



MED437
KING SAUD UNIVERSITY



Surface Anatomy of The Upper and Lower Limbs

Lecture 3



Please check our [Editing File](#).

هذا العمل لا يغني عن المصدر الأساسي للمذاكرة

{ وَمَنْ يَتَوَكَّلْ عَلَى اللَّهِ فَهُوَ حَسْبُهُ }

We would like to recommend you to study this lecture at the end, after all the other 22 lectures. Good luck!

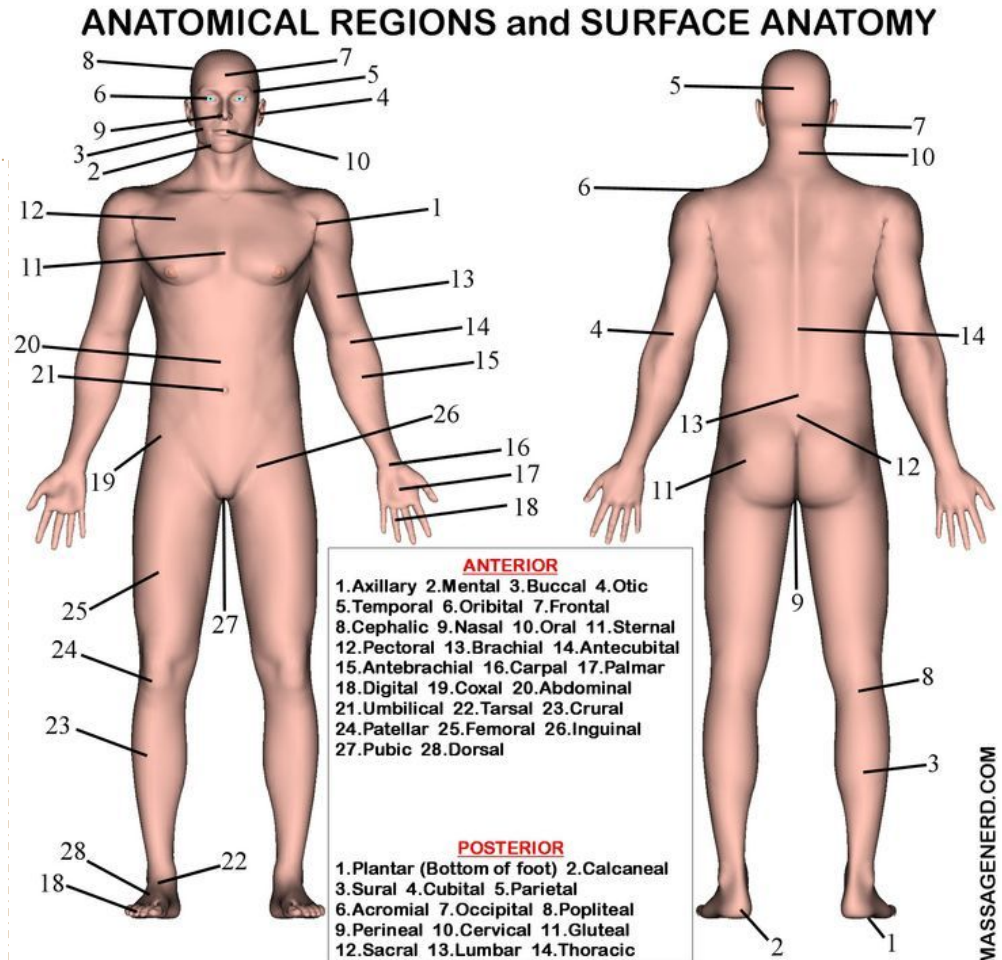
Objectives

- 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.

- Text in BLUE was found only in the boys' slides
- Text in PINK was found only in the girls' slides
- Text in RED is considered important
- Text in GREY is considered extra notes

Surface anatomy

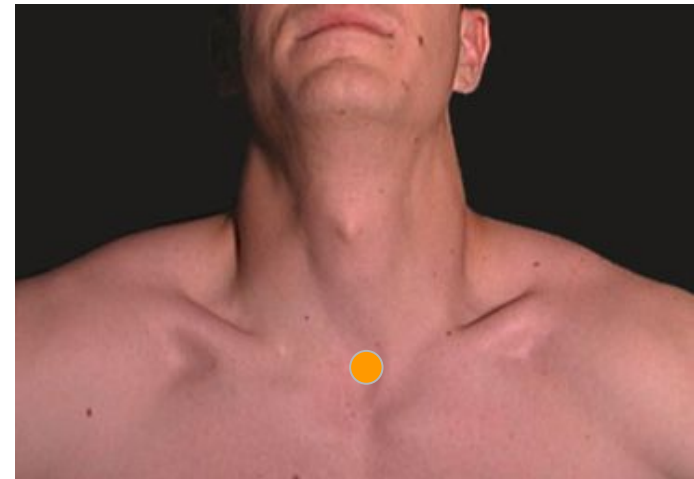
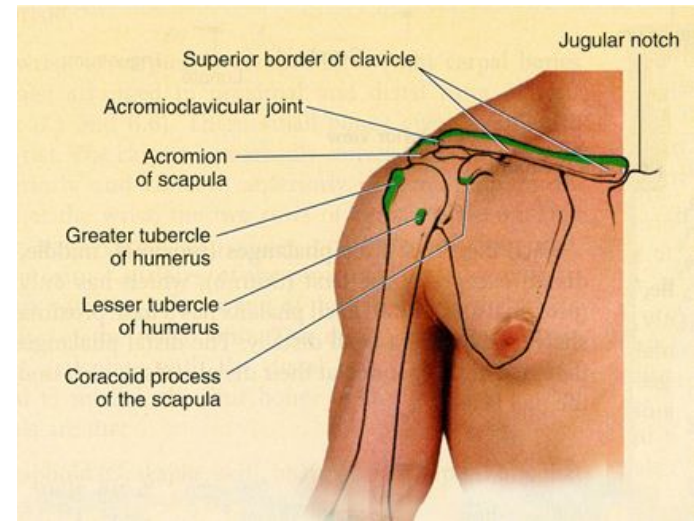
- It is a branch of gross anatomy that examines shapes and markings on the surface of the body as they are related to deeper structures.
- It is essential in locating and identifying anatomic structures prior to studying the internal gross anatomy.
- It helps to locate the affected organ / structure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



Upper limbs

- The **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).
(Important)
- The **acromial** end of the clavicle can be 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 convexity of the **clavicle**. Through the axillary canal.

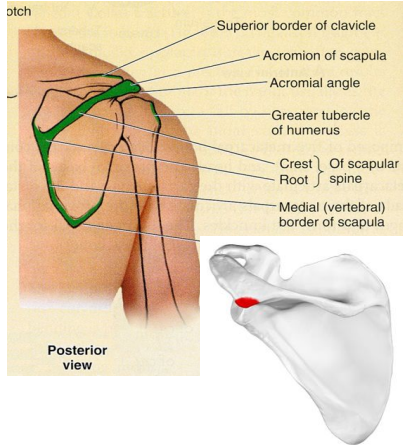
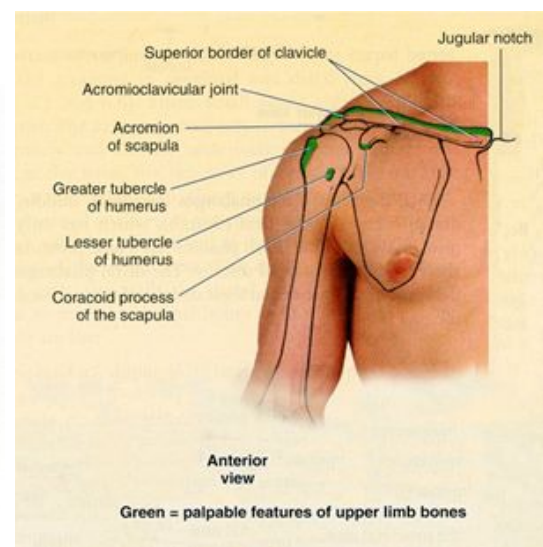
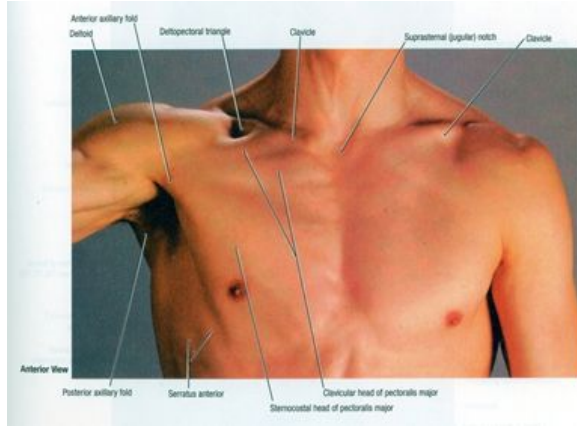
- The clavicle is the only long bones that lies horizontally.
- The axillary canal is walled by the clavicle anteriorly, outer border of the 1st rib medially and upper border of the scapula posteriorly.



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

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

- The clavipectoral triangle is bounded by:
 - Clavicle superiorly,
 - Deltoid laterally, and
 - Pectoralis major medially.



- The lateral and posterior borders of the acromion meet to form the **acromial angle**.

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

Which muscles originate from the coracoid process?

- Coracobrachialis and short head of biceps.

• Scapula:

1. Superior angle is parallel to the 2nd rib.
2. Spine is parallel to the 3rd rib.
3. Inferior angle is parallel to the 7th rib

(these are the medial borders for the scapula.)

REMEMBER: Abduction of the humerus is composed of 3 stages

0-15 > Supraspinatus

15-90 > Middle fiber of deltoid

90-180 > Trapezius and Latissimus Dorsi

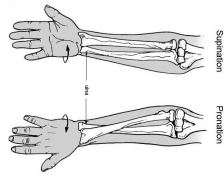
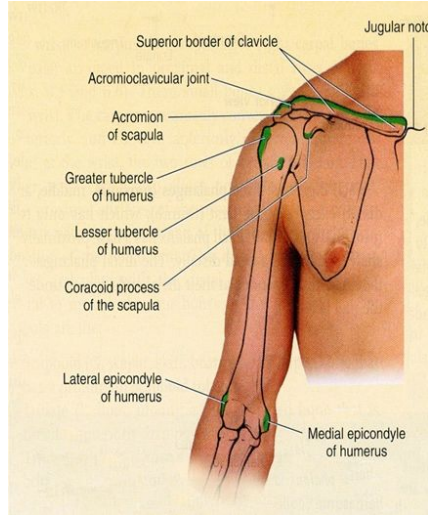
- The **greater tubercle of humerus** can be felt by deep palpation through the deltoid muscle, inferior to the acromion when the arm is by the side.

- In this position, the greater tubercle is the most lateral bony point of the shoulder.

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

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

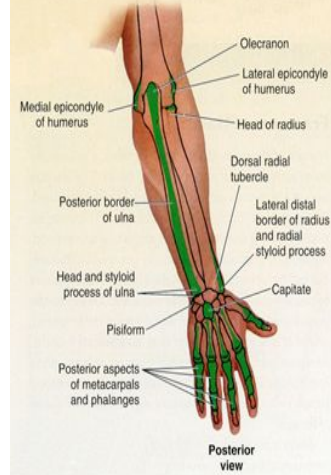
- Three muscles are attached to the greater tubercle of the humerus (SIT):
 - Supraspinatus
 - Infraspinatus
 - Teres minor
- The subscapularis inserts into the lesser tubercle of humerus.
- The medial epicondyle is more prominent than the lateral epicondyle.
- Anconeus origin is the back of the lateral epicondyle.
- The front of the lateral epicondyle is the common origin for the extensors.
- REMEMBER: the medial epicondyle is related to the common origin for the flexors + it is related to the ulnar nerve (funny nerve).



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

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

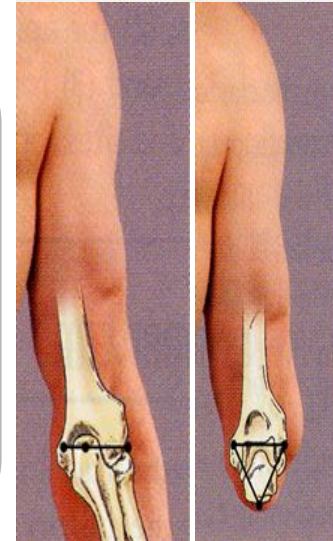
- The **olecranon and posterior border of the ulna** lie **subcutaneously** and can be palpated easily. Behind the elbow.



- When the **elbow joint is extended**, the tip of the olecranon process, the medial and the lateral epicondyles lie in a **straight line**.

- When the **elbow is flexed**, the olecranon forms the apex of an equilateral **triangle**, where the epicondyles form the angles.

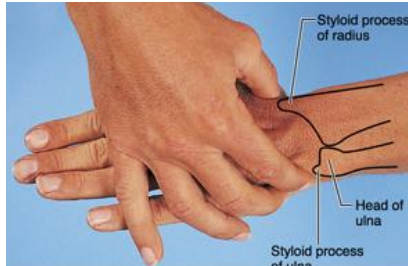
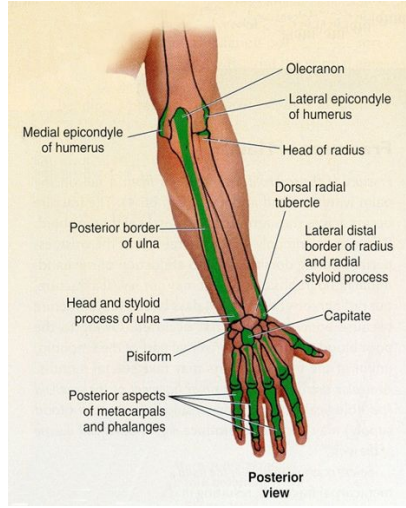
- Fractures of any of these structures will disturb this arrangement.



- The **head of radius** can be 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 **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.

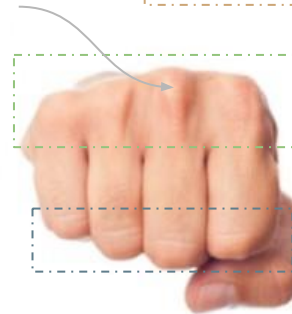


- The **metacarpals**, although they overlapped by the long extensor tendons of the fingers, they can be palpated on the dorsum of the hand.

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

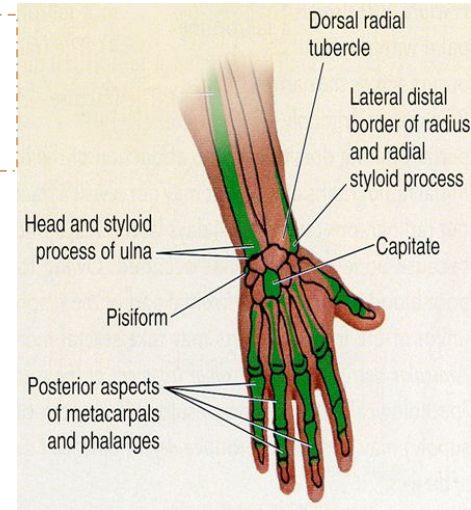
- Notice that the 3rd metacarpal head is the most prominent.

You have to know the proximal and distal carpal bones medially to laterally.



- 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**.



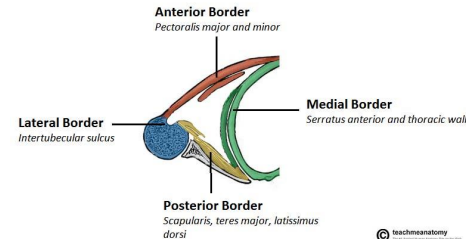
Axillary Folds

- **The anterior axillary fold** 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 his or her hand against the ipsilateral hip.
- **The posterior axillary fold** is formed by the tendons of latissimus dorsi and teres major muscles.



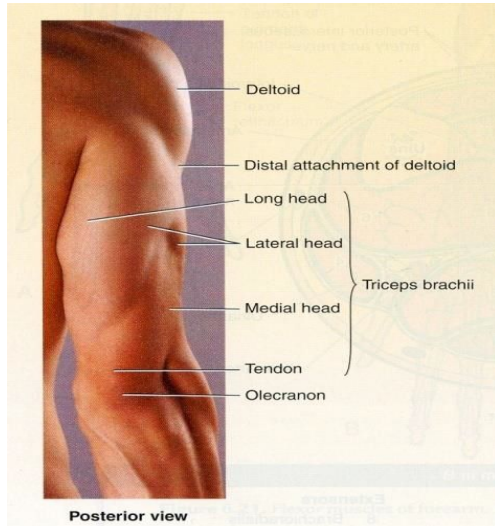
Axilla

- The axilla should be examined with the forearm supported and the pectoral muscles relaxed. The patient will relax their hand and you will carry and hold the arm and examine the axilla.
- When the arm is by the side, the inferior part of the head of the humerus can be easily palpated through the floor of the axilla.
- The **pulsations** of the **axillary artery** can be felt high up in the axilla, and around the artery are the cords of the brachial plexus.
- The medial wall of the axilla is formed by the upper ribs covered by the serratus anterior.
- The lateral wall is formed by the coracobrachialis and biceps brachii and the bicipital groove.

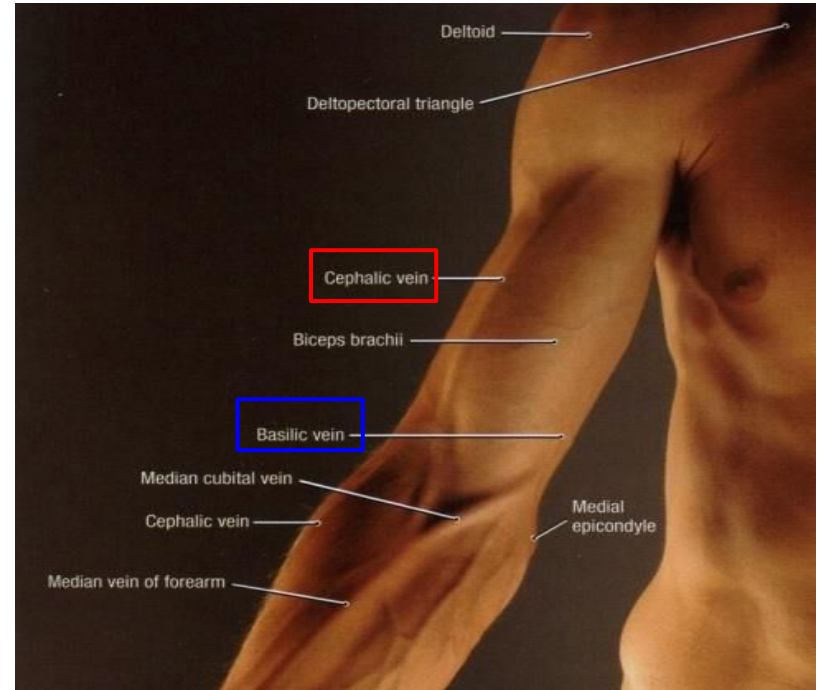


- The borders of the **deltoid** are visible when the arm is abducted against resistance.
- The **distal attachment of the deltoid** can be palpated on the lateral surface of the humerus (deltoid tuberosity of the humerus).
- Biceps brachii and triceps brachii form bulge on the anterior and posterior surfaces of the arm.
- The **biceps tendon** can be palpated in the cubital fossa, immediately lateral to the midline.
- The triceps tendon can be palpated where it is attached to the olecranon process. *Behind the elbow*

- **There are 2 grooves: Medial and lateral grooves** separate the bulges formed by the **biceps and triceps**.
- The **cephalic vein** ascends superiorly in the lateral groove and
- The **basilic vein** ascends in the medial groove.



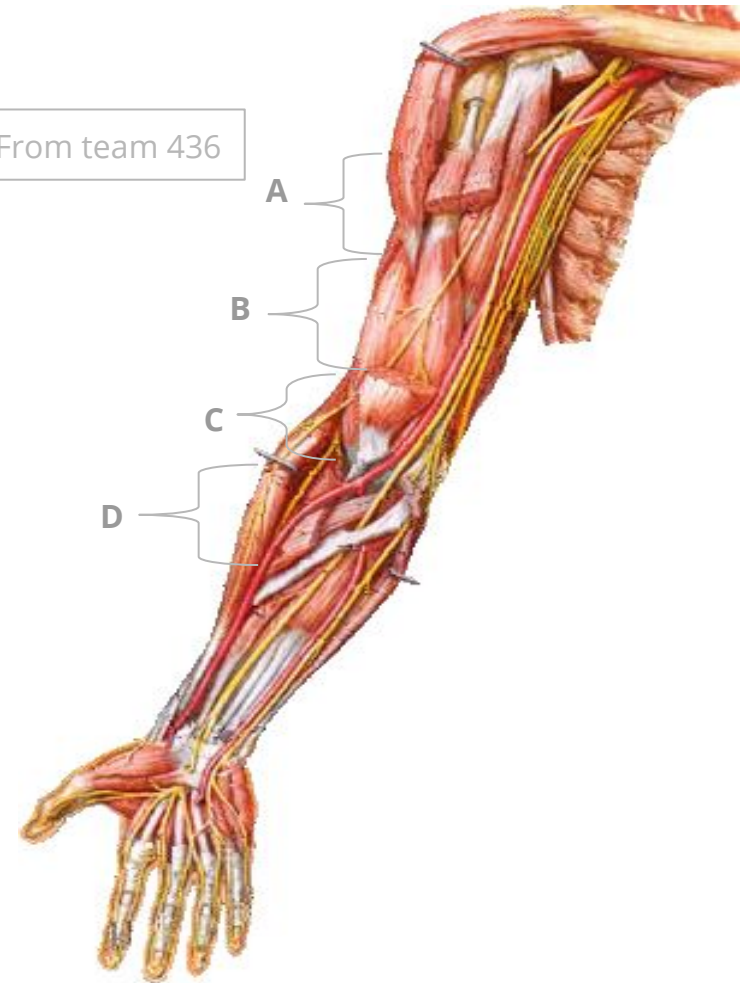
To stop a bleed in the arm we press on the arm laterally to push the brachial artery against the humerus.



Brachial artery

- The **brachial artery** 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 (A).
- In the lower half it is pushed **posteriorly** (B).
- In the cubital fossa, it lies beneath the bicipital aponeurosis (C).
- At the level of the neck of the radius, it divides into radial and ulnar arteries (D).

From team 436



Cubital fossa

In the cubital fossa, try to locate:

1- **Cephalic vein**

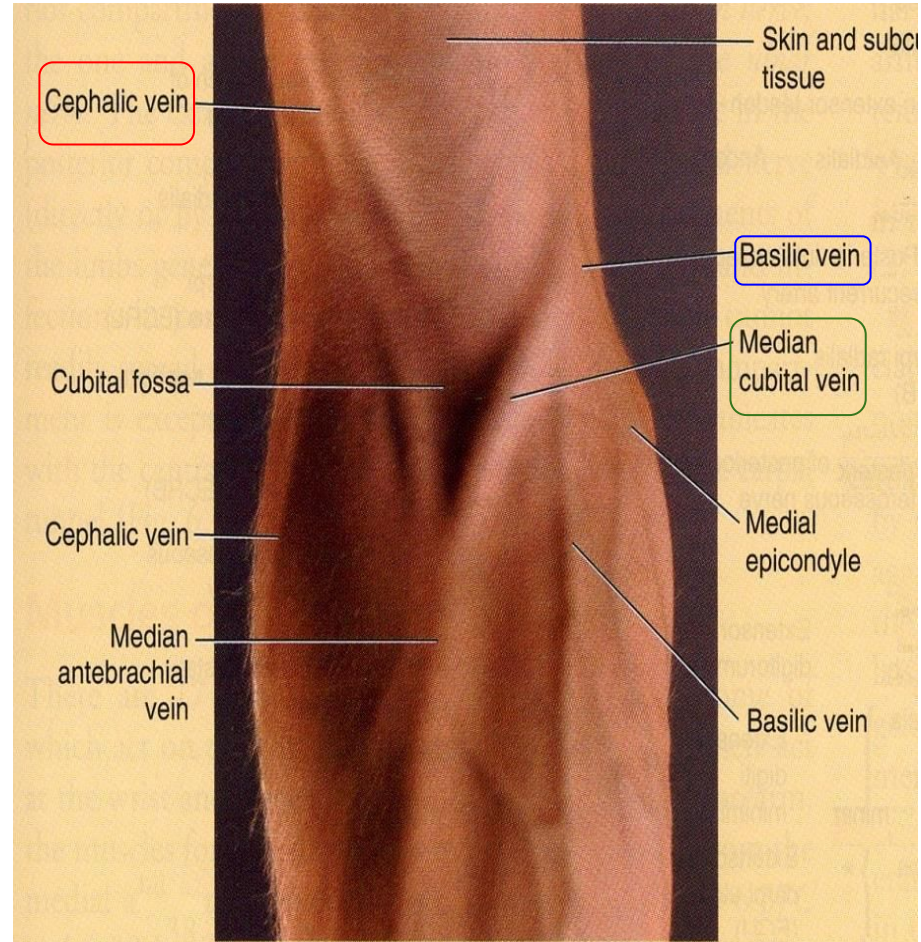
2- **Basilic vein**

3- **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 ?

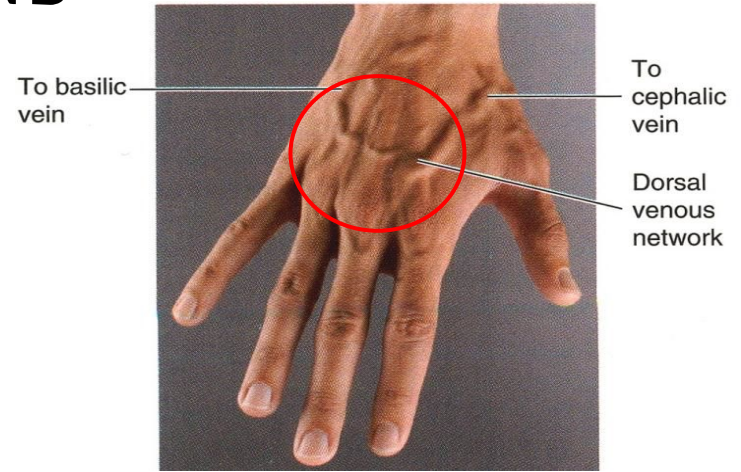
- The vein is separated from the artery and nerve due to the bicipital aponeurosis
- It is very superficial and its position is fixed



DORSUM OF THE HAND

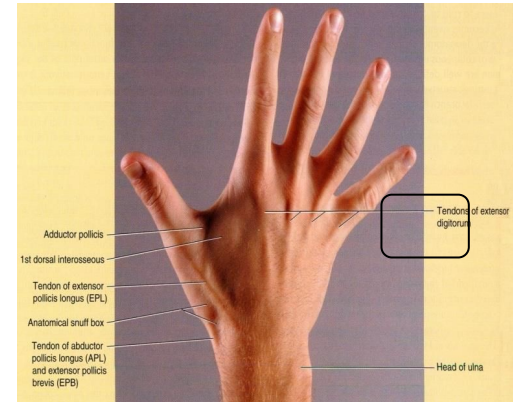
The dorsal venous network:

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.

- Each dorsum of the hand has one tendon except the index and little finger.



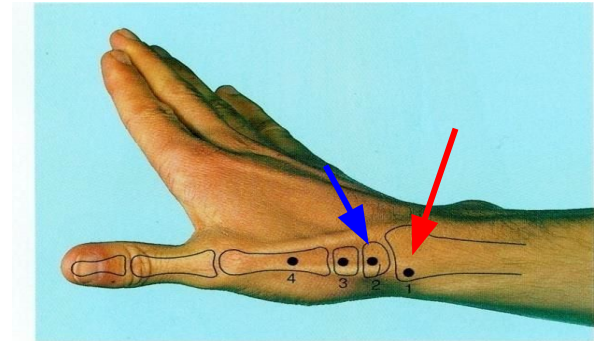
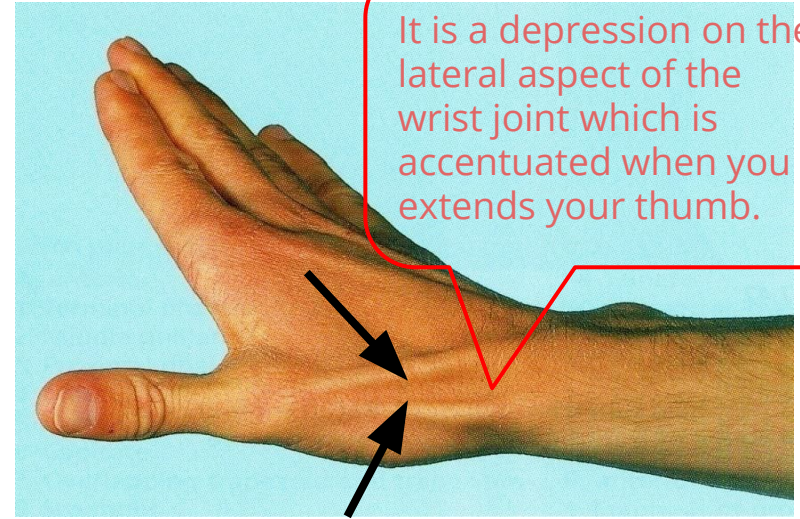
ANATOMICAL SNUFF BOX

Boundaries

- The snuff box is bounded :
- Laterally** by 2 tendons:
 - Abductor pollicis longus
 - Extensor pollicis brevis
- Medially** by 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.

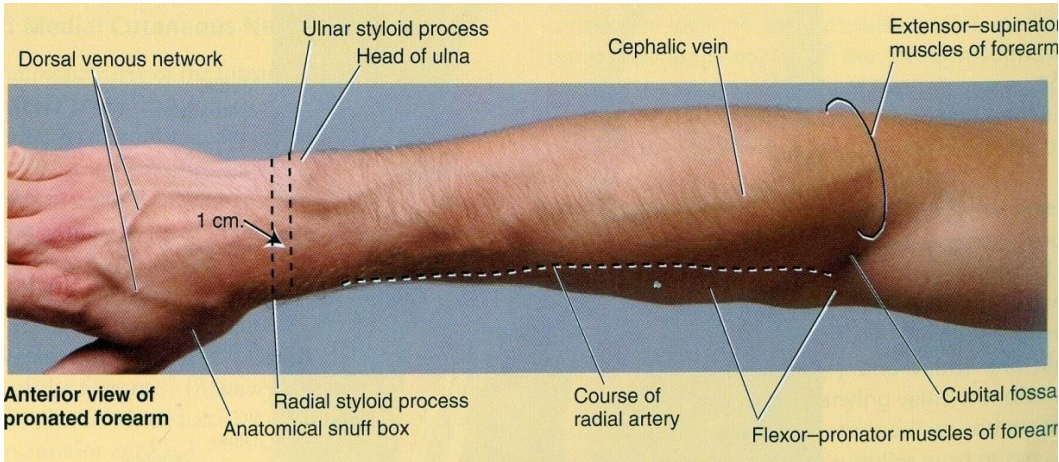
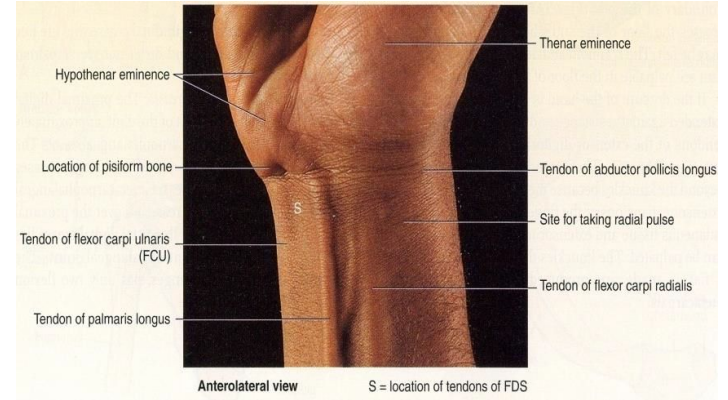


Anatomical snuff box: bones

- | | |
|------------------|--------------------|
| 1 Radial styloid | 3 Trapezium |
| 2 Scaphoid | 4 First metacarpal |

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 muscle**.

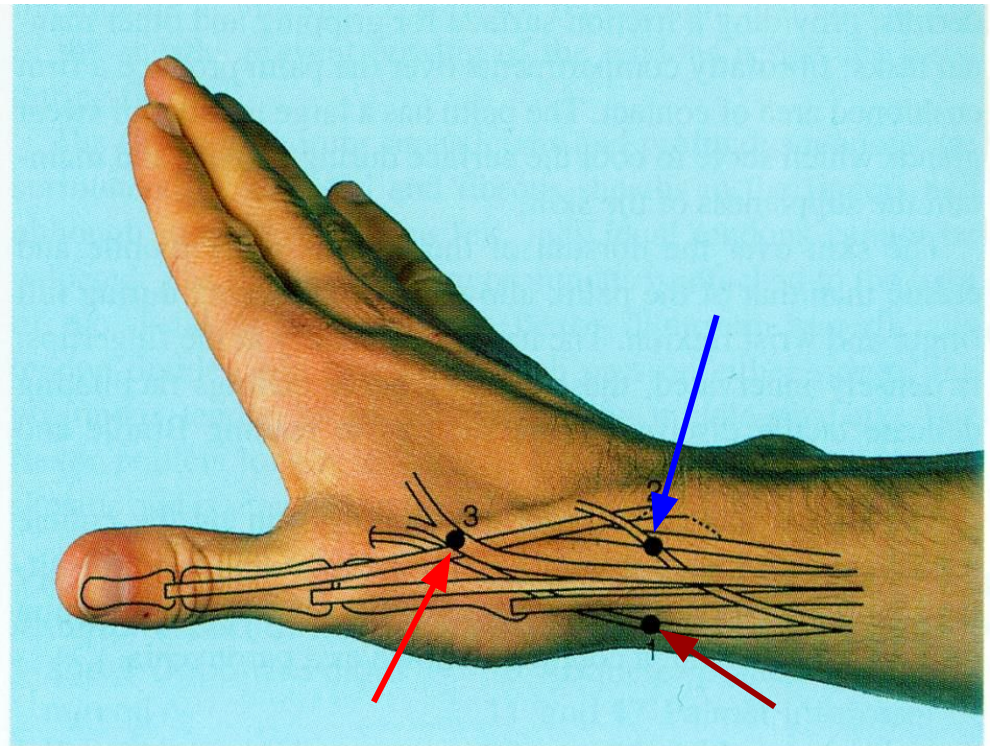
•Also, the **radial artery** pulsation can be felt against the floor of the **snuff box***.

•More superficially, the anatomical snuff box is crossed by:

1- **The cephalic vein.**

2- **The radial nerve.**

*The reason that it is called the anatomical snuffbox is that snuff (powdered tobacco) could be put there and then inhaled.



Anatomical snuff box: radial artery and nerve, and cephalic vein

1 Radial artery
2 Radial nerve

3 Cephalic vein

Arches of the hand

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**.

REMEMBER:

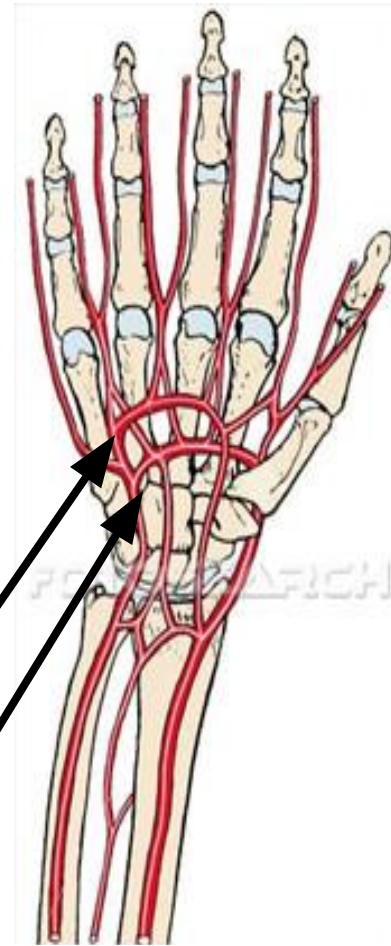
structures that pass **superficial** to the flexor retinaculum:

{from medial to lateral}

Ulnar nerve>>Ulnar Artery>>Palmar cutaneous branch of ulnar nerve>>tendon of palmaris longus>>palmar cutaneous branch of medial nerve.



Distal border
Proximal border

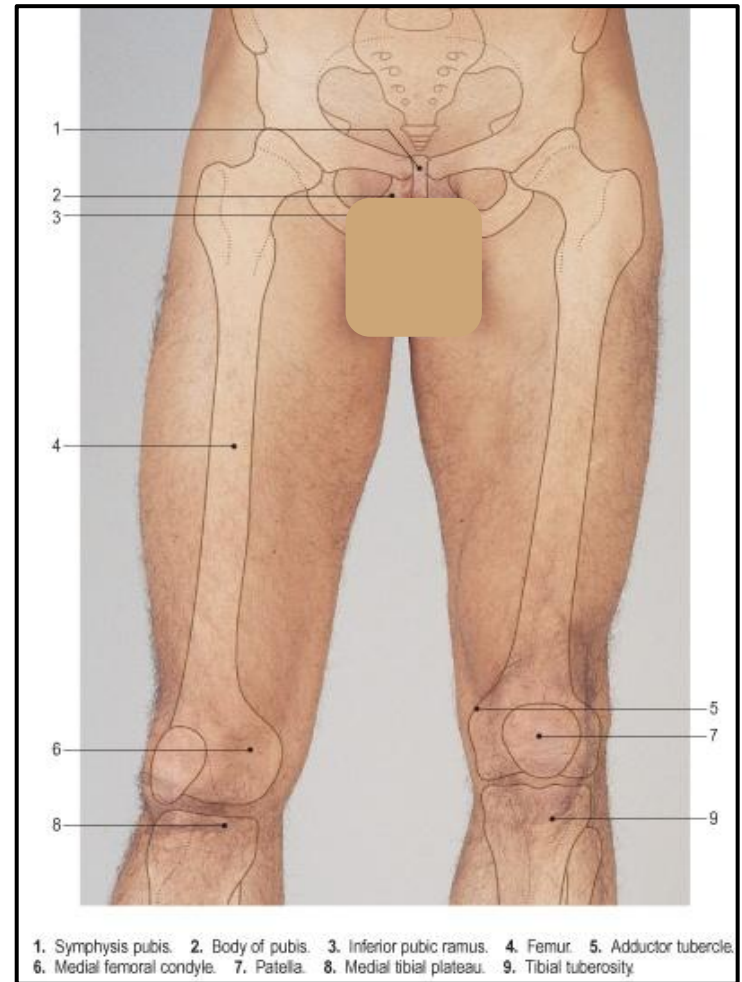
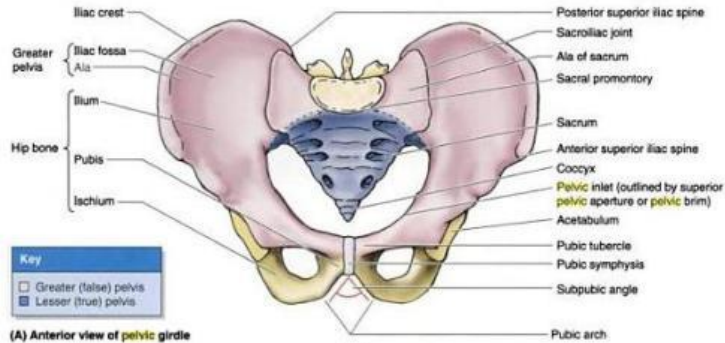


Lower Limb

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 pubic tubercle is a landmark for 2 types of hernias Team {436}.



Lower Limb

The inguinal ligament extends between:

The pubic tubercle and The **ASIS**.

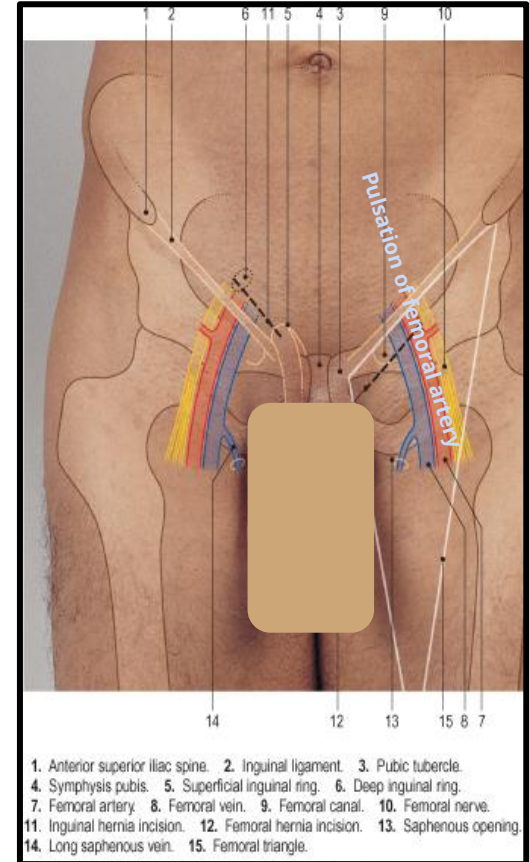
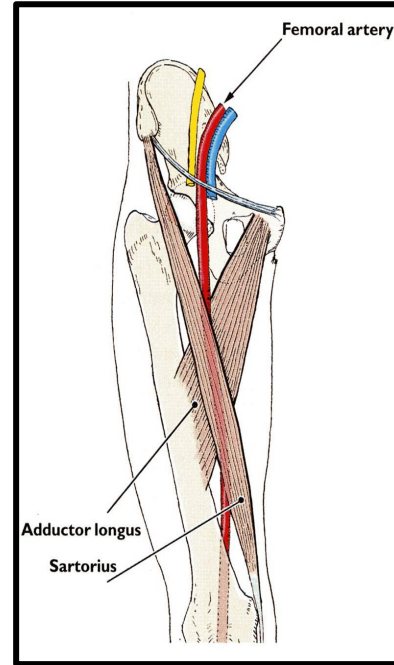
{Anterior Superior Iliac Spine}

- In the **mid-inguinal point** you can feel the pulsations of the **femoral artery**.
- The **femoral vein** lies on the **medial** side of the **artery**.
- The **femoral nerve** lies **lateral** to the **artery**.

VAN

Midinguinal point:

- It is a point on the inguinal ligament midway between the **symphysis pubis** and the **ASIS**.
- The **femoral artery** is an important site for vascular access as a large number of arteriographic procedures are undertaken through its percutaneous puncture, (coronary angiography).



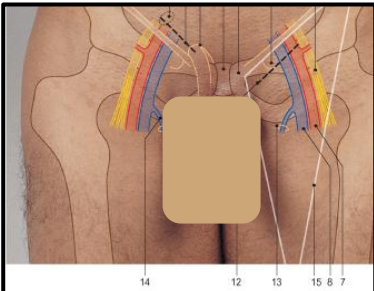
Lower Limb.cont

Femoral Triangle:

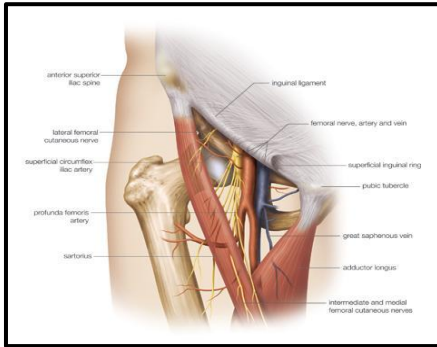
The **femoral triangle** can be seen as a depression below the fold of the groin in the upper part of the thigh.

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.



1. Anterior superior iliac spine. 2. Inguinal ligament. 3. Pubic tubercle.
4. Symphysis pubis. 5. Superficial inguinal ring. 6. Deep inguinal ring.
7. Femoral artery. 8. Femoral vein. 9. Femoral canal. 10. Femoral nerve.
11. Inguinal hernia incision. 12. Femoral hernia incision. 13. Saphenous opening.
14. Long saphenous vein. 15. Femoral triangle.



Contents of femoral triangle:

Femoral vein

Femoral artery

Both vein & artery are enclosed in a fascial envelope (Femoral sheath)

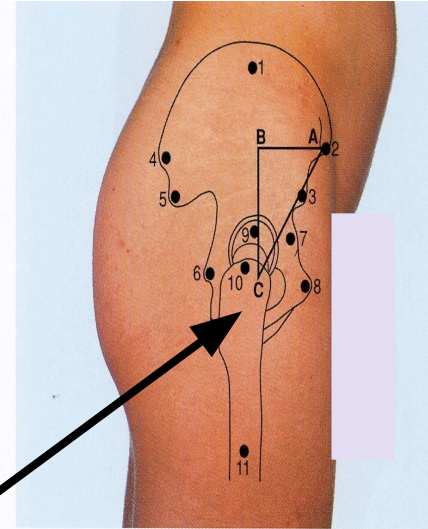
Femoral nerve (outside femoral sheath)

Deep inguinal lymph nodes

The **iliac crest** is **subcutaneous** and can be palpated throughout its length, from the **ASIS** to the **PSIS**.

{Posterior Superior Iliac Spine}

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



8.17

Lateral aspect of the hip joint: bones

- | | |
|----------------------------------|-----------------------|
| 1 Ilium | 6 Ischial spine |
| 2 Anterior superior iliac spine | 7 Iliopubic eminence |
| 3 Anterior inferior iliac spine | 8 Body of pubis |
| 4 Posterior superior iliac spine | 9 Head of femur |
| 5 Posterior inferior iliac spine | 10 Greater trochanter |
| | 11 Shaft of femur |
- ABC, Bryant's triangle

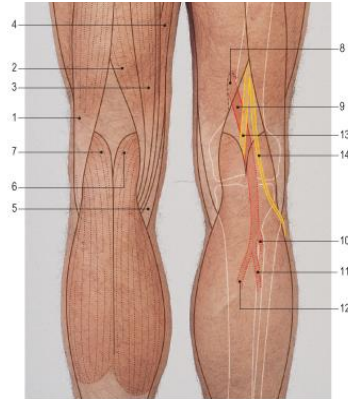
Lower limb (knee region)

In front of the knee joint the **patella** and the **ligamentum patellae** can be easily palpated. The ligamentum patellae can be traced downward as it is attached to the tibial tuberosity. 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:

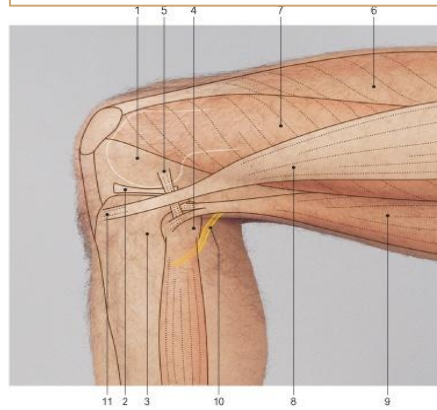
1. The boundaries of the popliteal fossa.
2. The pulsation of the popliteal artery which is deeply situated in the fossa.



1. Biceps femoris.
2. Semimembranosus.
3. Semitendinosus.
4. Gracilis.
5. Sartorius.
6. Gastrocnemius, medial head.
7. Gastrocnemius, lateral head.
8. Adductor hiatus.
9. Popliteal artery.
10. Anterior tibial artery.
11. Peroneal artery.
12. Posterior tibial artery.
13. Tibial nerve.
14. Common peroneal nerve.

On the lateral aspect of the knee joint try to palpate:

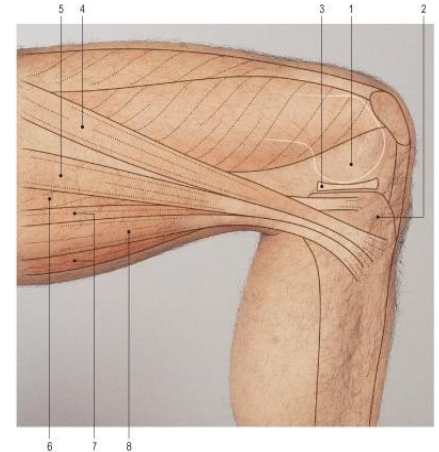
1. Lateral femoral condyle
2. Lateral tibial condyle
3. Head of the fibula
4. Neck of the fibula
5. Tendon of biceps femoris



1. Lateral femoral condyle.
2. Lateral meniscus.
3. Lateral tibial condyle.
4. Head of fibula.
5. Lateral collateral ligament.
6. Rectus femoris.
7. Vastus lateralis.
8. Iliotibial band.
9. Biceps femoris.
10. Common peroneal nerve.
11. Gerdy's tubercle.

On the medial aspect of the knee joint try to palpate:

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



1. Medial femoral condyle.
2. Medial tibial condyle.
3. Medial meniscus.
4. Sartorius.
5. Gracilis.
6. Adductor magnus.
7. Semimembranosus.
8. Semitendinosus.

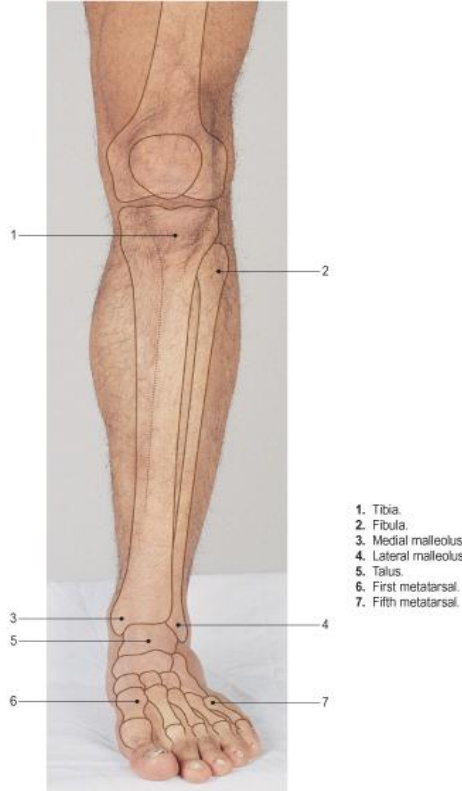
Lower limb (leg and foot)

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 (shin).
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:

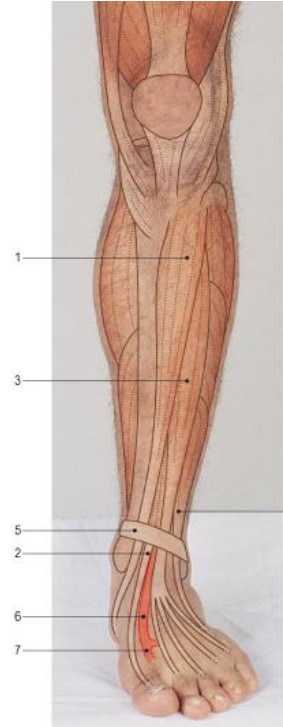
1. The tuberosity of the 5th metatarsal
2. The tubercle of navicular.
3. The metatarsals.



On the dorsum of the foot try to palpate:

The long extensor tendons:

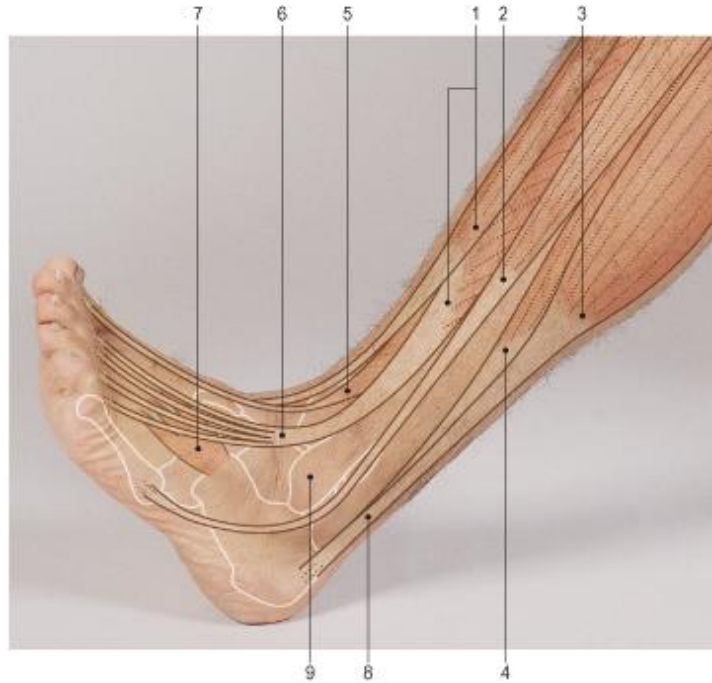
1. Tibialis anterior
2. Extensor hallucis longus.
3. Extensor digitorum longus.
4. Peroneus tertius.
5. Also, try to feel the pulsation of **the dorsalis pedis artery**. Between the tendons of extensor hallucis longus & extensor digitorum longus.



Lower limb (leg and foot)

On the lateral aspect of the leg try to palpate:

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

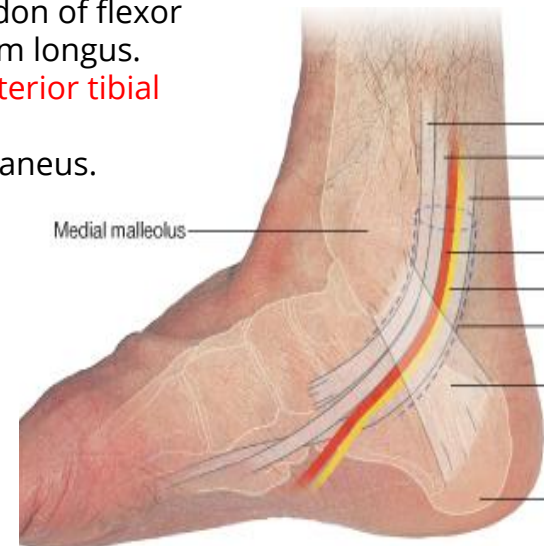


1. Tibialis anterior. 2. Peroneus longus. 3. Gastrocnemius 4. Soleus.
5. Tendon of extensor hallucis longus. 6. Tendons of extensor digitorum longus.
7. Extensor digitorum brevis. 8. Calcaneus tendon (Achilles tendon) 9. Lateral malleolus.

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

The medial malleolus.

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



MCQ:

1- It ascends in the medial groove :

A) Cephalic vein B) Basilic vein C) Axillary vein

2- The tendon of the biceps can be palpated in?

A) The olecranon process B) Cubital fossa

C) Lateral side of the arm

3- Anterior axillary fold is formed by ?

A) Teres minor B) Teres major

C) Pectoralis major D) Pectoralis minor

4- Which of the following structures make up the knuckle of the hand?

A) Head of proximal phalanges

B) Head of distal phalanges

C) Head of metacarpals

D) Base of metacarpals

5-

6-

Answers:

1-b

2-b

SAQ:

Team Members

Lamia Abdullah Alkuwaiz (Team Leader)

Rawan Mohammad Alharbi

Abeer Alabduljabbar

Afnan Abdulaziz Almustafa

Ahad Algrain

Alanoud Almansour

Albandari Alshaye

AlFhadah abdullah alsaleem

Arwa Alzahrani

Dana Abdulaziz Alrasheed

Dimah Khalid Alaraifi

Ghada Alhaidari

Ghada Almuhanha

Ghaida Alsanad

Hadeel Khalid Awartani

Haifa Alessa

Khulood Alwehabi

Layan Hassan Alwatban

Lojain Azizalrahman

Lujain Tariq AlZaid

Maha Barakah

Majd Khalid AlBarrak

Norah Alharbi

Nouf Alotaibi

Noura Mohammed Alothaim

Rahaf Turki Alshammari

Reham Alhalabi

Rinad Musaed Alghoraiby

Sara Alsultan

Shahad Alzahrani

Wafa Alotaibi

Wejdan Fahad Albadrani

Wjdan AlShamry

Faisal Fahad Alsaif (Team Leader)

Abdulaziz Al dukhayel

Fahad Alfaiz

Akram Alfandi

Saad Aloqile

Saleh Almoaiqel

Abdulaziz Alabdulkareem

Abdullah Almeaither

Yazeed Aldossari

Muath Alhumood

Abdulrahman Almotairi

Abdulelah Aldossari

Abdulrahman Alduhayyim

Hamdan Aldossari

Abdullah Alqarni

Mohammed Alomar

Abdulrahman Aldawood

Saud Alghufaily

Hassan Aloraini

Khalid Almutairi

Abdulmajeed Alwardi

Abdulrahman Alageel

Rayyan Almousa

Sultan Alfuhaid

Ali Alammari

Fahad Alshughaihthy

Fayez Ghyath Aldarsouni

Mohammed Alquwayfili

Abduljabbar Al-yamani

Sultan Al-nasser

Majed Aljohani

Zeyad Al-khenaizan

Mohammed Nouri

Abdulaziz Al-drgam

Fahad Aldhowaihy

Omar alyabis