MED439
KING SAUD UNIVERSITY

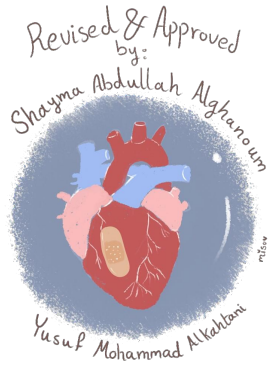
Introduction to surface anatomy of the upper & lower limbs

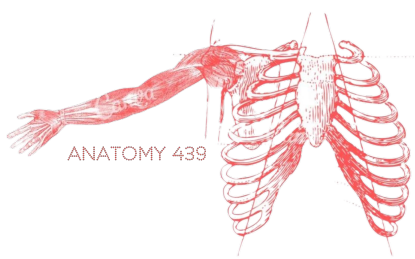
Musculoskeletal Block - Lecture 20

Objective:

✓Palpate and feel the important bony prominences in upper and lower limbs.
✓Palpate and feel the different muscles and muscular groups and tendons.
✓Perform some movements to see the action of individual muscle or muscular groups in the upper and lower limbs.
✓Feel the pulsations of most of the arteries of the upper and lower limbs.
✓Locate the site of most of the superficial veins in the upper and lower limbs.

Color index:
Important
In male's slides only
In female's slides only
Extra information, explanation





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WHAT is surface Anatomy ?

- It is a branch of gross anatomy that examines shapes and markings on the surface of the body as they are related to deeper structures.
- It is essential in locating and identifying anatomic structures prior to studying the internal gross anatomy.
- It helps to locate the affected organ / structure /region in disease process.

Surface anatomy of upper limb :

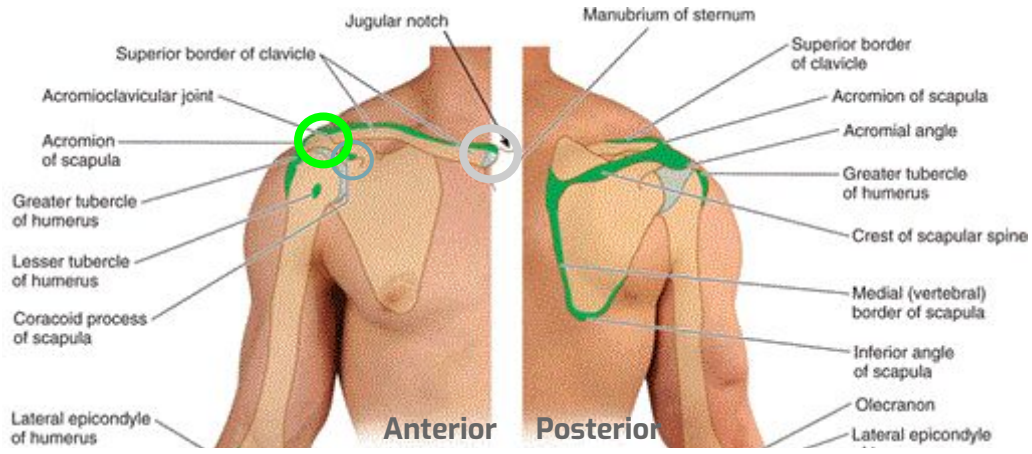
1- Clavicle

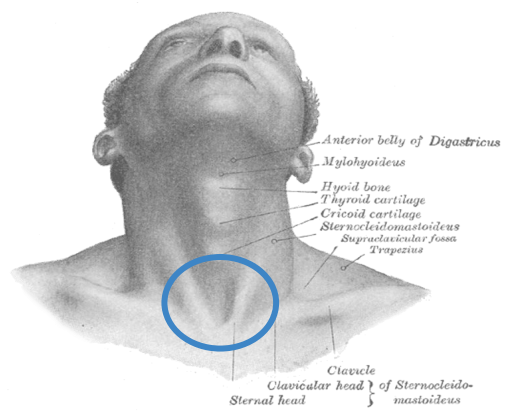
- is subcutaneous and can be palpated throughout its length.

Its **sternal end** projects little above the manubrium.

Between the 2 sternal ends of the 2 clavicle lies the jugular notch (suprasternal notch).

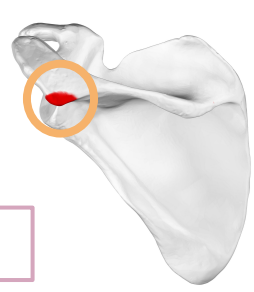
The **acromial end** of the clavicle :
- palpated medial to the lateral border of the acromion of the scapula. particularly when the shoulder is alternately raised and depressed.
- The large vessels and nerves to the upper limb pass posterior to the middle (convexity) of the clavicle.

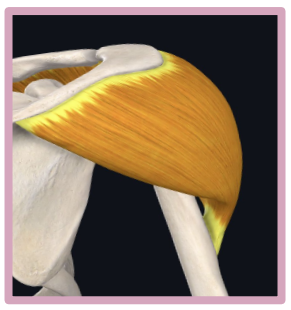




2- Scapula

The **lateral and posterior** borders of the acromion meet to form the acromial angle.
Supraspinatus tear change this angle





Inferior to the acromion, the deltoid muscle forms the rounded contour of the shoulder.

3- Deltopectoral groove

The **coracoid process** of scapula can be felt deeply below the **lateral one third of the clavicle** in the **Deltopectoral GROOVE or clavipectoral triangle.**

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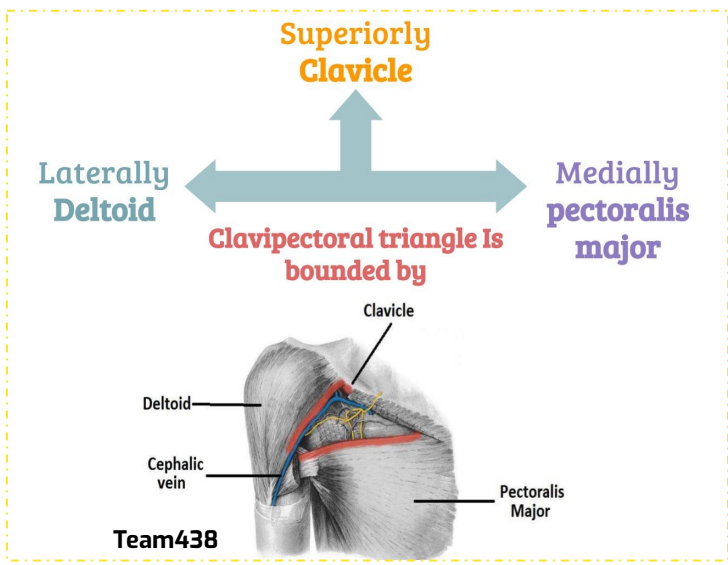
The clavipectoral or the (Deltopectoral) triangle is the slightly depressed area just inferior to the lateral third of clavicle.



4- Humerus, ulna & radius

- The shaft of the humerus may be felt in different areas deep to muscles surrounding it.

The **greater tubercle** of humerus can be felt by deep palpation through the deltoid muscle, **inferior to the acromion** when the arm is by the side. In this position, the **greater tubercle** is the most lateral bony point of the shoulder.

· The **medial and lateral epicondyles** of the humerus are palpated on the **medial &lateral sides of the elbow.**

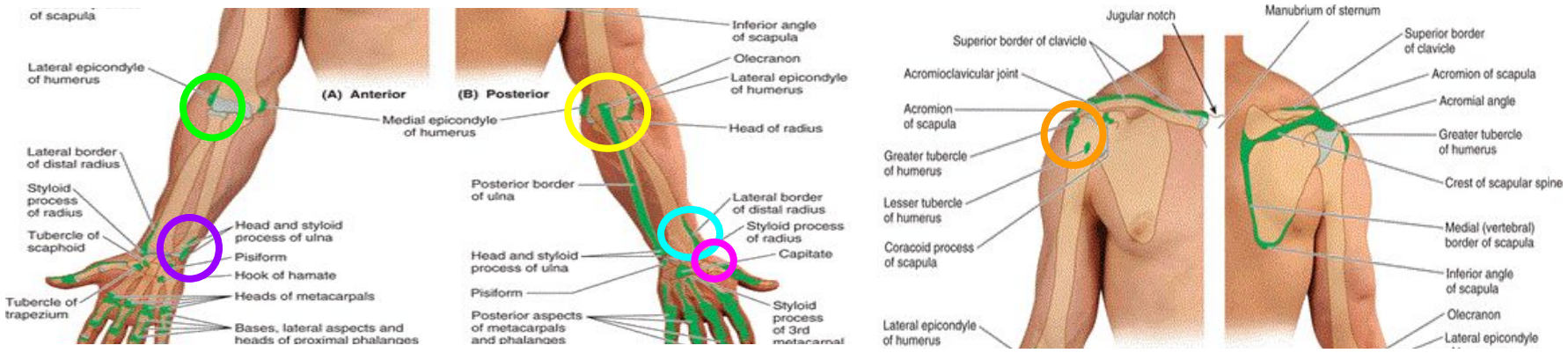
The **head of the ulna** forms a rounded subcutaneous prominence that can be easily seen and palpated on the **medial side of dorsal aspect of the wrist.**

The **head of radius** can palpated and felt to rotate in the depression on the posterolateral aspect of the extended elbow, just distal to the lateral epicondyle of the humerus with supination and pronation.

The **olecranon** and **posterior border of the ulna** lie subcutaneously and can be palpated easily.

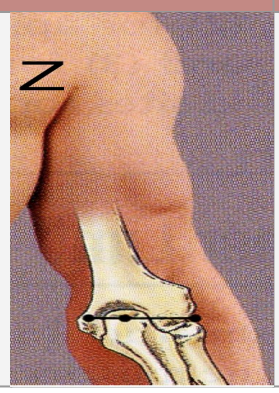
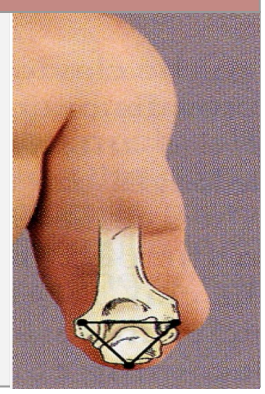
The **radial styloid** process can be palpated on the lateral side of the wrist in the **anatomical snuff box.**
It is approximately 1 cm distal to that of the ulna.

The pointed subcutaneous **ulnar styloid process** may be felt slightly distal to the head when the hand is supinated.



5- Elbow

- **Fractures** of any of these structures will disturbs this arrangement.

extended		flexed	
the tip of the olecranon process, the medial and the lateral epicondyles lie in a straight line.		the olecranon forms the apex of an equilateral triangle, where the epicondyles form the angles.	

6- Hand

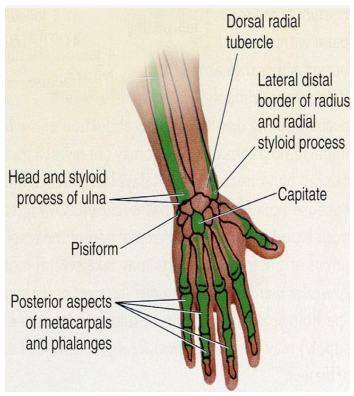
- The **metacarpals**, although they overlapped by the long extensor tendons of the fingers, they can be palpated on the dorsum of the hand.

The **heads** of the metacarpals form the knuckles of the hand.

The **3rd metacarpal** head is the most projected

The dorsal aspects of the phalanges can be easily palpated.

The knuckles of the fingers are formed by the heads of the proximal and middle phalanges.



7- axillary folds

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Anterior

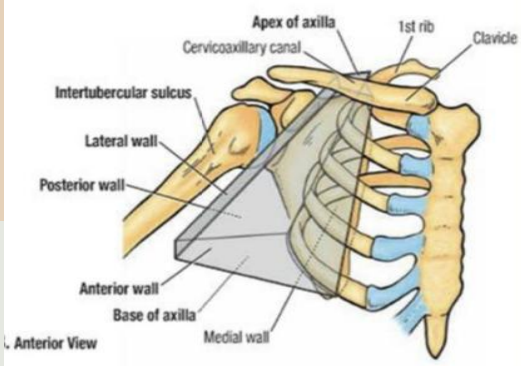
The anterior axillary folds is formed by the lower margin of the pectoralis major, and can be palpated by the finger.
This can be made by asking the patient to press the hand against the ipsilateral hip.

02

Posterior

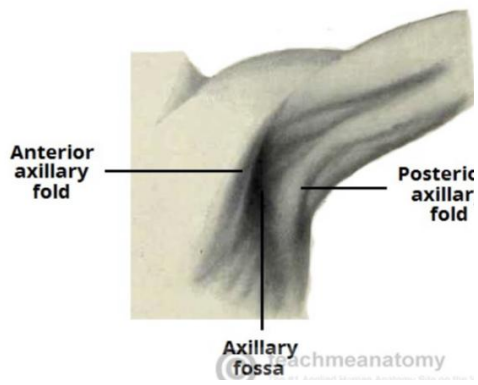
The posterior axillary fold is formed by the tendon of latissimus dorsi & teres major.

8- Axilla



· When the arm by the side, the inferior part of the head of the humerus can be easily palpated through the floor of the axilla

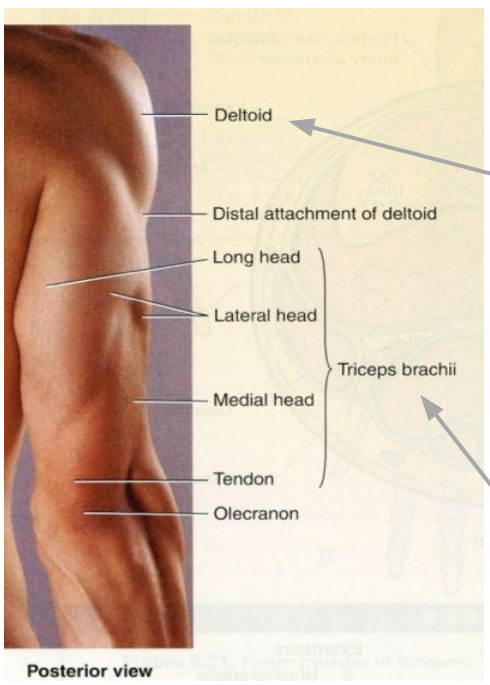
Pulsations of the axillary artery can be felt high up in the axilla, and around the artery and the cords of the brachial plexus.



The medial wall of the axilla is formed by the upper ribs covered by serratus anterior.

The lateral wall is formed by biceps brachii, coracobrachialis and the bicipital groove.

9- Muscles

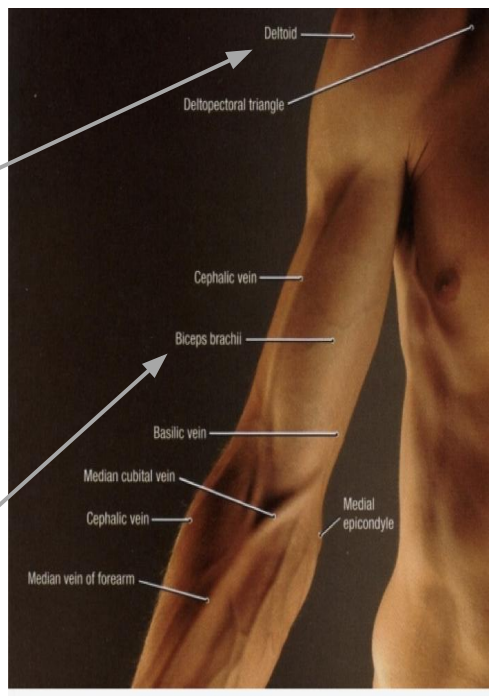


The borders are visible when the arm is abducted against resistance.
· The distal attachment of the deltoid can be palpated on the lateral surface of the humerus.

Biceps brachii & triceps brachii form bulge on the anterior and posterior surfaces of the arm.

The triceps tendon can be palpated where it is attached to the olecranon process.

The biceps tendon can be palpated in the cubital fossa, just lateral to the midline.

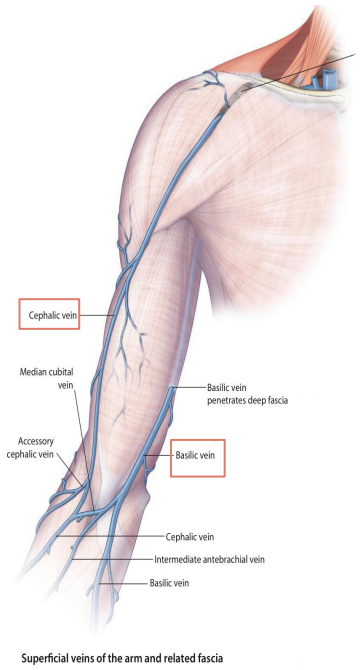


10- Veins

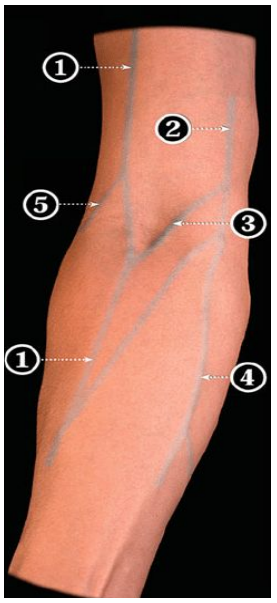
There are 2 grooves: Medial and lateral grooves separate the bulges formed by the biceps and triceps.

1-The <u>cephalic vein</u> ascends superiorly in the lateral groove.

2-The <u>basilic vein</u> ascends in the medial groove.

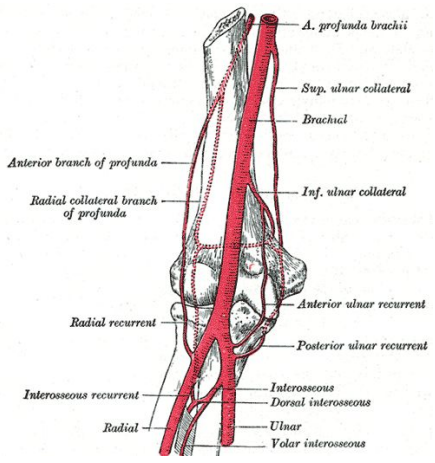


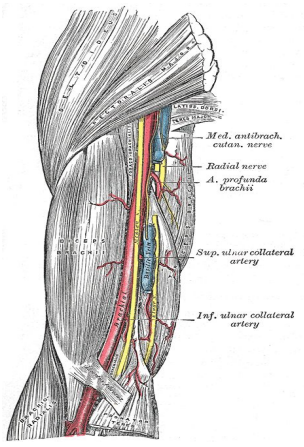
Superficial veins of the arm and related fascia



11- Brachial artery

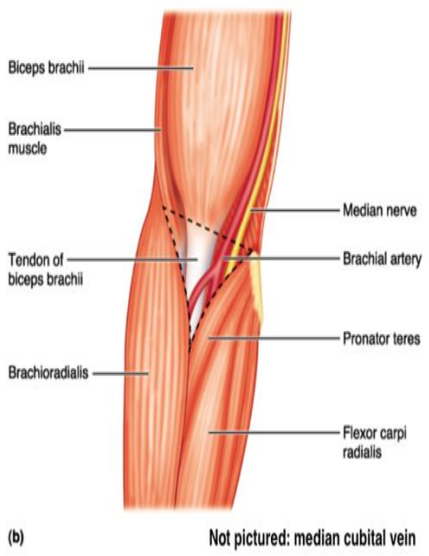
The <u>brachial artery</u> can be felt pulsating deep to the medial border of the biceps.
To stop bleeding by pressure on the artery:
- in the upper half of the arm it is pushed laterally against the humerus.
-In the lower half it is pushed posteriorly.
-In the cubital fossa, it lies beneath the bicipital aponeurosis.



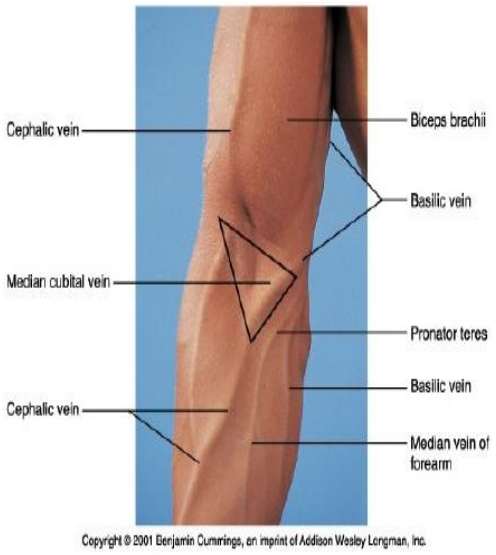


12- Cubital fossa

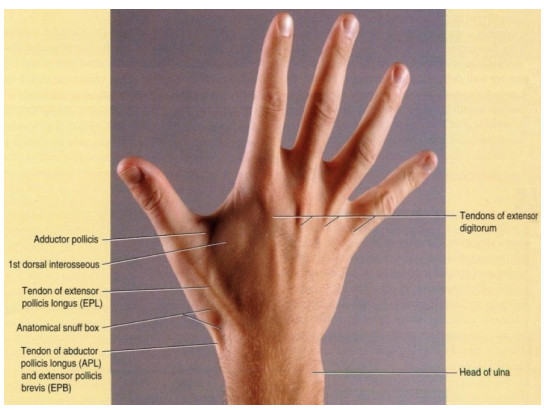
*Consist of :
- Cephalic vein
- Basilic vein
- Median cubital vein are clearly visible.
*The median cubital vein connects the cephalic and the basilic veins
- It crosses over the bicipital aponeurosis.
- It is the vein of choice for IV line,
WHY?



(b) Not pictured: median cubital vein

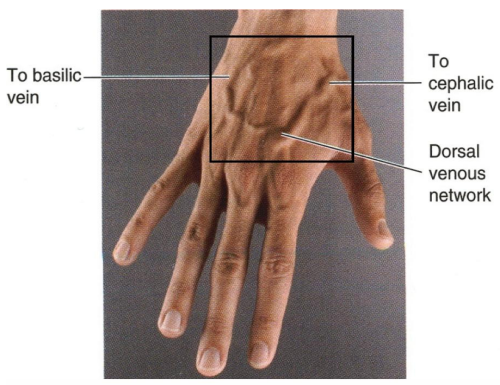


13- Dorsum Of The Hand:



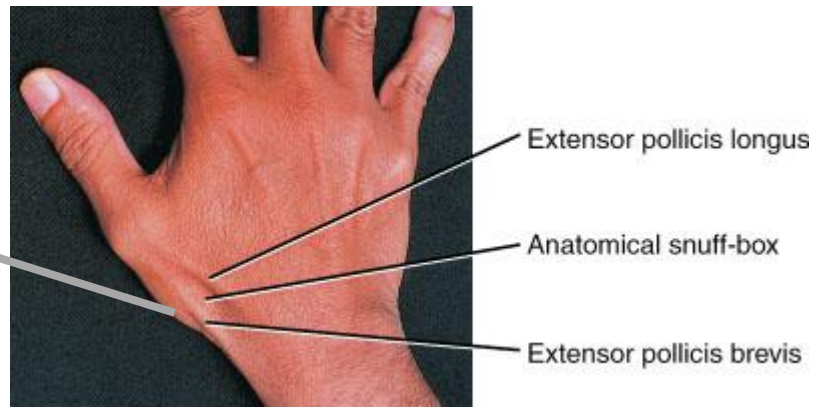
The dorsal venous network:
The network of superficial veins can be seen on the dorsum of the hand.
The network drains upward into the cephalic vein laterally, and the basilic vein medially

The tendons of extensor digitorum, extensor indicis, and extensor digiti minimi can be seen and felt as you extends your fingers.

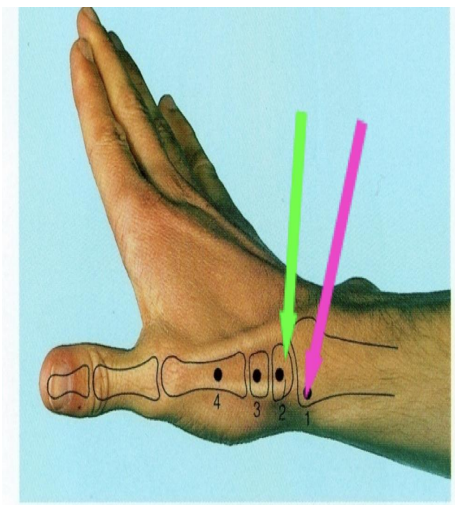


14- Anatomical Snuff Box:

It is a **depression** on the lateral aspect of the wrist joint which
is accentuated when you extends your thumb.



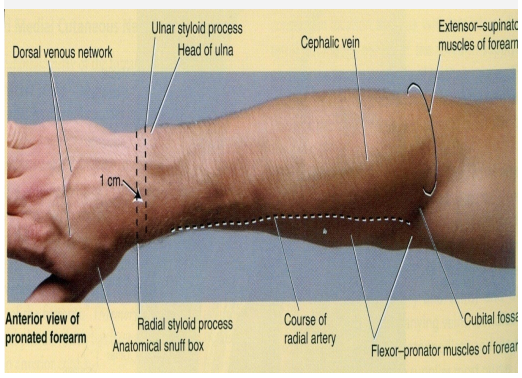
Boundaries:	The Floor:
Laterally by 2 tendons: • Abductor pollicis longus. • Extensor pollicis brevis. Medially: • Extensor pollicis longus.	In its proximal part the radial styloid process is palpable. The scaphoid bone is also palpable in the distal part of the anatomical snuff box.



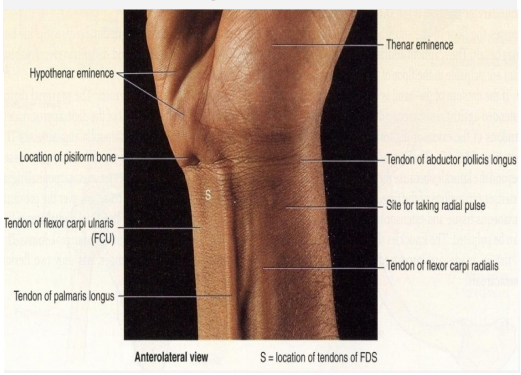
Anatomical snuff box: bones
1 Radial styloid
2 Scaphoid
3 Trapezium
4 First metacarpal

15- Radial Artery:

The **Radial artery** can be drawn by a line extends from the midpoint of the cubital fossa to the base of the styloid process of radius.

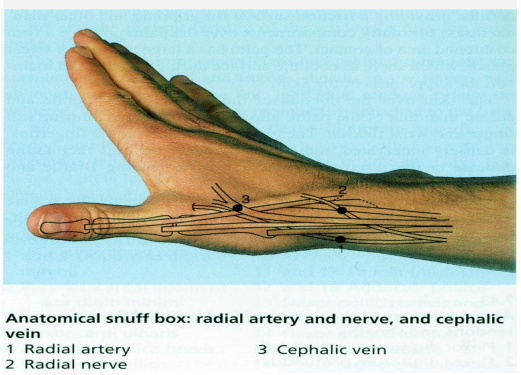


Radial Artery pulsation:
Universally, its pulsations can easily be felt anterior to the distal third of radius. Here it lies just beneath the skin and fascia lateral to the tendon of flexor carpi radialis.



Radial artery pulsation can be felt against the floor of the snuff box. More superficially, the anatomical snuff box is crossed by:

·The cephalic vein.
·The radial nerve.

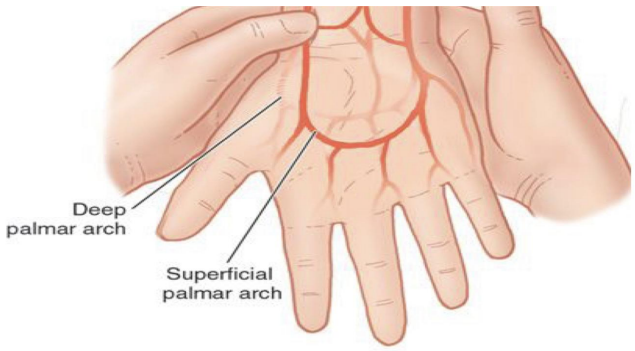


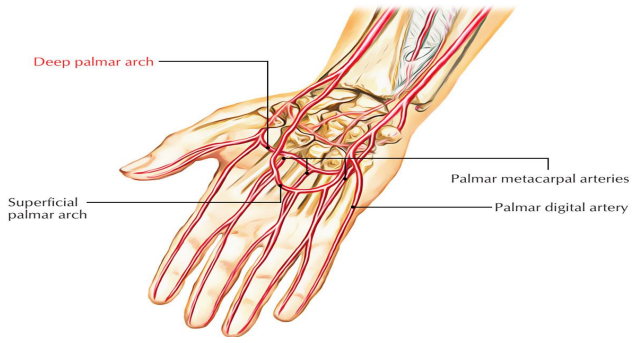
Anatomical snuff box: radial artery and nerve, and cephalic vein
1 Radial artery
2 Radial nerve
3 Cephalic vein

16 - Palmar Arterial Arch

Superficial Palmar Arterial arch:
The superficial palmar arterial arch is located in the central part of the palm and lies on a line drawn across the palm at the level of the distal border of the fully extended thumb.

Deep Palmar Arterial Arch:
The deep palmar arterial arch is also located in the central part of the palm (proximal to the superficial one), lies on a line drawn across the palm at the level of the proximal border of the fully extended thumb.





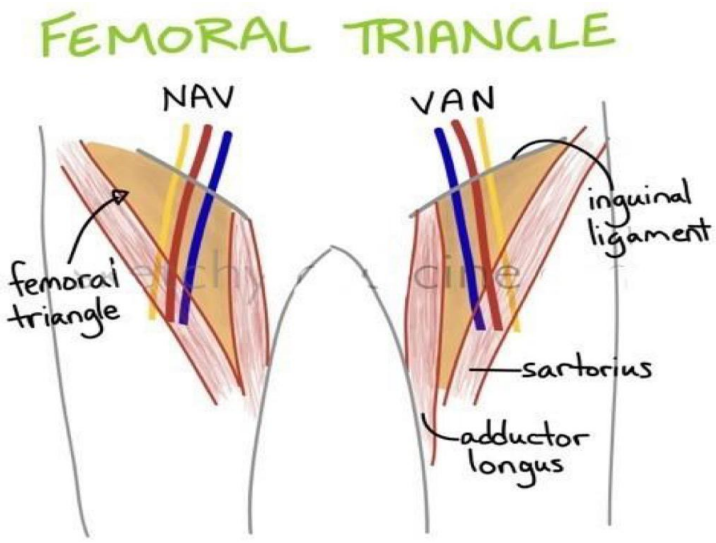
Lower Limb:

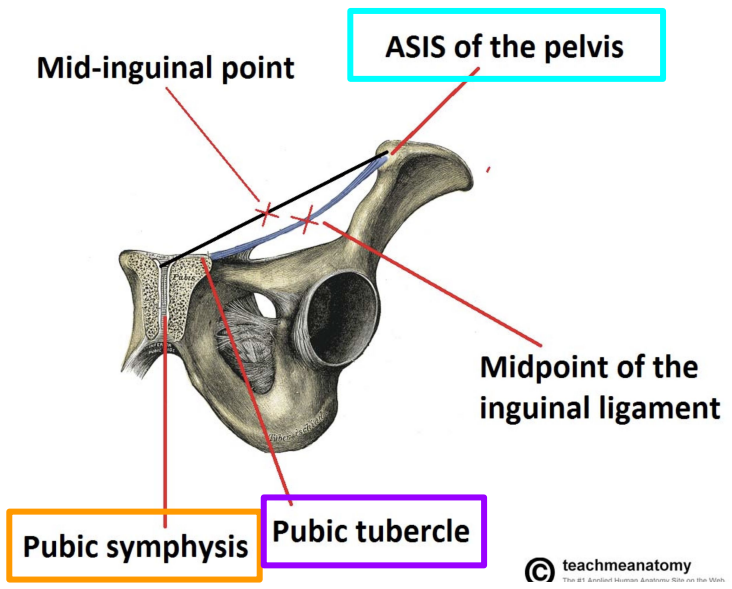
1- Inguinal Region:

- All of the following structures are palpable in the inguinal region:

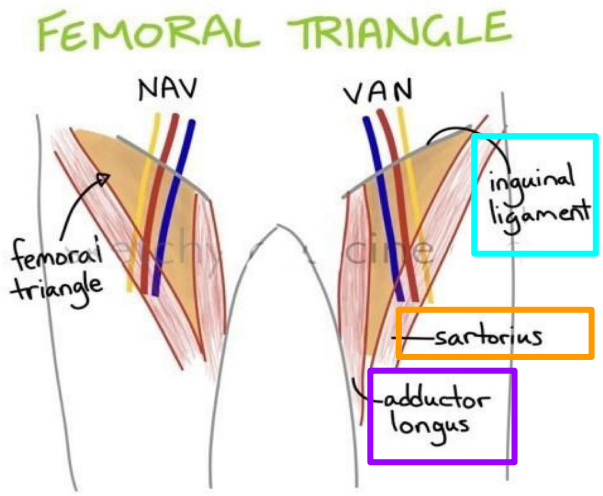
1. Symphysis pubis.
2. Body of pubis.
3. Pubic tubercle.
4. ASIS. (Anterior Superior Iliac Spine)

- The **inguinal ligament** extends between: The **pubic tubercle and The ASIS.**
- In the **mid-inguinal point** you can feel the pulsations of the femoral artery.
- The femoral artery is an important site for vascular access as a large number of arteriographic procedures are undertaken through its percutaneous puncture, (e.g. coronary angiography).
- The femoral vein lies on the **medial** side of the artery. While the femoral nerve lies **lateral** to the artery.





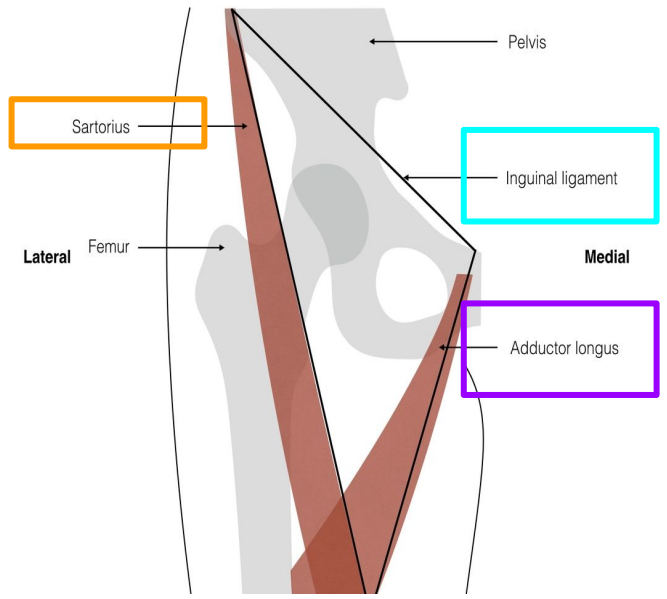
2- Femoral Triangle:



- The **femoral triangle** can be seen as a depression below the fold of the groin in the upper part of the thigh.

In a thin, muscular subject:

- the **boundaries** of the triangle can be identified when the thigh is flexed, abducted, and laterally rotated.
- The **base** of the triangle is formed by the inguinal ligament,
- the **lateral border** by the sartorius and
- the **medial border** by the adductor longus.
- The iliac crest is **subcutaneous** and can be palpated throughout its length, from the ASIS to the PSIS.

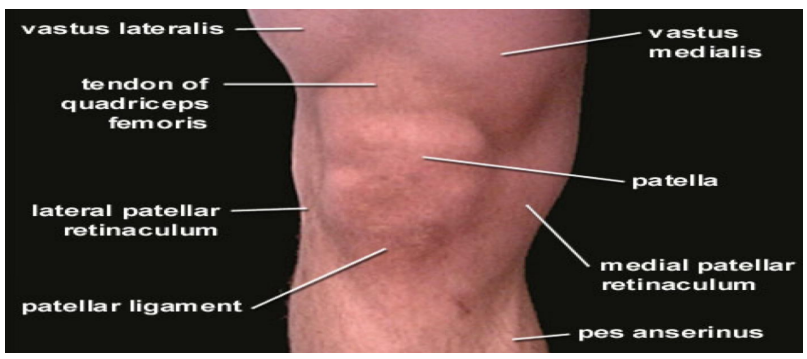


- The greater trochanter of the femur is also **subcutaneous** and can be palpated on the lateral aspect of the hip joint behind and below to the ASIS.

3- Knee region

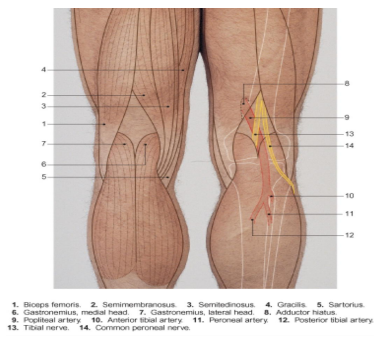
In **front of the knee** joint the patella and the ligamentum patellae can be easily palpated.

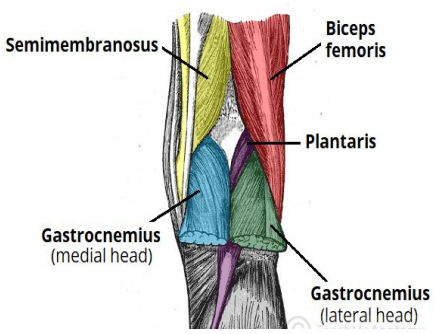
1. The ligamentum patellae can be traced downward as it is attached to the tibial tuberosity.
2. The condyles of the femur and tibia can be recognized on the sides of the knee and the joint line can be identified between them.



In the **back of the knee** and leg try to palpate:

1. The boundaries of the popliteal fossa.
2. The pulsation of the popliteal artery which is deeply situated in the fossa.





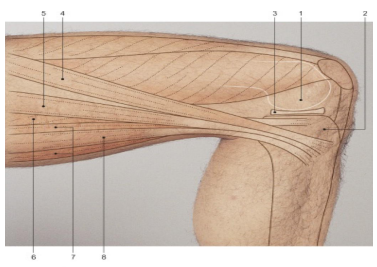
On the **medial aspect** of the knee Joint try to palpate:

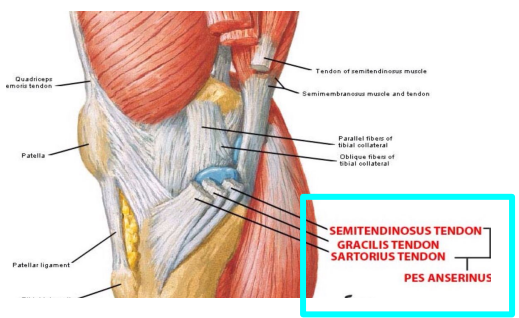
1. Medial femoral condyle.
2. Medial tibial condyle.
3. The 3 tendons of:
   - Sartorius.
   - Gracilis.
   - Semitendinosus.

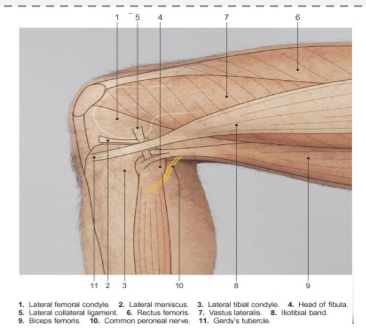
سنة :sartorius جدك: Gracilis سعيدة: Semitendinosus

On the **lateral aspect** of the knee Joint try to palpate:

1. Lateral femoral condyle.
2. Lateral tibial condyle.
3. Head of the fibula.
4. Neck of the fibula.
5. Tendon of biceps femoris.







4- Leg and Foot

On the **anterior** aspect of the leg and knee Joint and try to palpate:

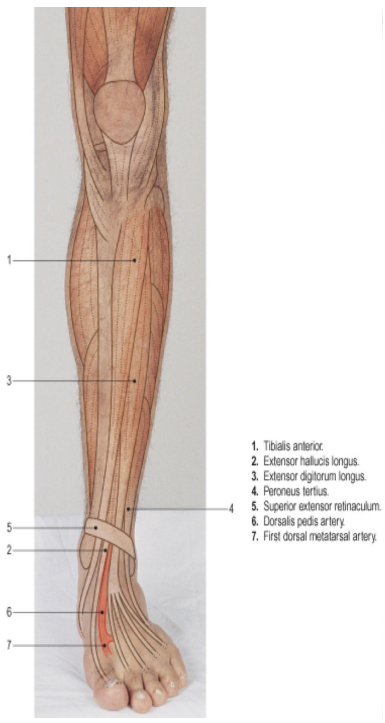
1. The patella.
2. The tibial tuberosity.
3. The anterior border of the tibia, (shine).
4. The medial tibial condyle.
5. The medial surface of the tibia.
6. The medial malleolus.
7. The lateral malleolus.

On the dorsum of the foot try to palpate:

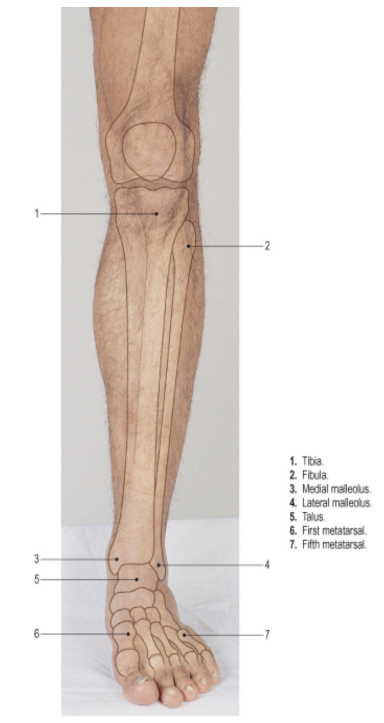
1. The tuberosity of the 5th metatarsal.
2. The tubercle of navicular.
3. The metatarsals.

On the **lateral** aspect of the leg try to palpate:

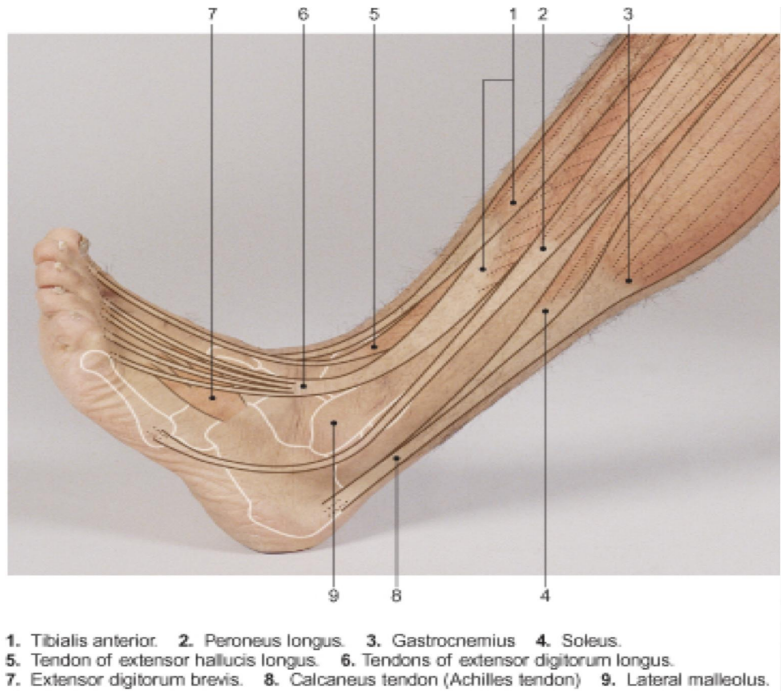
1. The tendons of peroneus longus and brevis.
2. The tendon Achilles.
3. The lateral malleolus.



1. Tibialis anterior.
2. Extensor hallucis longus.
3. Extensor digitorum longus.
4. Peroneus tertius.
5. Superior extensor retinaculum.
6. Dorsalis pedis artery.
7. First dorsal metatarsal artery.



1. Tibia.
2. Fibula.
3. Medial malleolus.
4. Lateral malleolus.
5. Talus.
6. First metatarsal.
7. Fifth metatarsal.



1. Tibialis anterior. 2. Peroneus longus. 3. Gastrocnemius 4. Soleus.
5. Tendon of extensor hallucis longus. 6. Tendons of extensor digitorum longus.
7. Extensor digitorum brevis. 8. Calcaneus tendon (Achilles tendon) 9. Lateral malleolus.

On the Medial aspect of the ankle try to palpate and feel:

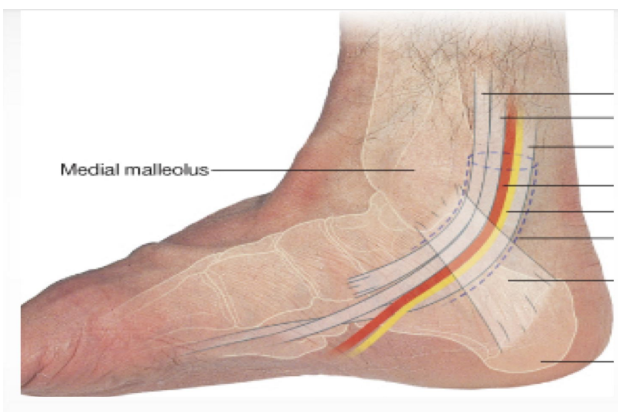
1. The medial malleolus.
2. The tendons of tibialis posterior
3. The tendon of flexor digitorum longus.
4. The posterior tibial artery.
5. The calcaneus.

On the dorsum of the foot try to palpate:
The long extensor tendons:

1. Tibialis anterior
2. Extensor hallucis longus.
3. Extensor digitorum longus.
4. Peroneus tertius

Tom has a very nice dog pig

Also, try to feel the pulsation of the dorsalis pedis artery.
Between the tendons of extensor hallucis longus & extensor digitorum longus.



MCQs

Q1: The tip of the olecranon process, the medial and the lateral epicondyles lie in a
A.straight line
B.tringle
C. Square
D.non

Q2: **to the acromion,** the deltoid muscle forms the rounded contour of the shoulder
A.inferior
B.posterior
C.superior
D.interior

Q3: The posterior axillary fold is formed by the tendon of
A.latissimus dorsi & teres minor.
B. Latissimus dorsi & teres major
C.longissimus & teres major
D.longissimus & teres minor

Q4:The ..... head is the most projected
A.3rd metacarpal
B.2nd metacarpal
C.1st metacarpal
D.all above

Q5:The brachial artery can be felt pulsating deep to the ..... border of the biceps.
A. medial
B. Lateral
C. Above
D. Can't be felt 😂

Q6: **Between the 2 sternal ends** of the 2 clavicle lies the
A.supracostal notch
B.infrasternal notch
C.jugular notch
D.infracostal notch

Q7:The pulsation of which of the following arteries can be felt in the snuff box?
A. Brachial artery
B. Femoral Artery
C. Radial Artery
D. Ulnar Artery

Q8: The inguinal ligament extends between the pubic tubercle and _____.
A. Anterior superior iliac spine
B. Anterior inferior iliac spine
C. Posterior superior iliac spine
D. Posterior inferior iliac spine

Q9: A patient suffering from a myocardial infarction underwent a coronary angiography. Which of the following arteries was used to gain vascular access?
A. Axillary artery
B. Femoral artery
C. Brachial artery
D. Radial artery

Q10: Which one form the base of femoral triangle?
A Femoral artery
B. Inguinal ligament
C. Femoral artery
D. Sartorius

Q11: Which one you can palpate on the lateral aspect of knee joint?
A. semitendinosus
B. Medial tibial condyle
C. Tendon of biceps femoris
D. Ligamentum patellae

Q12: which one you can palpate on the medial aspect of ankle?
A. The medial malleolus
B. The achilles tendon
C. Tendon of peroneus longus
D. Tendon of peroneus brevis

1)A 7)C
2)A 8)A
3)B 9)B
4)A 10)B
5)A 11)C
6)C 12)A

SAQs:
1- List 3 major structures passing through the femoral triangle
2- What are the boundaries of the anatomical snuff box?
3-While palpating the medial aspect of the knee what 3 tendons can we feel?
4- cubital fossa consist of ?
5- the lateral wall of axilla formed of ?

Answers:
1-Femoral artery, Femoral nerve, Femoral vein
2-The anatomical snuff box is bounded anteriorly by tendons of Abductor pollicis longus and Extensor pollicis brevis and posteriorly by extensor pollicis longus tendon.
3- Sartorius, Gracilis, Semitendinosus.
4- Cephalic vein - Basilic vein - Median cubital vein are clearly visible.
5-The lateral wall is formed by biceps brachii, coracobrachialis and the bicipital groove.

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