



Vascular Anatomy of the Upper Limbs

Lecture 12



Please check our [Editing File](#).

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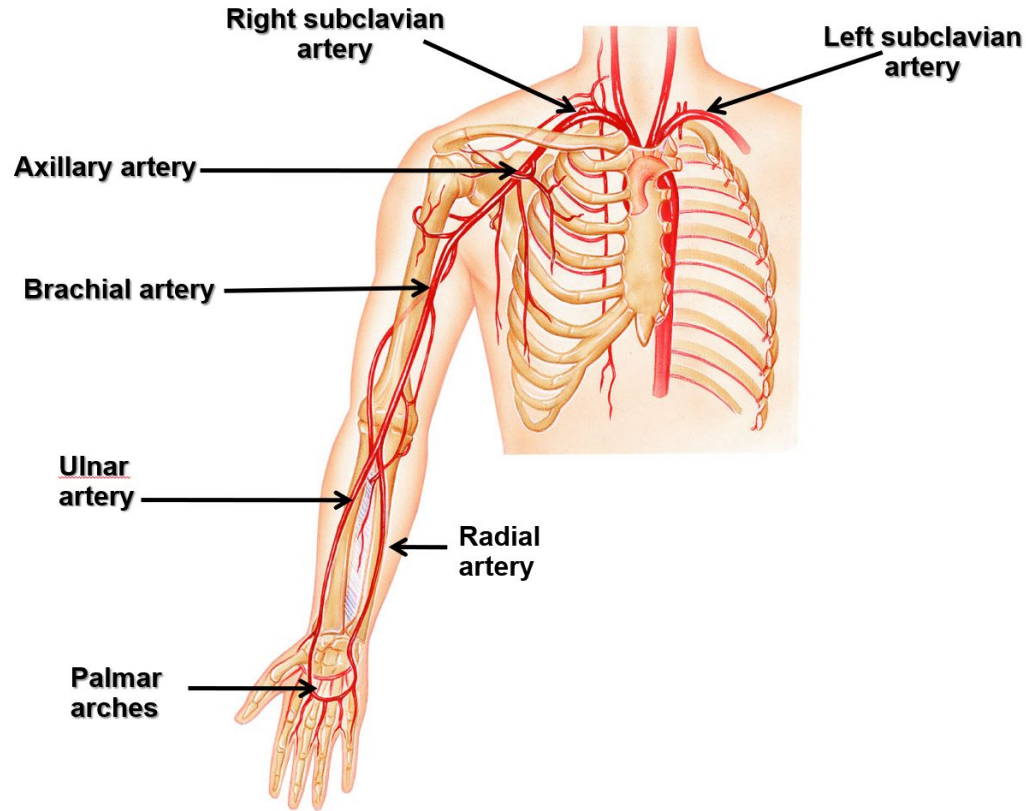
هذا العمل لا يغني عن المصدر الأساسي للمذاكرة

Objectives

- Identify the origin of the vascular supply for the upper limb.
- Describe the main arteries and their branches of the arm, forearm & hand.
- Describe the vascular arches for the hand.
- Describe the superficial and deep veins of the upper limb

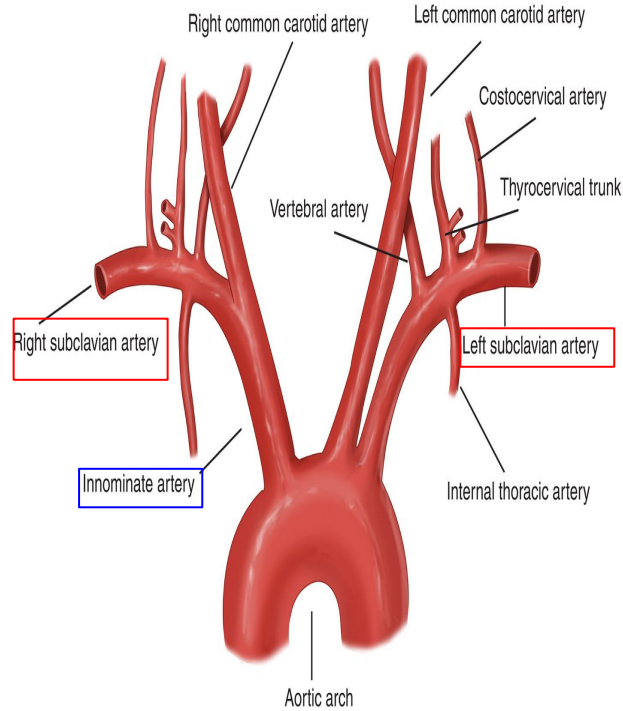
- Text in **BLUE** was found only in the boys' slides
- Text in **PINK** was found only in the girls' slides
- **Text in RED is considered important**
- Text in **GREY** is considered extra notes

Arteries Of The Upper Limb



The Subclavian Artery

The right subclavian artery originates from the brachiocephalic artery (AKA **Innominate artery**). (originates from a branch of the aorta)



The left subclavian artery originates from the arch of the aorta. (originates directly from the aorta)

Continues as the **Axillary artery** at the lateral border of the 1st rib (بدایتہ)

The Axillary Artery

- Begins at the lateral border of the **1st rib** as continuation of the **subclavian artery**
- **Continues as brachial artery** at lower border of **teres major**
- It is closely related to the cords of **brachial plexus** and their branches
- Is enclosed within the **axillary sheath**.
- It is crossed anteriorly by the pectoralis minor and is divided into three parts; 1st (above), 2nd (behind) & 3rd (below).

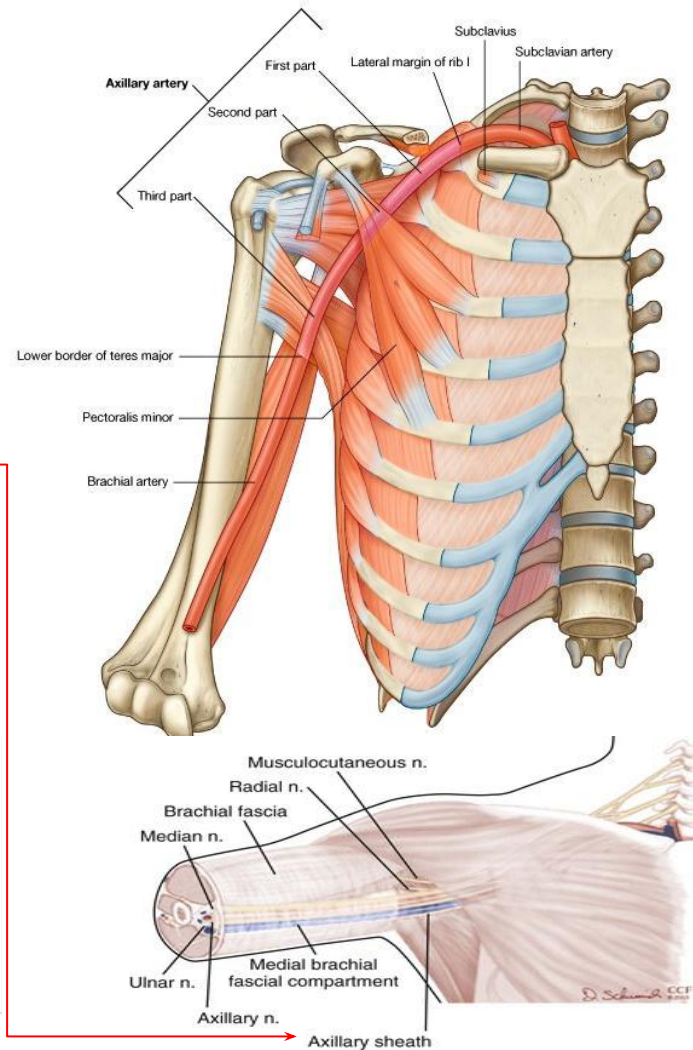
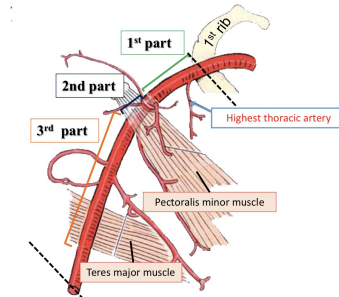
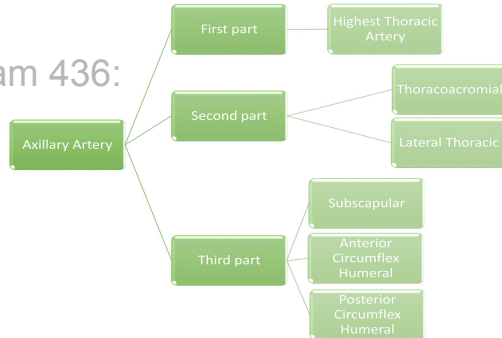


Diagram from team 436:



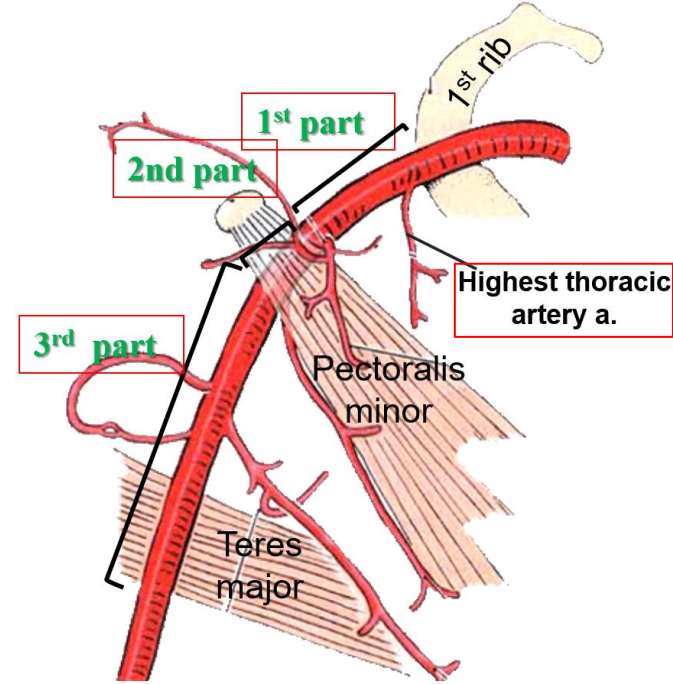
The 1st part of the axillary artery

- Extends from the **lateral border of 1st rib** to the upper border of **the pectoralis minor muscle**.

Related:

- Anteriorly: to **the pectoralis major muscle**
- Laterally: to **the cords of the brachial plexus**.

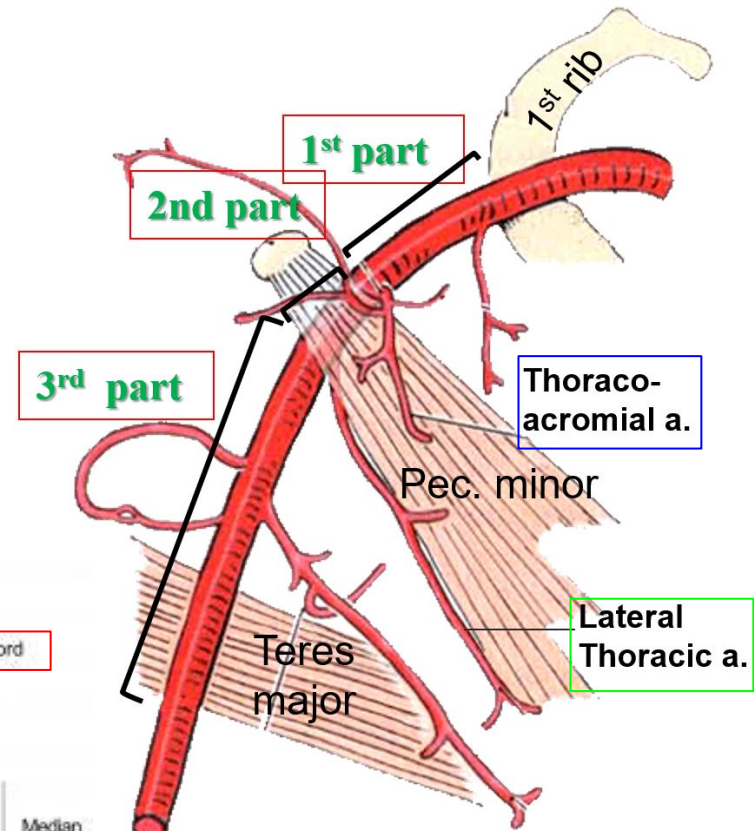
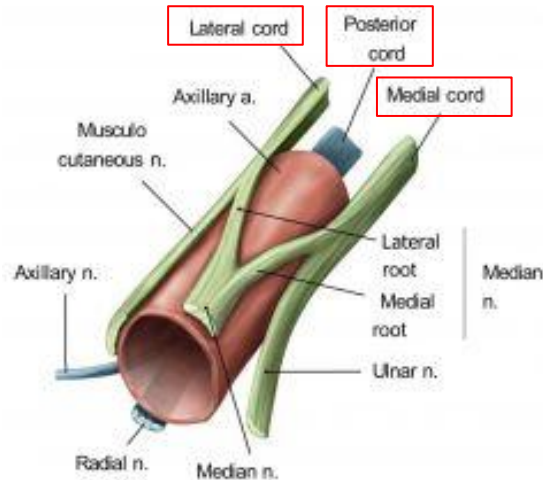
It gives **ONE branch**: Highest thoracic artery



1st part	→	1 branch
2nd part	→	2 branches
3rd part	→	3 branches

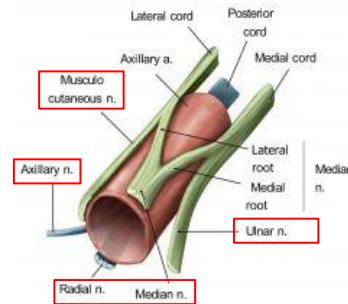
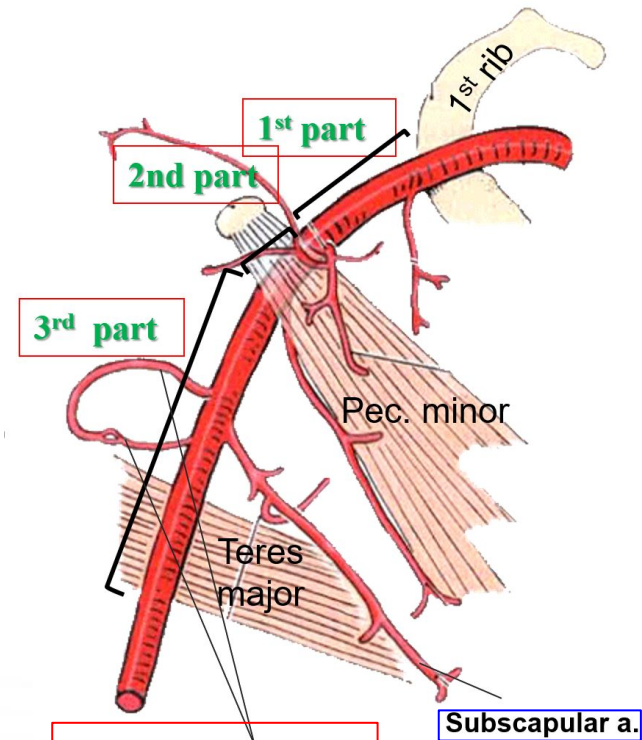
The 2nd part of the axillary artery

- Lies behind the **pectoralis minor muscle**.
- It is surrounded medially, laterally, and posteriorly by **the corresponding cord of the brachial plexus**.
- It gives; TWO branches:
 - **Thoracoacromial**
 - **Lateral thoracic**



The 3rd part of the axillary artery

- Extends from the **lower border of pectoralis minor** muscle to the **lower border of the teres major muscle**.
- It is surrounded medially, laterally, and posteriorly by **the branches** (not cords themselves) **of the cords of the brachial plexus**
- It gives; **THREE** Branches:
- **Subscapular**
- **Anterior circumflex humeral (الأصغر)**
- **Posterior circumflex humeral. (الأكبر)**



Anterior & posterior circumflex humeral aa.

Around the surgical neck of humerus

Anastomosis

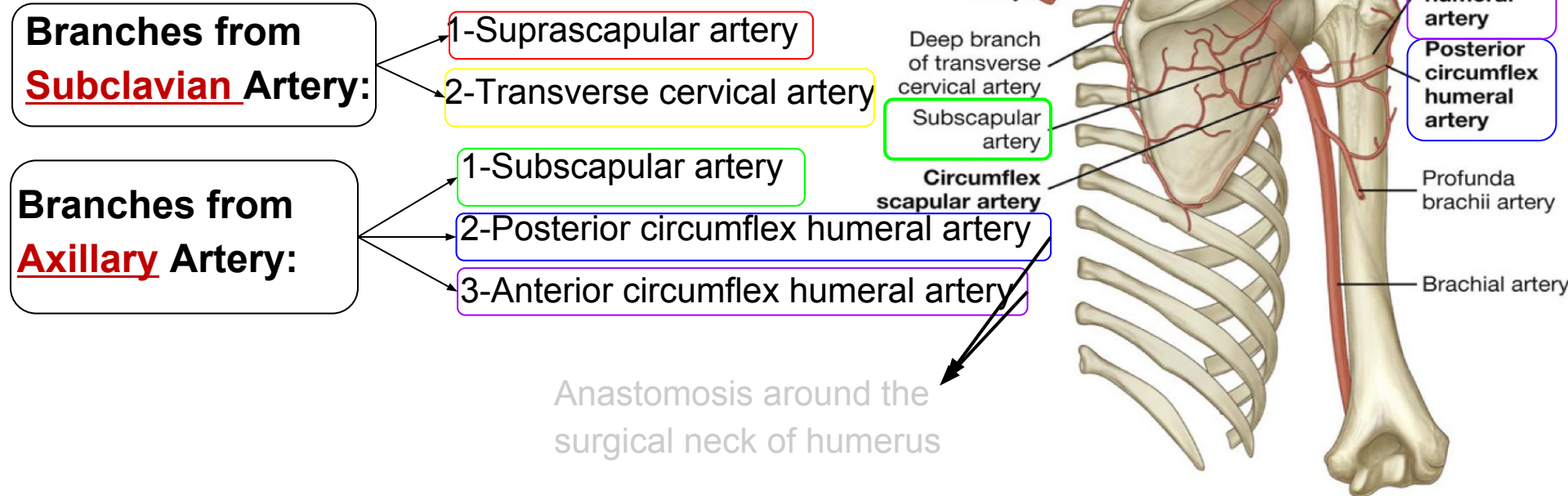
From Girls' lecture only

Anastomosis occurs between branches of **Subclavian and Axillary**

arteries:

around Shoulder joint (SCAPULA)

The scapula moves all the time so it needs rich supply



The Brachial Artery:

- Provides main arterial supply to the arm.
- Is a continuation of the **axillary artery** at the lower border of teres major muscle.
- **Terminates** opposite **Neck of Radius** by dividing into **Radial & Ulnar arteries**. (In the cubital fossa)

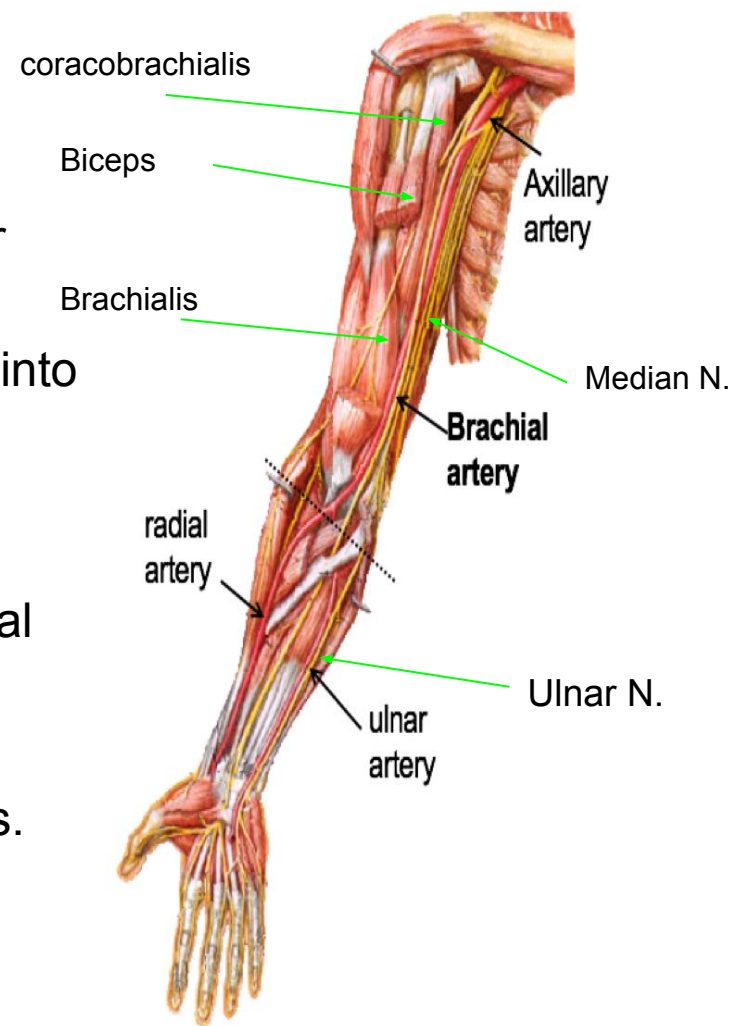
Relations of brachial artery:

Anteriorly: crossed from above downward by medial cutaneous nerve of the forearm, median nerve, and bicipital aponeurosis.

Posteriorly: triceps, coracobrachialis and brachialis.

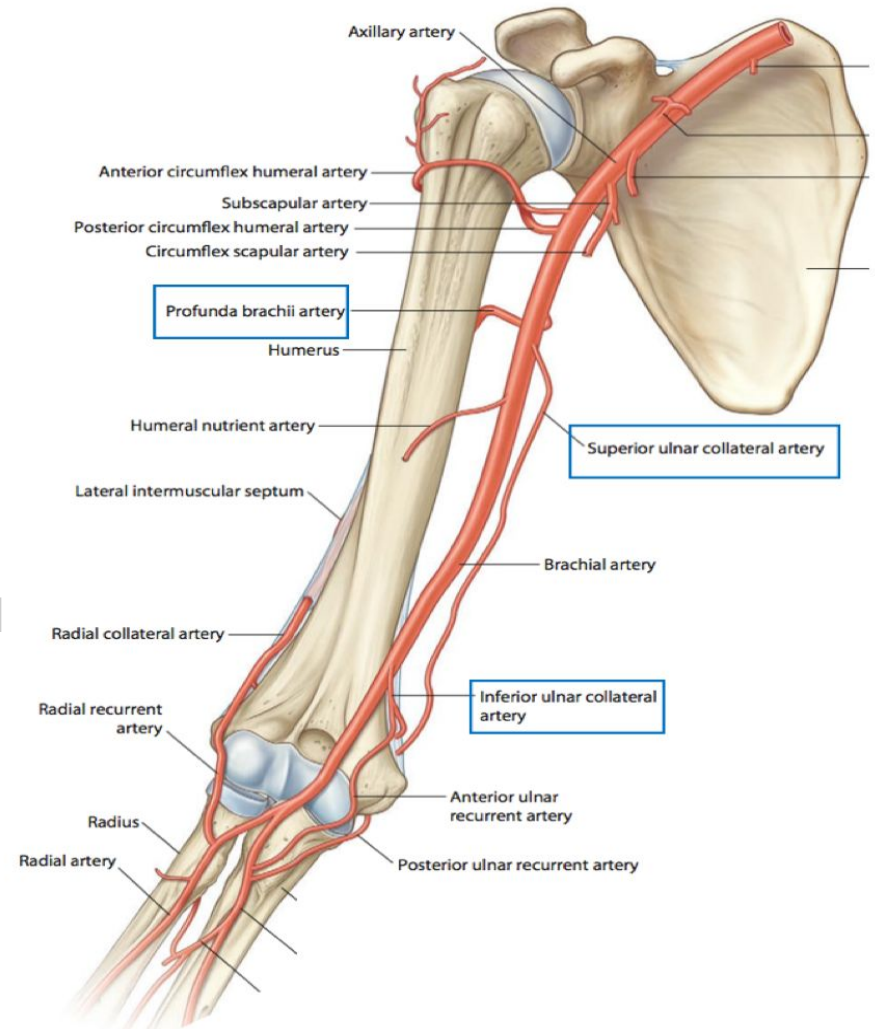
Medially: basilic vein, ulnar and median nerves.

Laterally: coracobrachialis and biceps muscles.



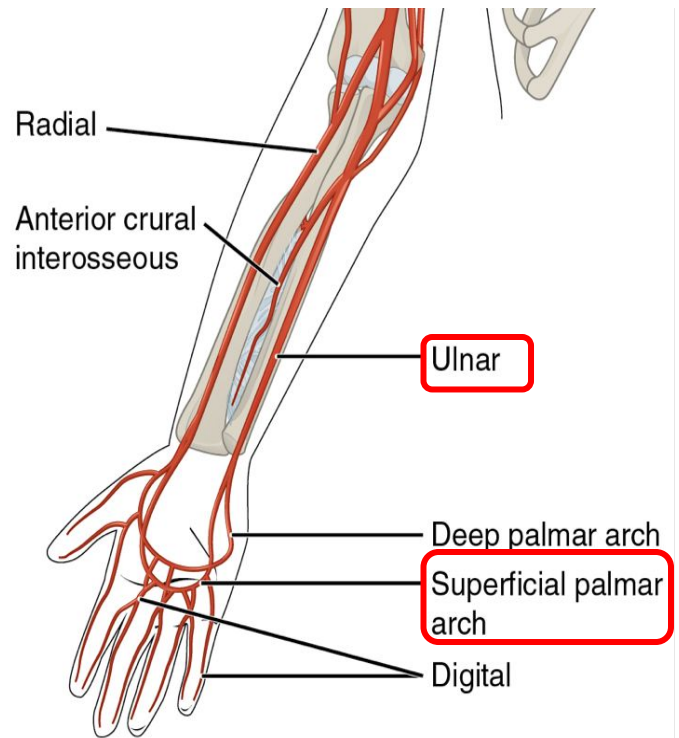
Branches of Brachial Artery

- Muscular.
 - Nutrient to humerus.
 - **Profunda brachii** (along with the radial nerve in the spiral groove)
 - **Superior ulnar collateral.** (front of medial epicondyle)
 - **Inferior ulnar collateral.** (back of medial epicondyle)
- Collateral means it branches towards the lateral side



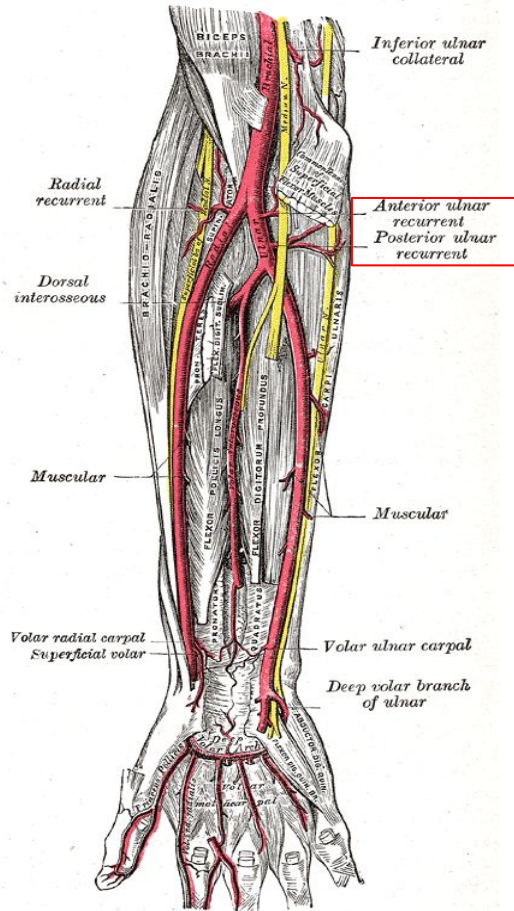
The Ulnar Artery

- The **larger** of the two terminal branches of the **brachial artery**. (Larger than the radial artery)
- Begins in the **cubital fossa** at the level of the **neck of the radius**.
- Descends through **the anterior compartment** of the forearm (lateral to the ulnar nerve)
- Enters the palm, **in front** of the flexor retinaculum, with the **ulnar nerve**. (doesn't enter the carpal tunnel)
- Ends by forming **the superficial palmar arch**, by anastomosing with superficial palmar branch of radial artery.



- The radial artery is small but **superficial** so we can feel its pulse, while the ulnar artery is big but **deep** so we can't feel its pulse. (Team 436)

Branches of Ulnar Artery



• Muscular.

1- **Recurrent** branch (for anastomosis around the elbow joint). Around the medial epicondyle, to anastomose with the inferior and superior ulnar collateral arteries

2- **Common Interosseous artery**, which gives:

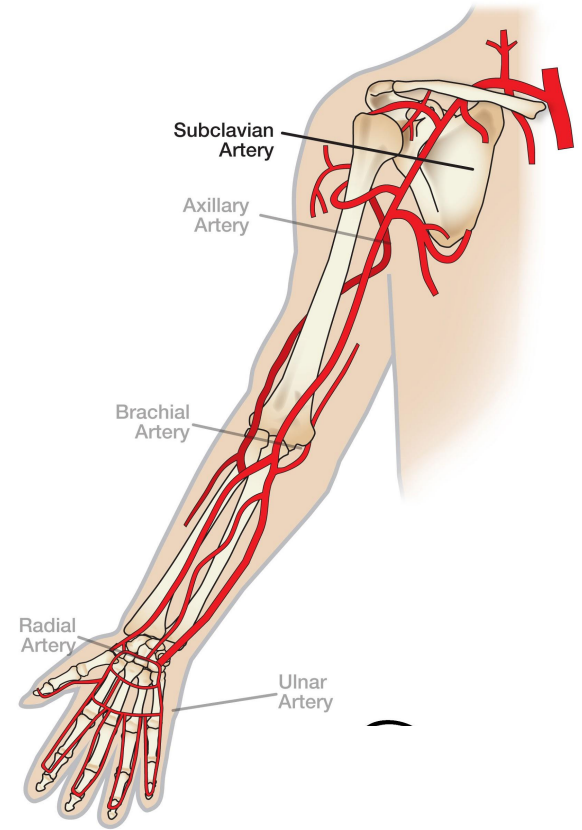
- Anterior Interosseous artery
- Posterior Interosseous artery

3- **Branch to anastomoses around the wrist joint.**

Ulnar Recurrent : branch of Ulnar Artery
ulnar collateral : branch of brachial Artery

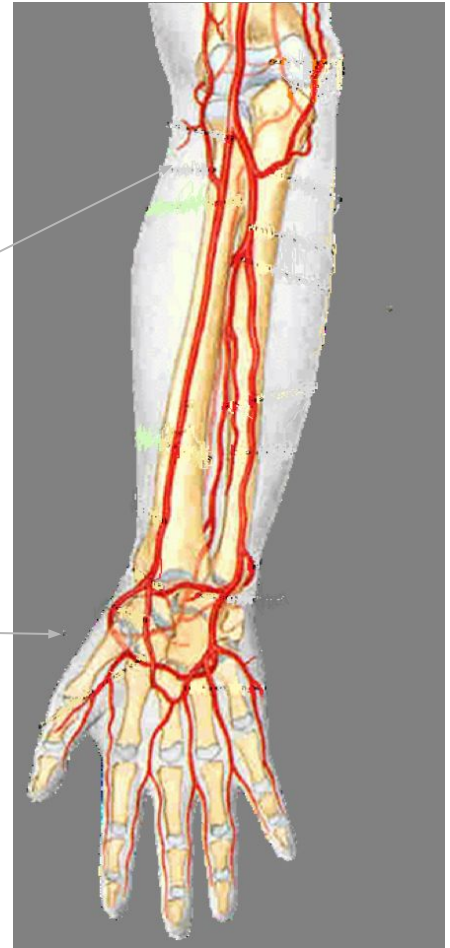
Radial Artery

- The **smaller** of the two terminal branches of the **brachial artery**.(smaller than the ulnar artery)
- Begins in the cubital fossa at the level (In front) of **neck of radius**.
- Descends downward and laterally
- Leaves the forearm by **winding** around the lateral aspect of the wrist to reach the **dorsum** of the hand through anatomical snuff box.



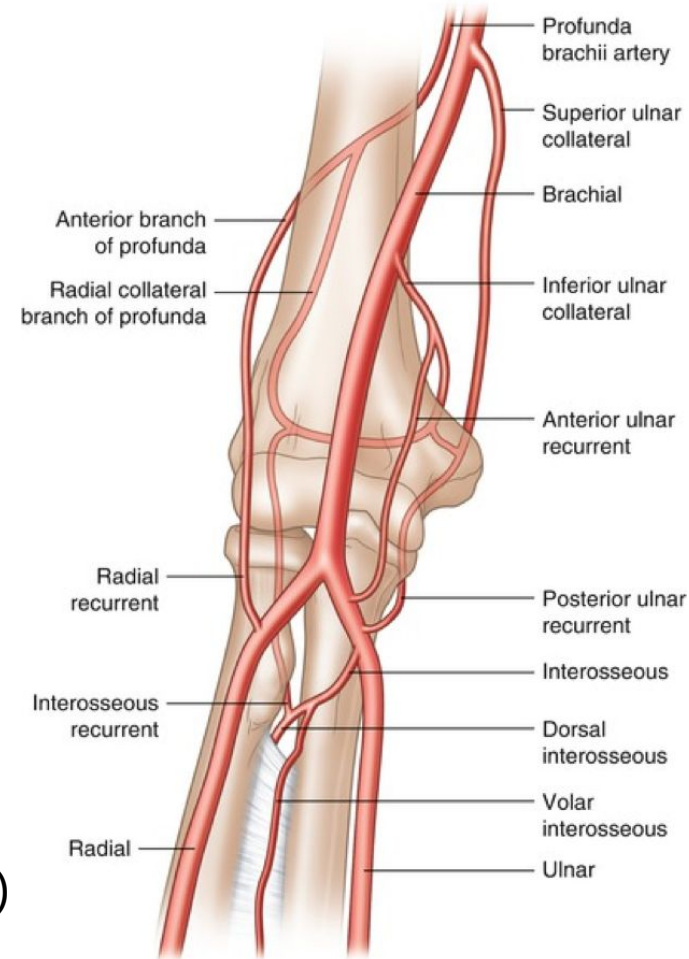
Branches of Radial Artery

- Muscular
- Recurrent branch for anastomosis around the **elbow joint**. (Lateral epicondyle)
- Superficial palmar branch, joins the ulnar artery to form the **Superficial Palmar arch**. (90% ulnar , 10% radial)
Deep arch is the opposite, most of it is radial.



Anastomosis around elbow joint

- Anastomosis occurs between branches of **brachial, radial and ulnar arteries**.
- Branches from Brachial Artery:
 - 1-Profunda Brachii artery
 - 2-Superior ulnar collateral artery
 - 3-Inferior ulnar collateral artery
- Branches from Ulnar and Radial Arteries:
 - 1-Radial & ulnar recurrent arteries
 - 2-posterior Interosseous recurrent artery (from ulnar)



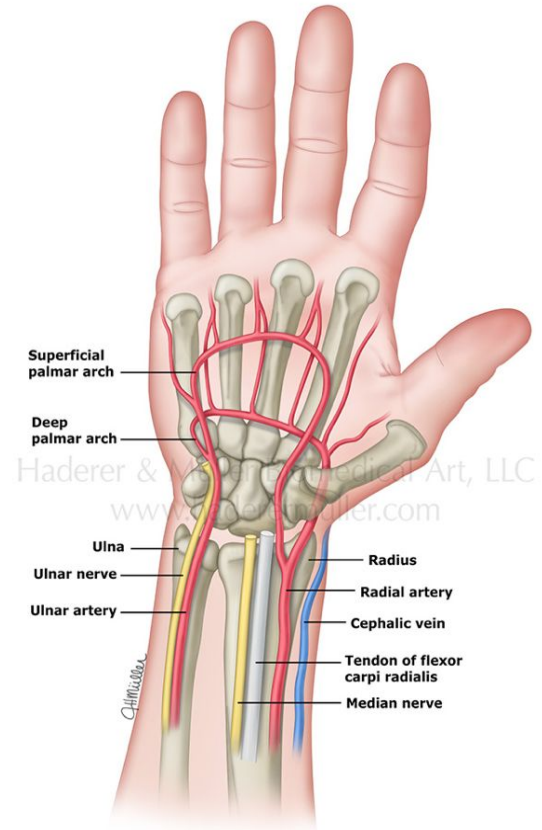
Arteries of the palm

Ulnar artery:

Enters the hand:

- anterior to the flexor retinaculum,
- on the lateral side of the ulnar nerve and pisiform bone.

- Gives a **deep branch**.
- Continue as the **superficial palmar arch**.



Arteries of the palm

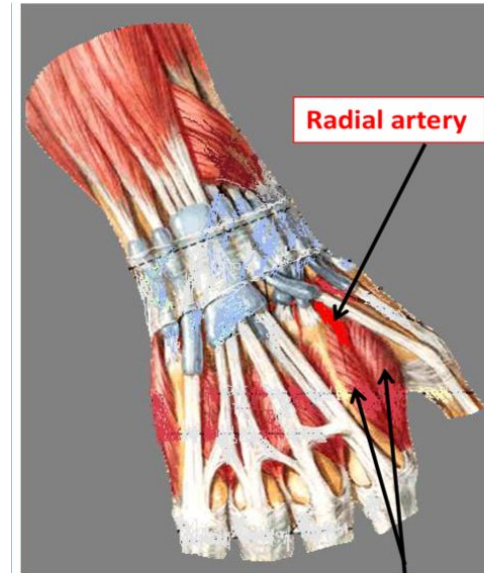
Radial artery:

- Leaves dorsum of the hand by **turning forward** between the proximal ends of the **1st and 2nd metacarpal** bones, and between **two heads of the 1st dorsal interosseous muscle**.

(This place is called the anatomical snuff box)

- On entering the palm it continues as the **deep palmar arch**.
- It gives; arteria **radialis indicis** and arteria **princeps pollicis**.
(lateral side of the index) (to the thumb)

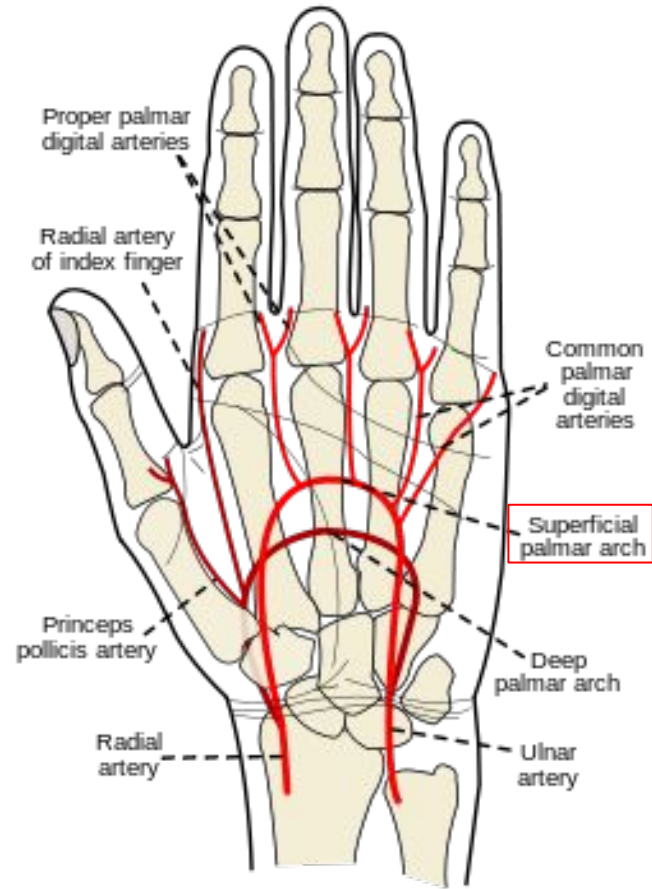
The digits have arterial supply from the superficial palmar arch except the thumb and the lateral side of the index which are supplied by the radial artery



1st dorsal interosseous muscle
(between thumb and index)

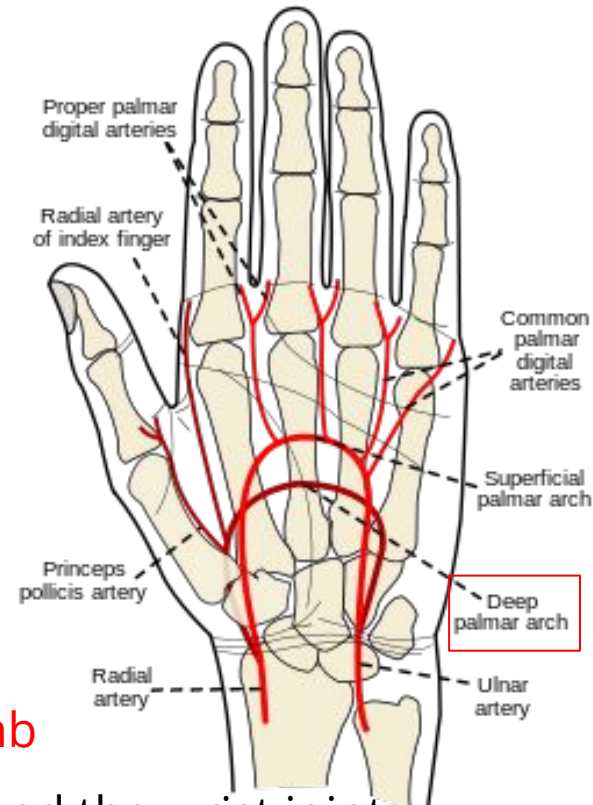
The superficial palmar arch

- Is the direct continuation of the **ulnar artery**, as it curves **laterally** behind the palmar aponeurosis. It comes from the medial side and curves laterally
- Is completed by a **branch from the radial artery**.
- Lies approximately at the level of the **distal border of the extended thumb**.
- Gives **digital arteries** from its convexity to supply the finger
- **The superficial palmar arch is more distal than the deep palmar arch** (very important, had its own slide)



The deep palmar arch

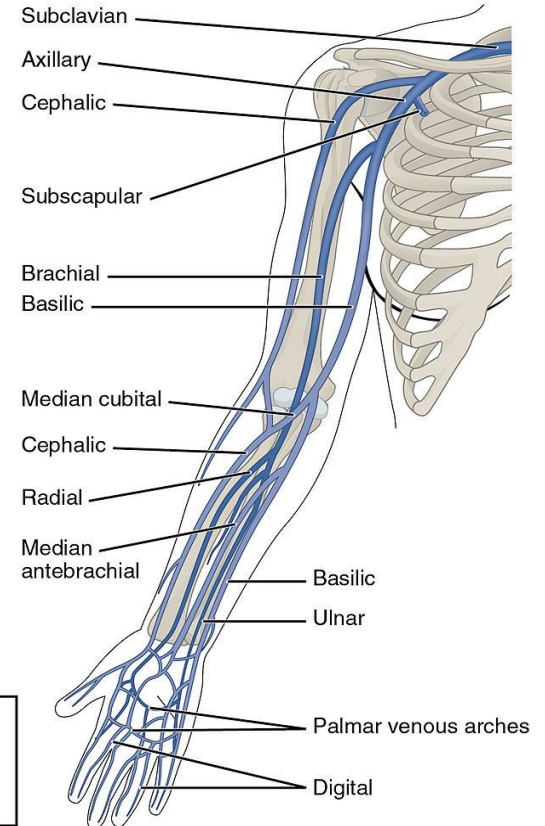
- Is a continuation of the **radial artery** as it curves medially beneath long flexor tendons, in front of the metacarpal bones and interosseous muscles.
- Is completed on the medial side by the **deep branch of the ulnar artery**
- Lies at the level of the **proximal border of extended thumb**
- It sends branch: -**Superiorly** to share in anastomosis around the wrist joints.
-**Inferiorly** to join branches of the superficial palmar arch.



Veins of the Upper Limb

The veins of the upper limb are divided into two sets: **Superficial** and **Deep**

- The two sets anastomose frequently with each other.
- The **superficial veins** are placed immediately beneath the skin, in the superficial fascia.
- The **deep veins** (الأوردة المصاحبة) accompany the arteries, and constitute the venæ comitantes of those vessels.

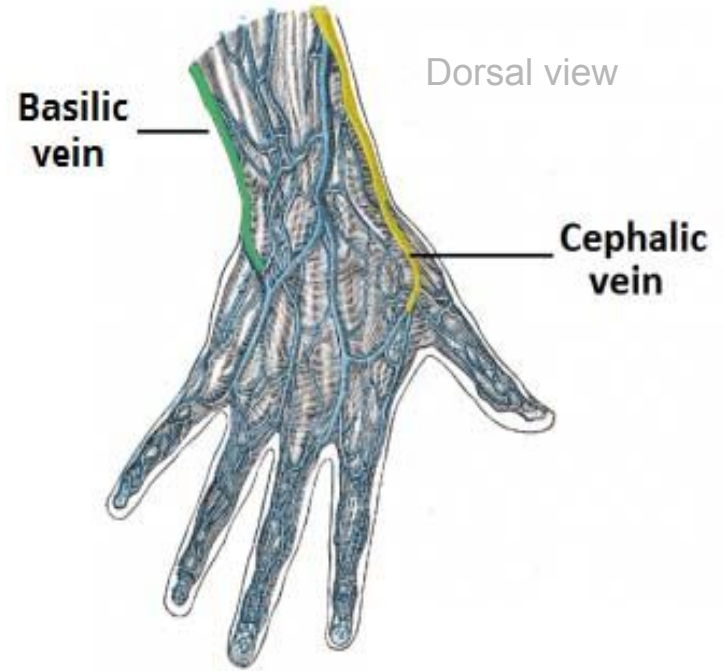


Superficial Veins of the Upper Limb

Dorsal Venous Arch (network)

The **dorsal digital veins** drain into **dorsal metacarpal veins**, which unite to form a **dorsal venous arch or network**.

- Dorsal venous network lies on the dorsum of the hand (ظاهر الكف), in the **subcutaneous tissue**, proximal to the metacarpophalangeal joints
- Drains into the **cephalic** vein laterally, and **basilic** vein medially



Cephalic Vein

Arises from the **lateral end** of the dorsal venous arch of hand.
Ascends on **radial side** of the forearm to the elbow and continues up the arm in the **deltopectoral groove**.
Pierces **clavipectoral fascia** to drain into the **axillary vein**.

(يخترق fascia عشان يفرغ الدم
في axillary vein)

Blood is always drained from superficial veins into deep veins

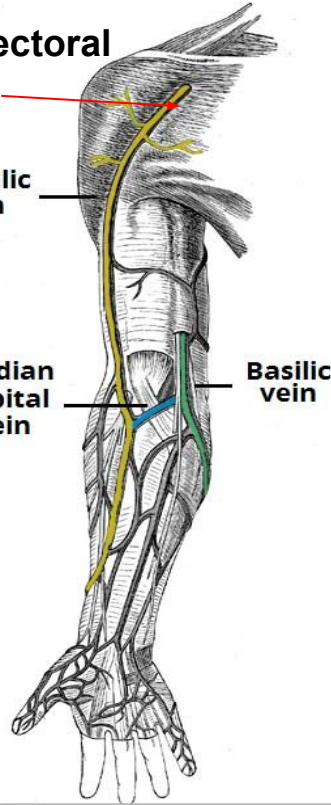
Median Cubital Vein

Deltopectoral groove

Cephalic vein

Median cubital vein

Basilic vein



Basilic Vein

Arises from the **medial side** of the dorsal venous arch of hand.
Ascends on the **ulnar side** of forearm to the elbow ,
In the middle of the arm, it pierces the **deep fascia** and joins the **brachial vein or axillary vein**.

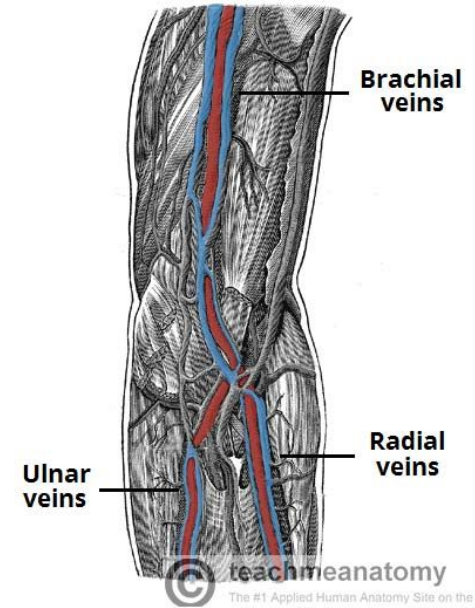
Basilic vein is nearer to the Body

- Links cephalic vein and basilic vein in the cubital fossa.
- Is a frequent site for **venipuncture** (**Vein of choice for IV injection**)
- Carries most of cephalic blood to basilic vein

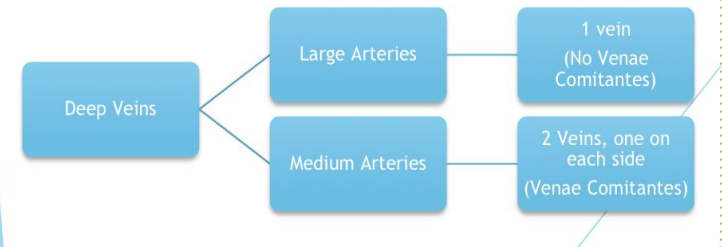
Deep Veins of the Upper Limb

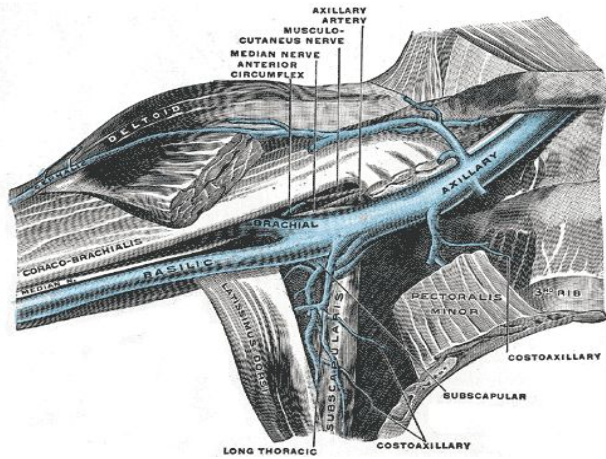
Accompany the arteries of the same region and bear similar names. (مالها اسم خاص)

- **Venae comitantes:** They are generally arranged in **pairs**, and are situated **one on either side of the corresponding artery**, and connected at intervals by short transverse branches.
- The superficial and deep palmar arterial arches are each accompanied by a pair of venae comitantes which constitute the **superficial** and **deep palmar venous arches**, and receive the veins corresponding to the branches of the arterial arches.
- The **deep veins of the forearm** are the venae comitantes of the radial and ulnar veins.
- The **brachial veins** are placed one on either side of the brachial artery.



Recall what we took in foundation:





The **axillary vein:**

Opposite of axillary artery

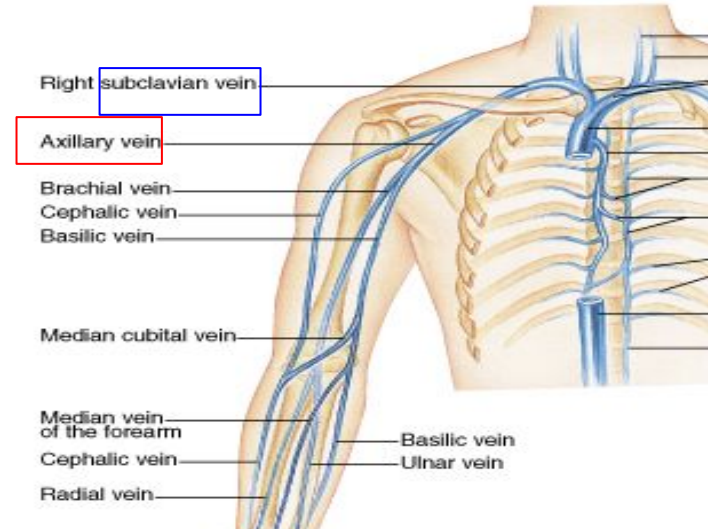
Begins at the **lower border of the Teres major**, as the continuation of the basilic vein.

Ends at the **outer border of the first rib** as the subclavian vein.

Receives the **brachial veins** and, close to its termination, the **cephalic vein**.

The **subclavian vein:**

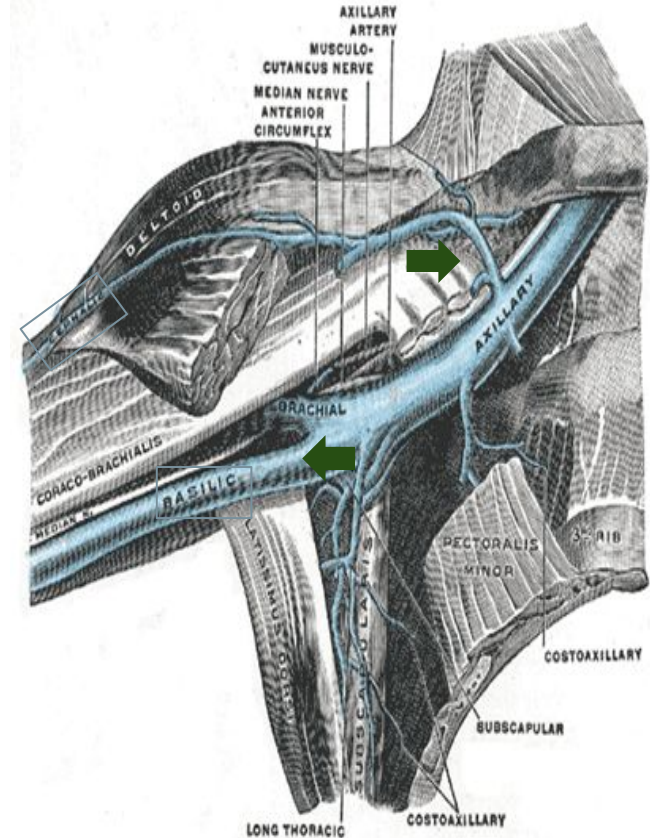
Is the continuation of the axillary vein. Extends from the **outer border of the first rib to the sternal end of the clavicle**, where it unites with the internal jugular to form the **brachiocephalic (innominate) vein**.



Anatomy of basilic and cephalic vein catheterization

Entire Slide from girls' slides

- The **basilic vein** is the vein of choice for **central venous catheterization**. (a flexible tube inserted through a narrow opening into a body cavity for removing fluid)
- From the cubital fossa until reaching the axillary vein it:
1- increases in diameter (because it receives blood from the cephalic) 2- lies in direct line with the axillary vein.
- **Abduction of the arm** (الوضعية المناسبة) will overcome the trouble caused by the valves in the axillary vein, and allows the catheter (أنبوب القسطرة) to move past (skip) the obstruction.
- *The **cephalic vein**: 1- does not increase in size as it ascends (go up) in the arm 2- frequently divides into small branches (↓diameter=↓amount of blood) 3- **At it's termination** it joins the axillary vein at right angle ,so it is difficult to maneuver the catheter around this angle.
*that's why we don't choose the cephalic.



Palpation and compression of arteries

Entire Slide from girls' slides

Arteries of the upper limb can be palpated or compressed in an emergency.

• **Subclavian artery:** can be traced in the root of posterior triangle of the neck as it crosses the 1st rib to become the axillary artery.

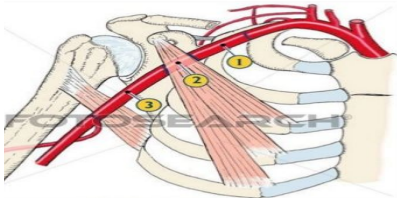
• **Axillary artery (3rd part):** can be felt in the axilla as it lies anterior to teres major muscle.

• **Brachial artery:** can be palpated in the arm as it lies on brachialis and is overlapped from the lateral side by the biceps brachii.

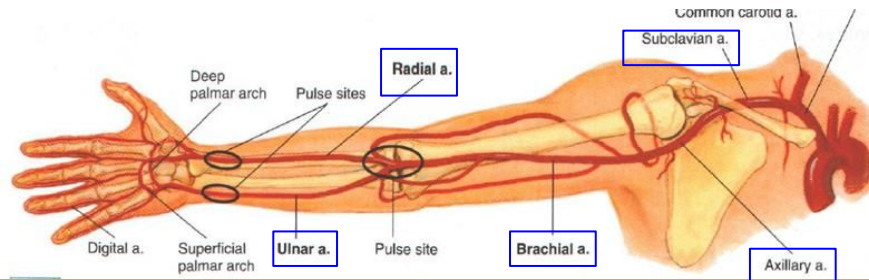
• **Radial artery:** it lies superficial anterior to distal end of radius between tendons of brachioradialis and flexor carpi radialis (radial pulse) or as it crosses the anatomical snuffbox.

• **Ulnar artery:** can be palpated as it crosses anterior to the flexor retinaculum lateral to pisiform bone.

PARTS OF AXILLARY ARTERY



gd210004 www.fotosearch.com



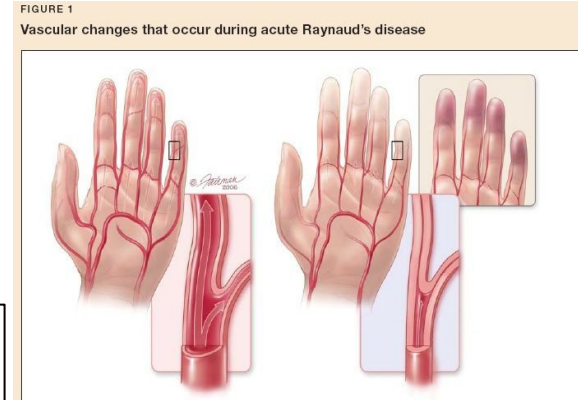
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ARTERIAL INNERVATION AND RAYNAUD'S DISEASE

from girls' slides and boys' slides from last year

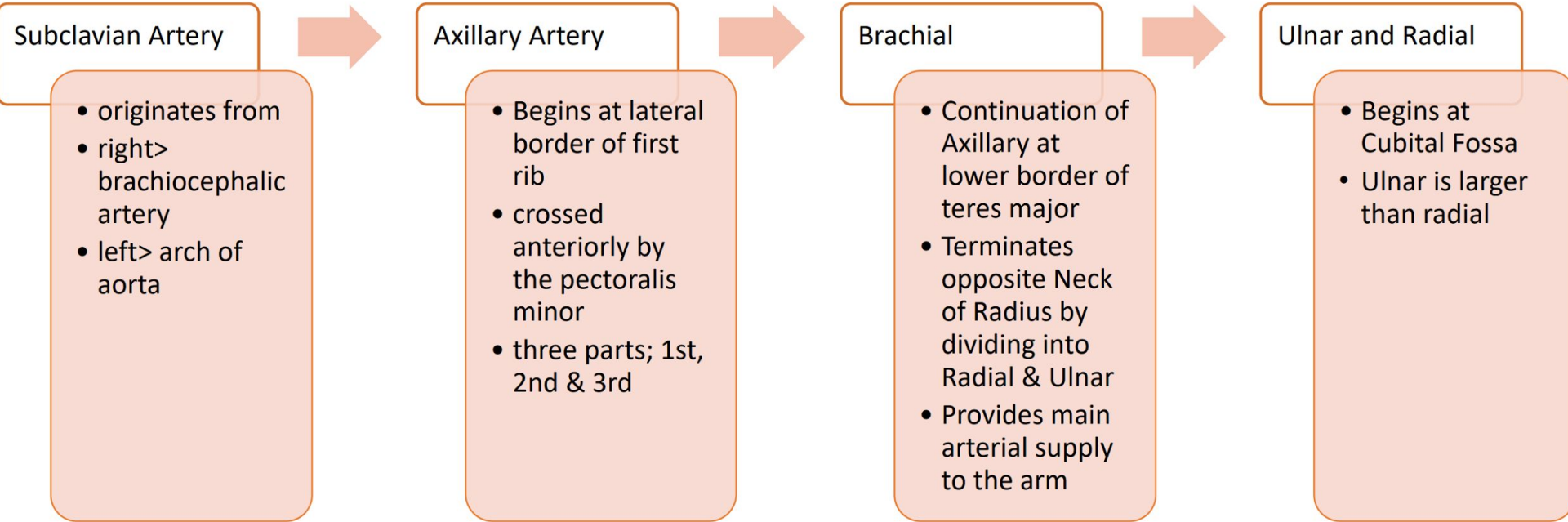
- Sympathetic innervation of the upper limb arteries is carried on by; preganglionic fibers from cell bodies from **2nd to 8th** thoracic segments.
- They ascend in the sympathetic trunk to synapse in middle and inferior cervical and 1st thoracic.
- Postganglionic fibers are distributed along branches of the **brachial plexus**.
- **Raynaud's disease** is a vasospastic diseases involves digital arteries.
- It may require cervicodorsal preganglionic (or post...) sympathectomy* to prevent necrosis of the fingers.
- *prevents any sympathetic supply to the arteries

Overstimulation of sympathetic
↓
permanent vasoconstriction
↓
Raynaud's disease



Summary

From team 436



Questions

1. The left subclavian artery originates from

- A- left common carotid artery B- aorta artery
C-suprascapular artery D- the arch of aorta

2. The 3rd part of the axillary artery ends at

- A-lower end of pectoralis maj. B-lower end of teres maj.
C-lower end of pectoralis min. D- lower end of teres min.

3. Which of the following are branches of axillary artery

- A-subscapular artery. B-posterior circumflex humeral artery
C- anterior circumflex humeral artery D-all of the above

4. A branch of brachial artery is :

- A-submuscular. B-lateral ulnar collateral
C-medial radial unilateral. D- profunda brachii

5.The deep palmar arch is more proximal than:

- A- superficial palmar arch B- ulnar artery.
C- radial artery. D- brachial artery

6. Which is the vein of choice for injection

- A-basilic B-cephalic
C-median cubital D-axillary

7.Which is the vein of choice for central venous catheterization

- A-basilic B-cephalic. C-median cubital. D-axillary

8. Dorsal venous network lies on the dorsum of the hand, in the subcutaneous tissue, proximal to the

- A- deltopectoral groove. B- clavipectoral groove.
C- metacarpophalangeal joints D- wrist joint

9. what is the correct for the basilic vein:

- A- lies in indirect line with the axillary vein B- ↓ diameter. C-
↓ amount of blood. D- vein of choice for central venous catheterization

10. Sympathetic innervation of the upper limb arteries is carried on by; preganglionic fibers from cell bodies from:

- A- 1st thoracic segment B- 8th thoracic segment
C- 1st-8th thoracic segments. D- 2nd-8th thoracic segments

- 1-D
2-B
3-D
4-D
5-A
6-C
7-B
8-C
9-D
10-D

Team Members

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Ahad Algrain
Alanoud Almansour
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Dimah Khalid Alaraifi
Ghada Alhaidari
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Haifa Alessa
Khulood Alwehabi
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Noura Mohammed Alothaim
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Reham Alhalabi
Rinad Musaed Alghoraiby
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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 Ghiyath
Aldarsouni
Mohammed Alquwayfili

Abduljabbar Al-yamani
Sultan Al-nasser
Majed Aljohani
Zeyad Al-khenizan
Mohammed Nouri
Abdulaziz Al-drgam
Fahad Aldhowaihy
Omar alyabis