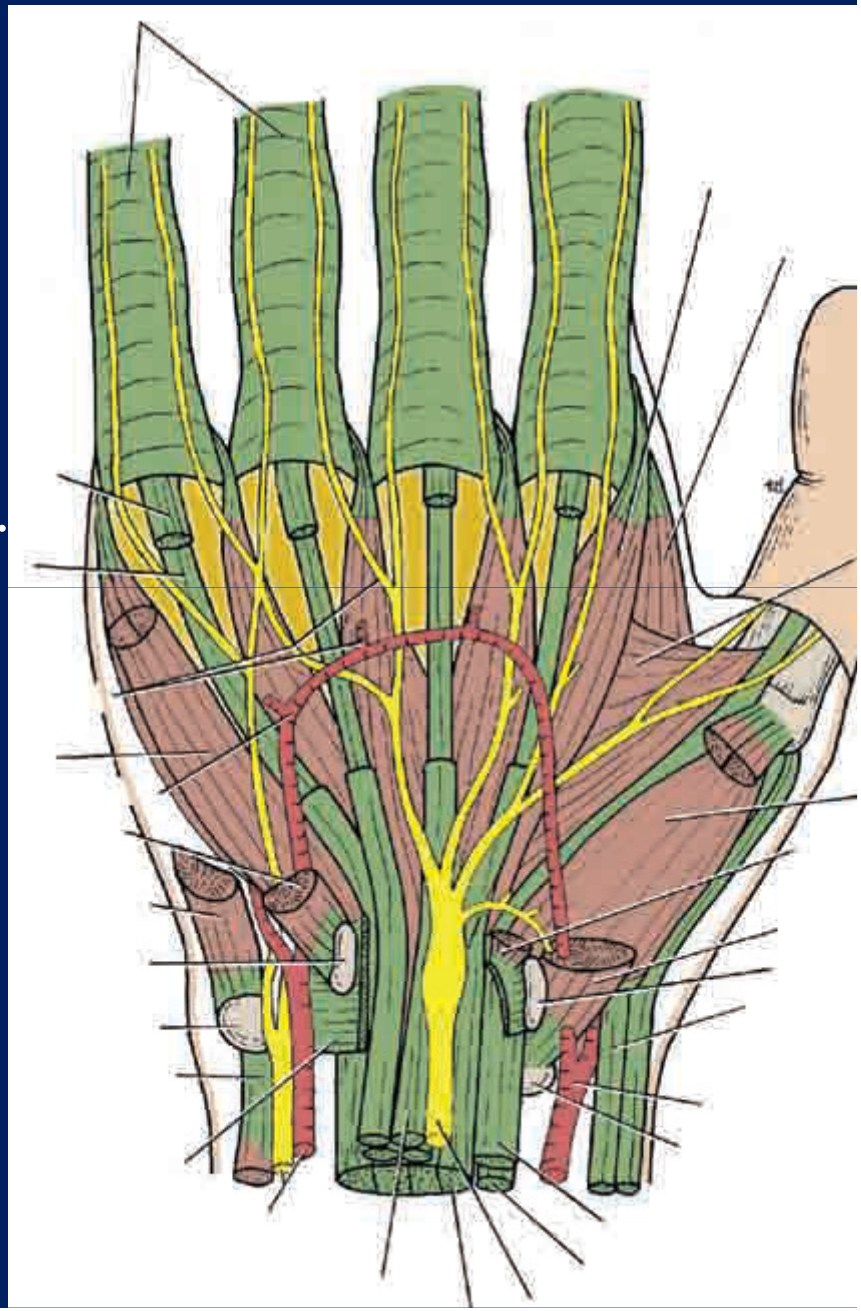
Ulnar Artery

The ulnar artery enters the hand anterior to the flexor retinaculum on the lateral side of the ulnar nerve and the pisiform bone. The artery gives off a deep branch and then continues into the palm as the superficial palmar arch.

The **superficial palmar arch** On entering the palm, The arch is completed on the lateral side by one of the branches of the radial artery.

Four digital arteries **arise from the arch** and pass to the fingers.

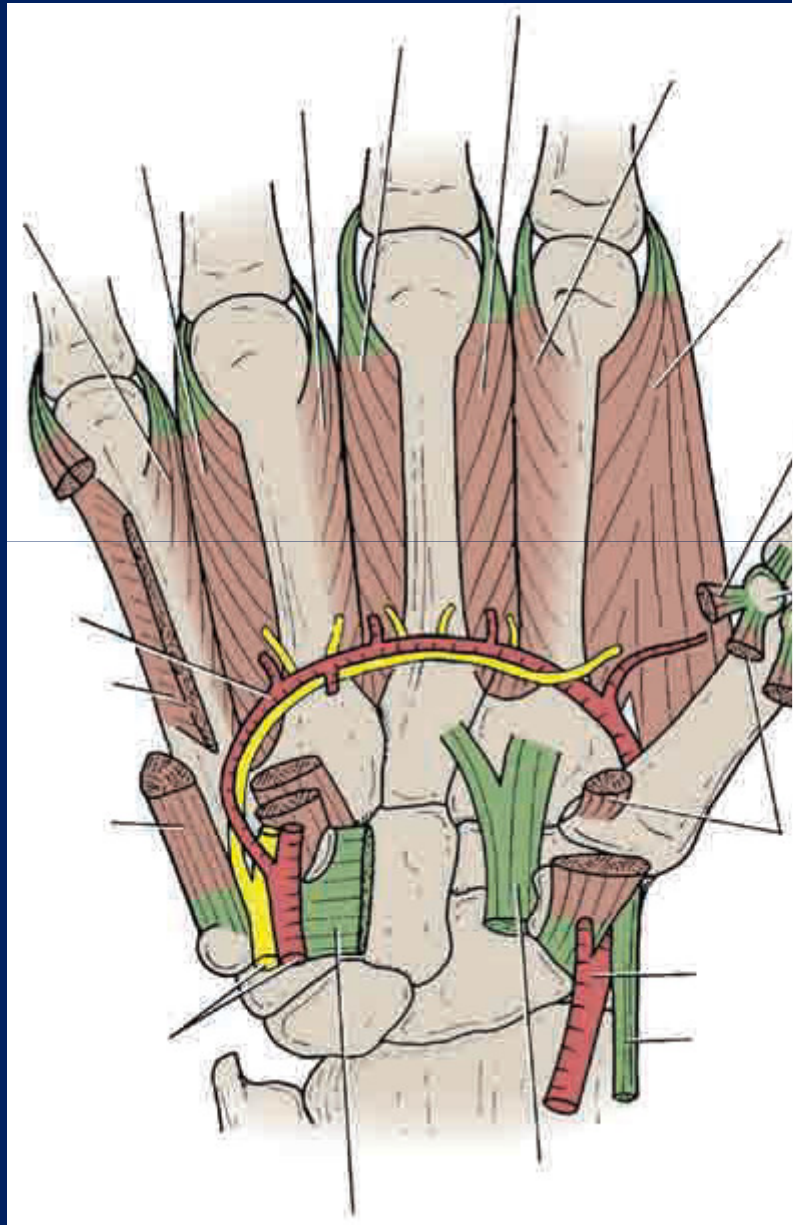
The **deep branch of the ulnar artery** joins the radial artery to complete the deep palmar arch



Radial Artery

The radial artery entering the palm, it curves medially between the oblique and transverse heads of the adductor pollicis and continues as the deep palmar arch. The **deep palmar arch** is completed on the medial side by the deep branch of the ulnar artery.

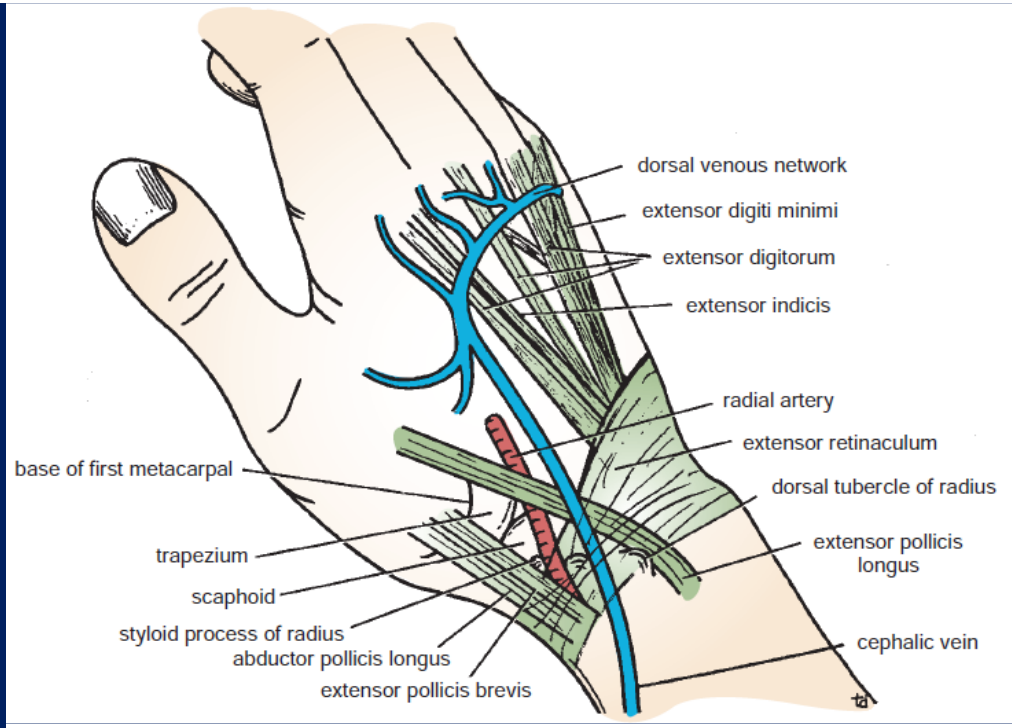
The deep palmar arch sends branches **superiorly**, which take part in the anastomosis around the wrist joint, and **inferiorly**, to join the digital branches of the superficial palmar arch.



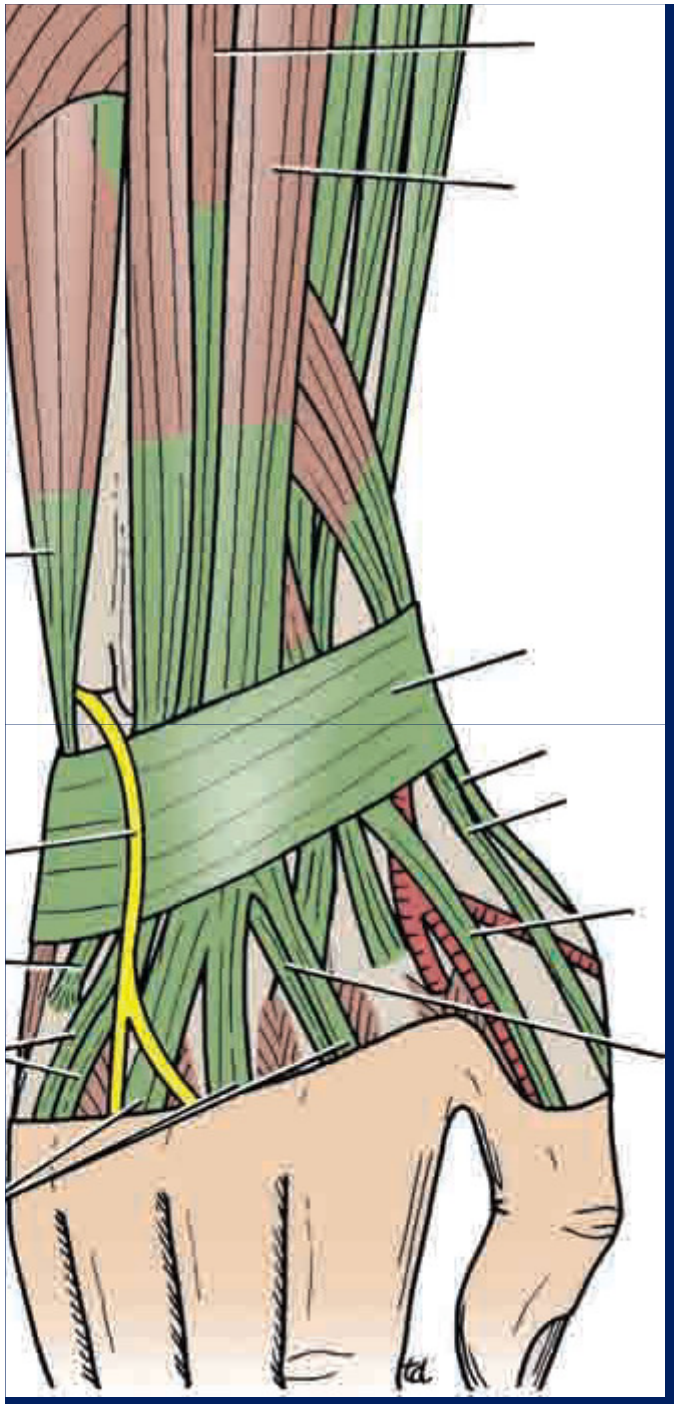
Veins of the Palm

Superficial and deep palmar arterial arches are accompanied by superficial and deep palmar venous arches, receiving corresponding tributaries.

Dorsal Venous Arch (or Network)



- The dorsal venous arch lies in the subcutaneous tissue proximal to the metacarpophalangeal joints and drains on the lateral side into the cephalic vein and, on the medial side, into the basilic vein. The greater part of the blood from the whole hand drains into the arch, which receives digital veins and freely communicates with the deep veins of the palm through the interosseous spaces.



Anatomic Snuffbox

The anatomic snuffbox is a term commonly used to describe a triangular skin depression on the lateral side of the wrist that is bounded medially by the tendon of the extensor pollicis longus and laterally by the tendons of the abductor pollicis longus and extensor pollicis brevis.

Brachial Plexus Injuries

The roots, trunks, and divisions of the brachial plexus reside in the lower part of the posterior triangle of the neck, whereas the cords and most of the branches of the plexus lie in the axilla.
Complete lesions involving all the roots of the plexus are rare.
Incomplete injuries are common and are usually caused by traction or pressure; individual nerves can be divided by stab wounds.

Upper lesions of the brachial plexus(C5 and C6 roots)

The suprascapular nerve; causing paralysis of supraspinatus (the initiator of abduction) and infraspinatus (a lateral rotator of the shoulder).

The nerve to subclavius; causing paralysis of the sublavius and loss of its function.

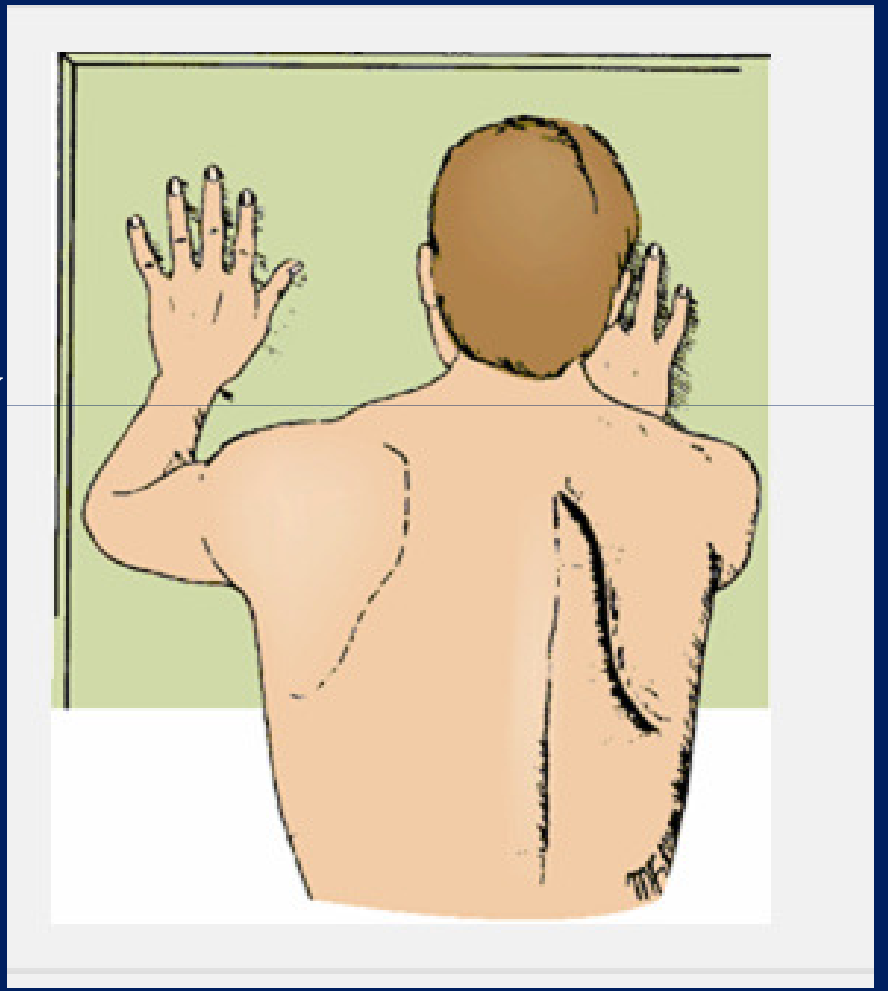
The musculocutanous nerve; causing paralysis and loss of the functions of biceps brachii (elbow flexion and supination and shoulder flexion), coracobrachialis (shoulder flexion) and most of brachialis (elbow flexi).

The axillary nerve; causing paralysis of deltoid (mainly shoulder abduction is affected) and teres minor (lateral rotator of the shoulder)

Long Thoracic Nerve

The long thoracic nerve, which arises from C5, 6, and 7 and supplies the serratus anterior muscle, can be injured by blows to or pressure on the posterior triangle of the neck or during the surgical procedure of radical mastectomy. Paralysis of the serratus anterior results in the inability to rotate the scapula during the movement of abduction of the arm above a right angle.

The patient therefore experiences difficulty in raising the arm above the head. The scapula will no longer be kept closely applied to the chest wall and will protrude posteriorly, a condition known as “winged scapula”



Axillary Nerve

The axillary nerve which arises from the posterior cord of the brachial plexus (C5 and 6), can be injured by the pressure of a badly adjusted crutch pressing upward into the armpit.

The passage of the axillary nerve backward from the axilla through the quadrangular space makes it particularly vulnerable here to downward displacement of the humeral head in shoulder dislocations or fractures of the surgical neck of the humerus.

Paralysis of the **deltoid** and **teres minor** muscles results. The cutaneous branches of the axillary nerve, including the **upper lateral cutaneous nerve** of the arm, are functionless, and consequently there is a loss of skin sensation over the **lower half of** the deltoid muscle. The paralyzed deltoid wastes rapidly, and the underlying greater tuberosity can be readily palpated. Because the supraspinatus is the only other abductor of the shoulder, this movement is much impaired. Paralysis of the teres minor is not recognizable clinically.

Radial Nerve

The radial nerve which arises from the posterior cord of the brachial plexus, characteristically gives off its branches some distance proximal to the part to be innervated.

In the axilla, it gives off three branches: the posterior cutaneous nerve of the arm, which supplies the skin on the back of the arm down to the elbow; the nerve to the long head of the triceps; and the nerve to the medial head of the triceps.

In the spiral groove of the humerus, it gives off four branches: the lower lateral cutaneous nerve of the arm, which supplies the lateral surface of the arm down to the elbow; the posterior cutaneous nerve of the forearm, which supplies the skin down the middle of the back of the forearm as far as the wrist; the nerve to the lateral head of the triceps; and the nerve to the medial head of the triceps and the anconeus.

In the anterior compartment of the arm above the lateral epicondyle, it gives off three branches: nerve to a small part of the brachialis, nerve to the brachioradialis, and the nerve to the extensor carpi radialis longus.

The radial nerve is commonly damaged in the axilla and in spiral groove.

Musculocutaneous Nerve

The musculocutaneous nerve is rarely injured because of its protected position beneath the biceps brachii muscle. If it is injured high up in the arm, the biceps and coracobrachialis are paralyzed and the brachialis muscle is weakened (the latter muscle is also supplied by the radial nerve). **Flexion** of the forearm at the elbow joint is then produced by the remainder of the brachialis muscle and the flexors of the forearm. When the forearm is in the prone position, the extensor carpi radialis longus and the brachioradialis muscles assist in flexion of the forearm.

There is also sensory loss along the lateral side of the forearm. Wounds or cuts of the forearm can sever the lateral cutaneous nerve of the forearm, a continuation of the musculocutaneous nerve beyond the cubital fossa, resulting in sensory loss along the lateral side of the forearm.

Median nerve injury

The median nerve may be injured at the elbow by supracondylar fractures of the humerus resulting in the following effects;

Motor

- All the muscles of the flexor compartment of the forearm; except flexor carpi ulnaris and the medial 2 tendons of flexor digitorum profundus; are paralyzed. As a result, the forearm is kept in supine position. Wrist flexion is weak but not lost because flexor carpi ulnaris flexes the wrist but also deviates it medially (due to loss of opposed lateral deviation by flexor carpi radialis).
- Flexion of the terminal phalanx of the thumb is lost due to paralysis of flexor pollicis longus. *The median nerve is more commonly* ***compressed at the wrist by excessive synovial fluid*** *in the ulnar and radial bursae; a condition known as* ***carpal tunnel syndrome. In this*** *case, the thenar muscles will be weakened not paralyzed and the sensory loss will be limited to the fingers only. The skin of the lateral 2/3 of the palm is spared because the palmar cutaneous branch of the median nerve*

Sensory loss occurs in skin of lateral 2/3 of the palm and lateral3½ fingers.

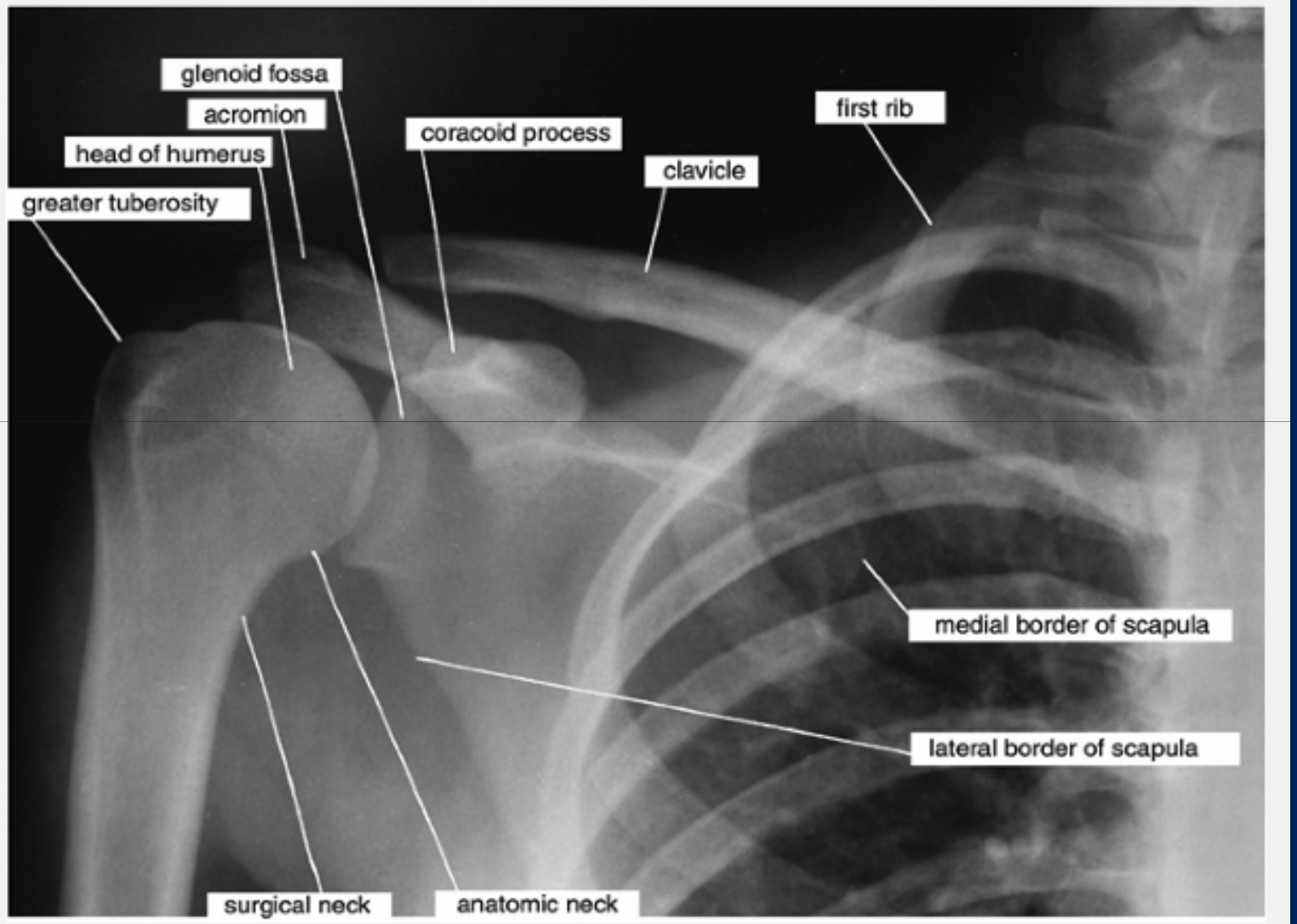
Ulnar nerve injury

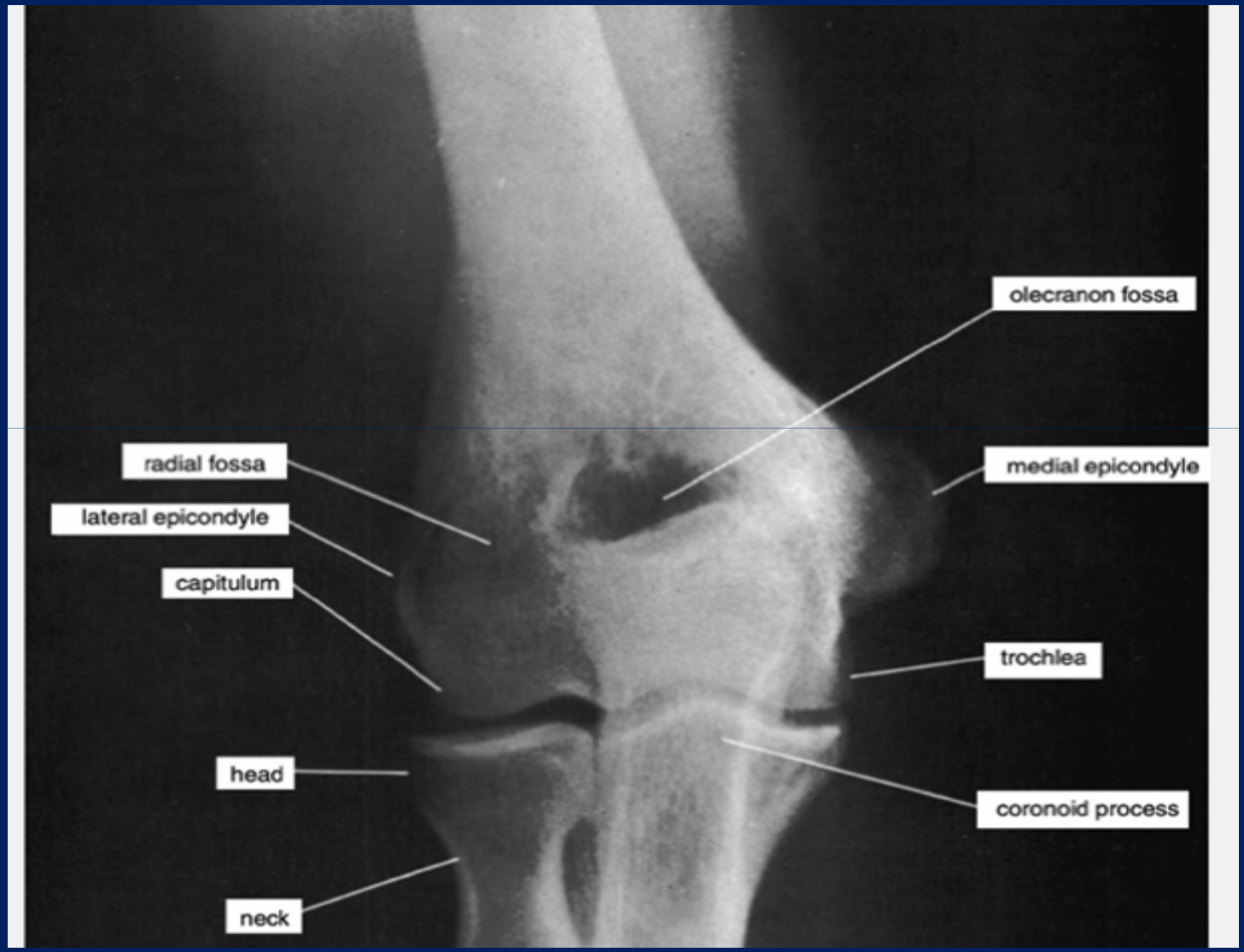
Injury of the ulnar nerve at the elbow is common and is associated with fractures of the medial epicondyle of the humerus. The clinical findings include;

Motor

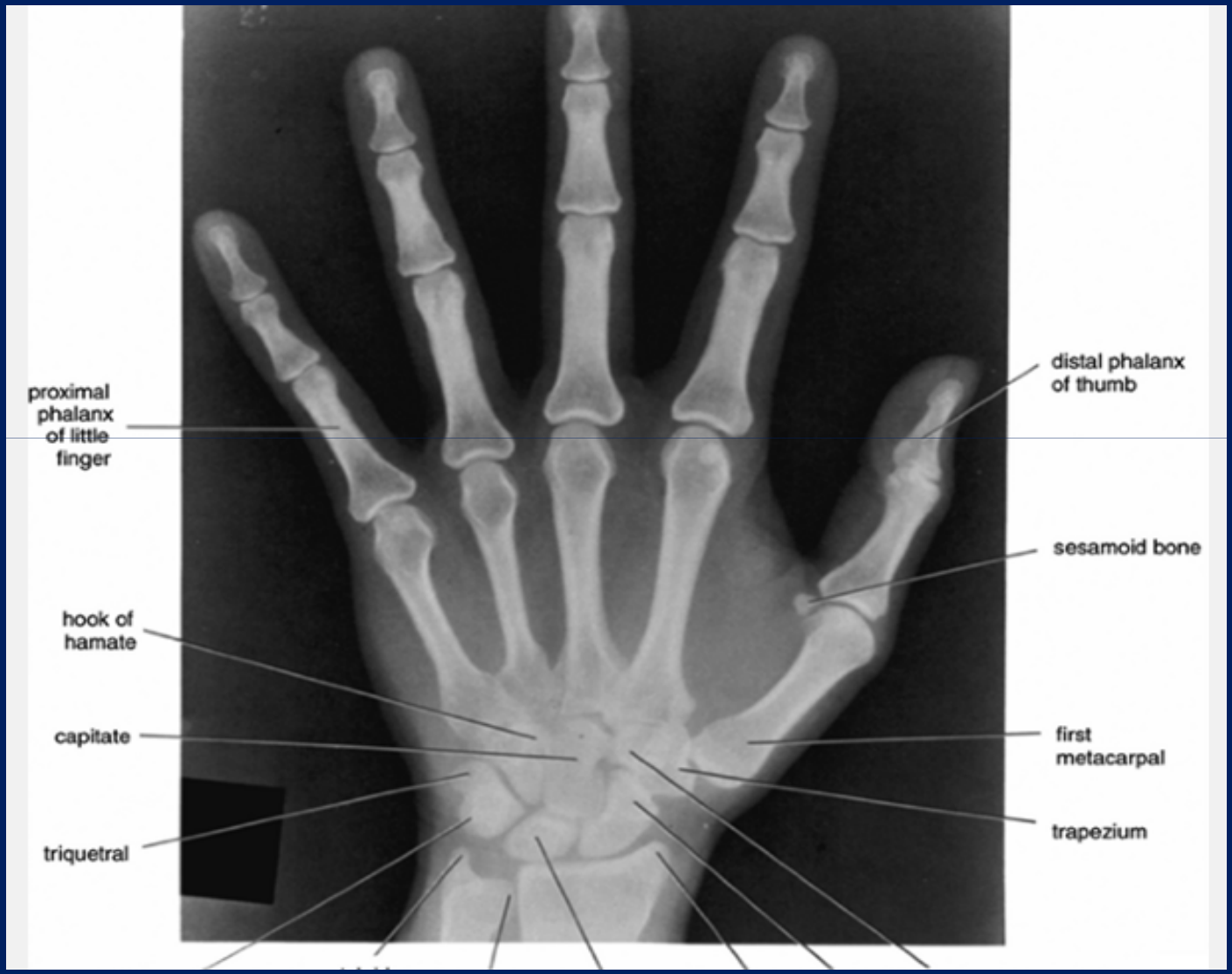
- Paralysis of flexor carpi ulnaris weakens wrist flexion and when the patient attempts to flex the wrist the movement is associated with lateral deviation due to the unopposed action of flexor carpi radialis.
- Paralysis of the medial 2 tendons of flexor digitorum profundus prevents flexion of the distal interphalangeal joints of the little and ring fingers.
- All the small muscles of the hand paralyzed;

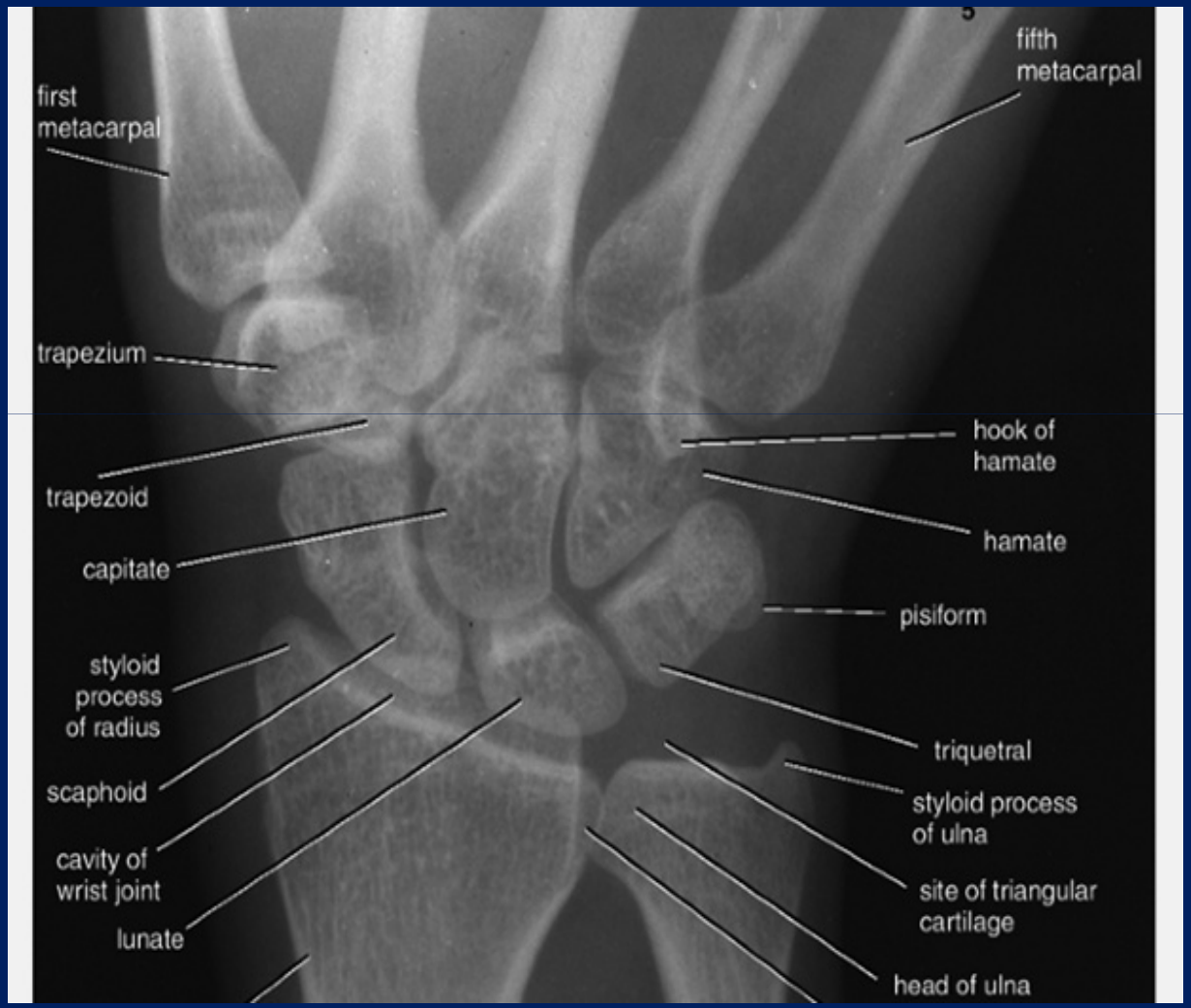
Sensory The entire skin area of ulnar nerve supply will show sensory loss i.e. the medial 1/3 of the hand and medial 1½ fingers anteriorly and posteriorly.

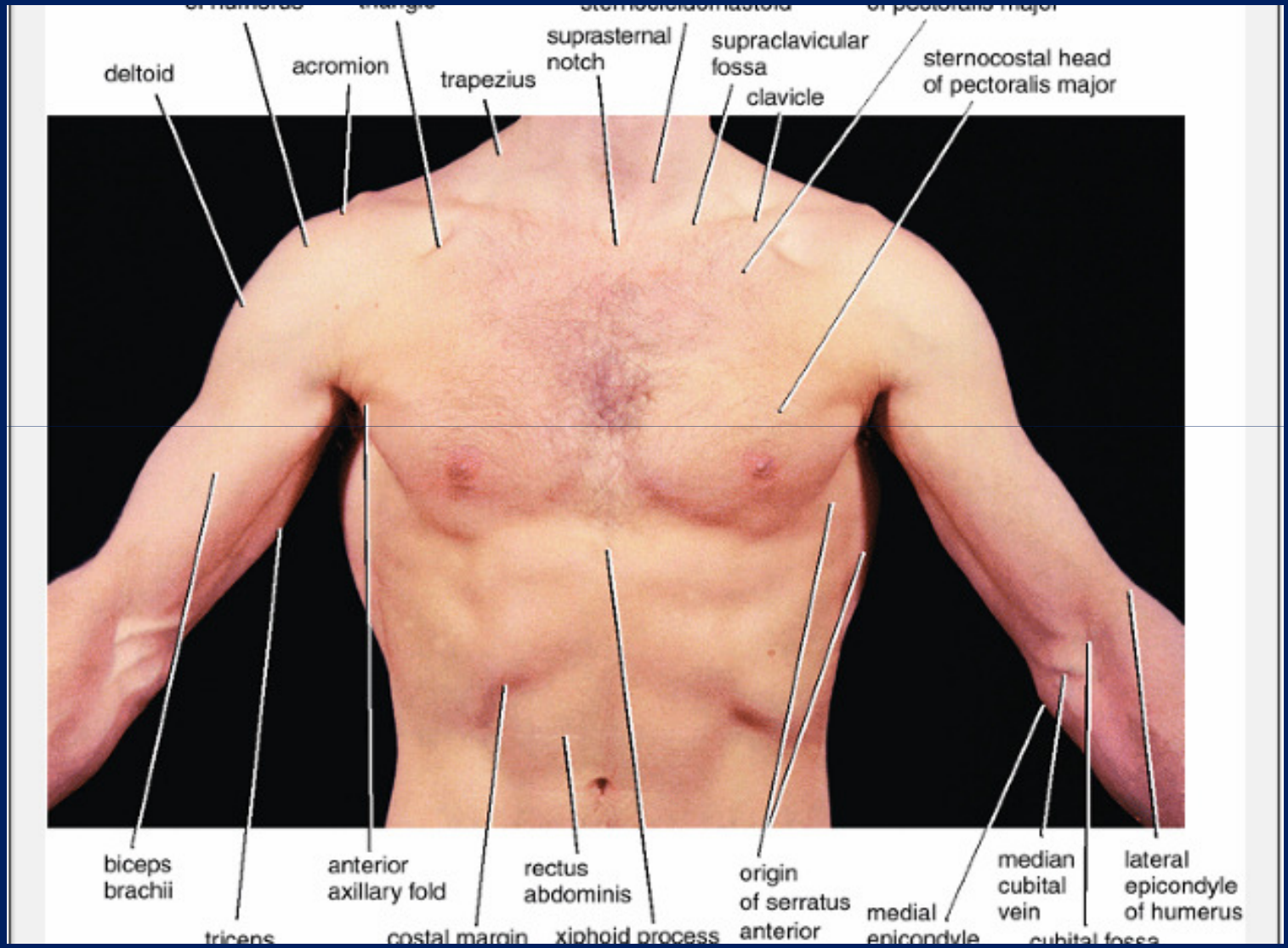

glenoid fossa
acromion
head of humerus
greater tuberosity
coracoid process
clavicle
first rib
medial border of scapula
lateral border of scapula
surgical neck
anatomic neck


olecranon fossa
radial fossa
medial epicondyle
lateral epicondyle
capitulum
trochlea
head
coronoid process
neck


humerus
lateral supracondylar ridge
head of radius
neck
bicipital tuberosity
lateral epicondyle
olecranon process of ulna
coronoid process


proximal phalanx of little finger
distal phalanx of thumb
sesamoid bone
hook of hamate
capitate
first metacarpal
trapezium
triquetral


fifth metacarpal
first metacarpal
trapezium
hook of hamate
trapezoid
hamate
capitate
pisiform
styloid process of radius
triquetral
scaphoid
styloid process of ulna
cavity of wrist joint
site of triangular cartilage
lunate
head of ulna


deltoid
acromion
trapezius
suprasternal notch
supraclavicular fossa
clavicle
sternocostal head of pectoralis major
biceps brachii
anterior axillary fold
rectus abdominis
origin of serratus anterior
medial epicondyle
median cubital vein
lateral epicondyle of humerus
tricens
costal margin
xiphoid process
cubital fossa

Thank You & Good Luck