

MED439
KING SAUD UNIVERSITY

Vascular anatomy of the upper limb

Musculoskeletal Block - Lecture 8

Objective:

- ✓ Identify the origin of 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

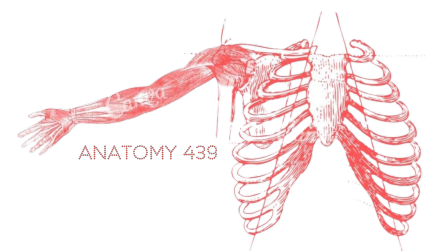
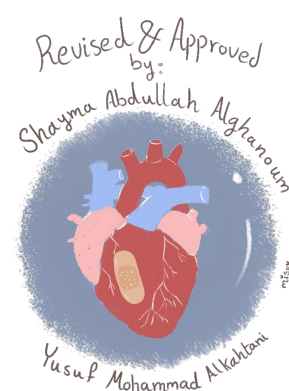
Color index:

Important

In male's slides only

In female's slides only

Extra information, explanation



Editing file



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Arteries of the upper limb

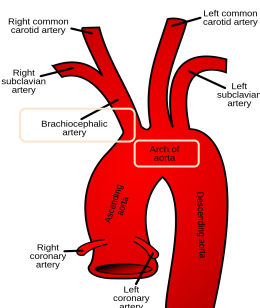
1- the subclavian artery

Subclavian artery

The **left** subclavian artery originates from the **arch of the aorta**.

The **right** subclavian artery originates from the **brachiocephalic artery**.

both Continue as **Axillary** artery at the **lateral (outer) border of the 1st rib**



Left subclavian artery
Right subclavian artery

Axillary artery

Brachial artery

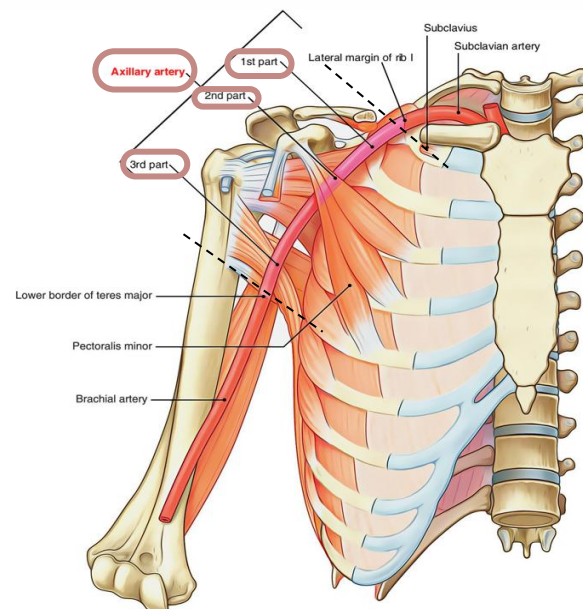
Ulnar artery
Radial artery

Palmar arches

2- the axillary artery

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** muscle.
- It's closely related: to the cords of **brachial plexus** and their branches
- It's enclosed **within the axillary sheath**. (axillary sheath is a fibrous sheath that encloses the axillary artery and the three cords of the brachial plexus to form the neurovascular bundle)
- It's crossed anteriorly by the **pectoralis minor muscle**, and is divided into three parts; **1st, 2nd & 3rd**.



The 1st part

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

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

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

The 2nd part

Lies: **behind the pectoralis minor muscle**.

It is related: **medially, laterally, and posteriorly** to the corresponding cord of the brachial plexus.

It gives; **TWO** branches
1-Thoracoacromial .
2-Lateral thoracic.

The 3rd part

Extends from the **lower border of pectoralis minor** muscle to the lower border of **teres major** muscle.

Related: medially, laterally, and posteriorly, to the branches of the **cords of the brachial plexus**

It gives; **THREE** branches:
1-Anterior circumflex humeral
2-Posterior circumflex humeral.
3-Subscapular

The 1st part

Axillary R.
Arteria axillaris

Superior thoracic, R.
Arteria thoracica superior

The 3rd part

Suprascapular, R.
Arteria suprascapularis

Circumflex humeral, anterior, R.
Arteria circumflexa humeri anterior

Circumflex humeral, posterior, R.
Arteria circumflexa humeri posterior

The 2nd part

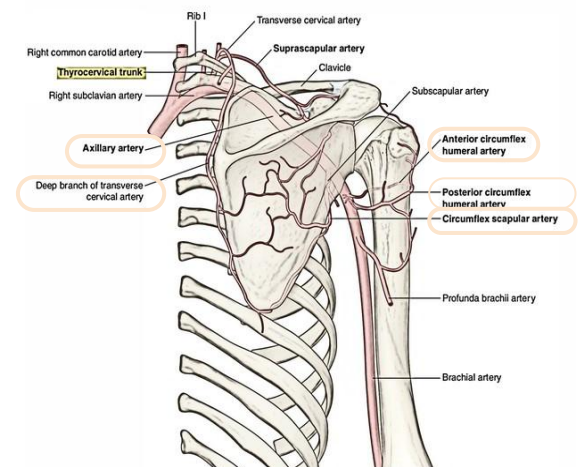
Axillary R.
Arteria axillaris

Superior thoracic, R.
Arteria thoracica superior

Lateral thoracic, R.
Arteria thoracica lateralis

Anastomosis around shoulder joint

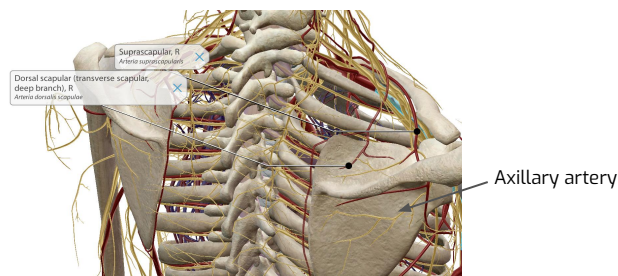
Anastomosis occurs between branches of **Subclavian** and **Axillary** arteries



Branches from Subclavian

Suprascapular artery

Transverse cervical artery

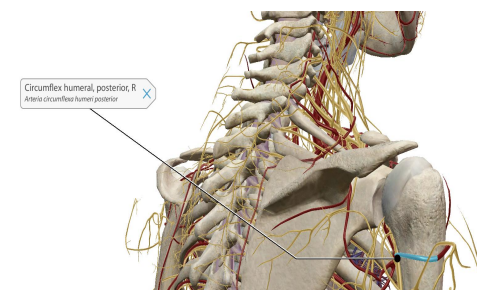
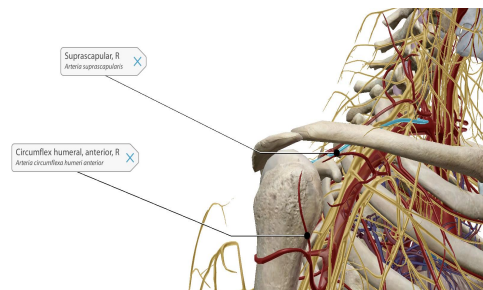


Branches from axillary

Subscapular artery

Anterior circumflex humeral artery

Posterior circumflex humeral artery



3- the brachial artery

Branches

- 1- Muscular.
- 2- Nutrient to humerus.
- 3- Profunda brachii
- 4- Superior ulnar collateral
- 5- Inferior ulnar collateral.

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

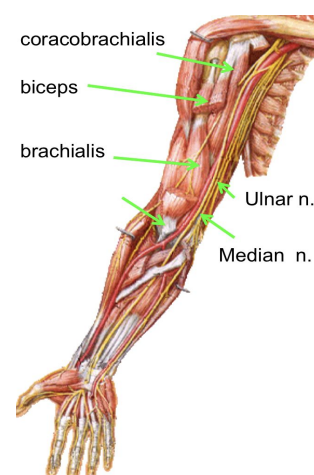
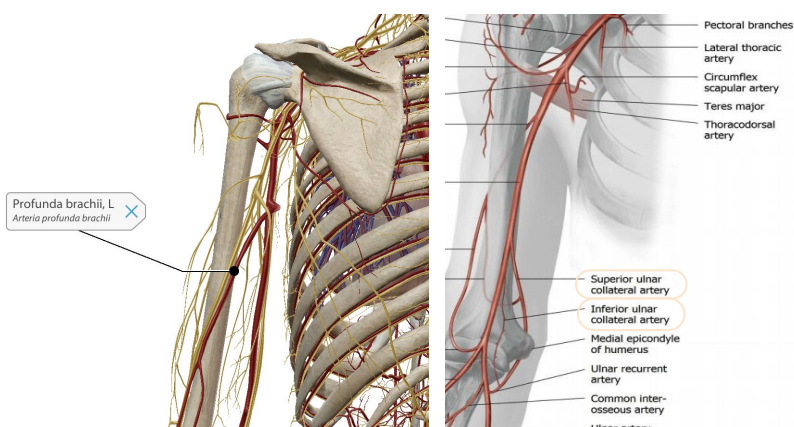
Relations

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

2- **Posteriorly**: triceps, coracobrachialis and brachialis.

3- **Medially**: basilic vein, ulnar and median nerves.

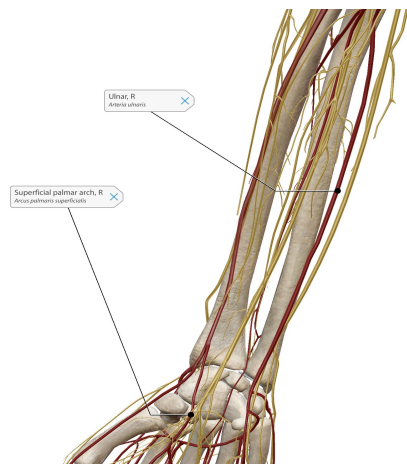
4- **Laterally**: coracobrachialis and biceps muscles.



4- The ulnar artery

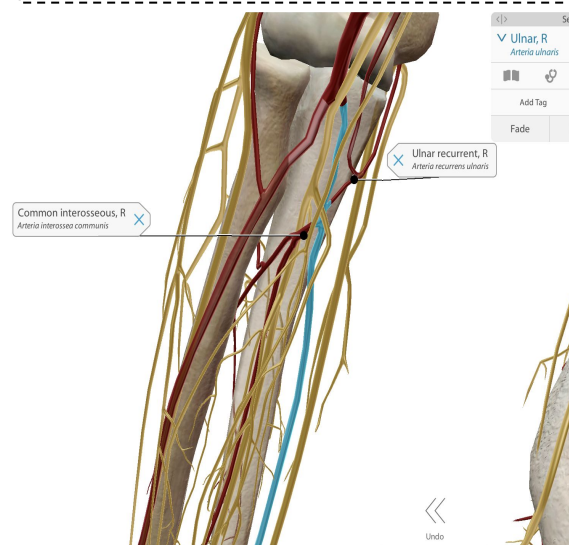
Ulnar artery

- The **larger** of the two terminal branches of the **brachial artery**.
- Begins in the cubital fossa at the level of **neck of radius**.
- Descends through the **anterior compartment** of the forearm.
- Enters the palm, **in front of** the flexor retinaculum, with the ulnar nerve.
- Ends by forming **the superficial palmar arch**, by anastomosing with superficial palmar branch of radial artery.



Branches

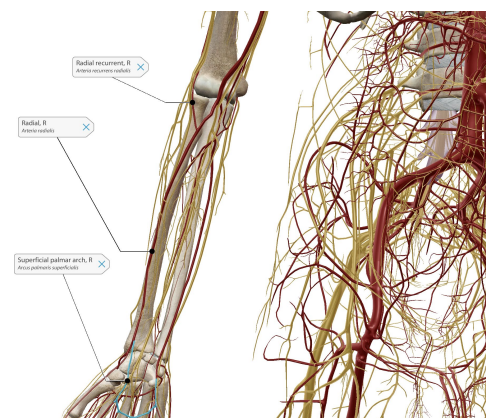
- **Muscular**.
- **Recurrent branch** (for anastomosis around the elbow joint).
- **Common Interosseous artery**, which gives: (**Anterior** and **Posterior**) **Interosseous arteries**.
- **Branch** to anastomoses around the wrist joint.



5- The Radial artery

Radial artery

- The **smaller** of the two terminal branches of the **brachial artery**.
- Begins in the cubital fossa at the level 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.



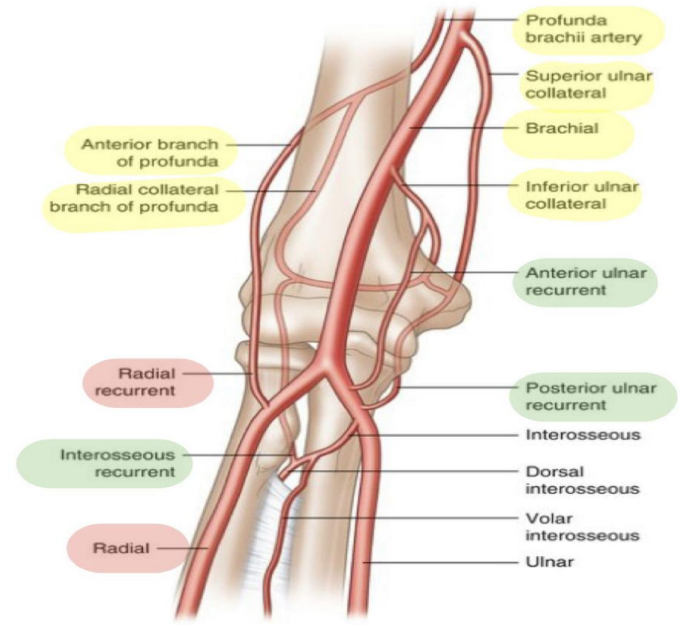
Branches

- **Muscular**
- **Recurrent branch** (for anastomosis around the elbow joint).
- **Superficial palmar branch**, joins the ulnar artery to form the superficial palmar arch.

Anastomosis around Elbow Joint

Arteries of the palm

Anastomosis occurs between branches of **Brachial, Radial and Ulnar arteries** Around the epicondyle of humerus (medial & lateral)



Lateral

Medial

Branches from Brachial artery:

- Profunda **Brachii** artery
- Superior **ulnar** collateral artery
- Inferior **ulnar** collateral artery

Around the **lateral epicondyle** The profunda brachii branches anastomose with the radial recurrent artery and the interosseous recurrent artery.

Around the **medial epicondyle**, the superior ulnar collateral artery anastomoses with the posterior ulnar recurrent. The inferior ulnar collateral artery anastomoses with the anterior ulnar recurrent

Branches from Ulnar and Radial Arteries:

- **Radial & ulnar** recurrent arteries
- Posterior Interosseous recurrent artery (**from ulnar**)

-Arteries of the palm

Radial arteries

-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 called **anatomical snuff box**

-On entering the palm it continues as **deep palmar arch**.

-gives; arteria **radialis indices** and arteria **princeps pollicis**.

Ulnar arteries

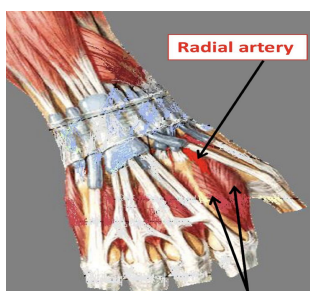
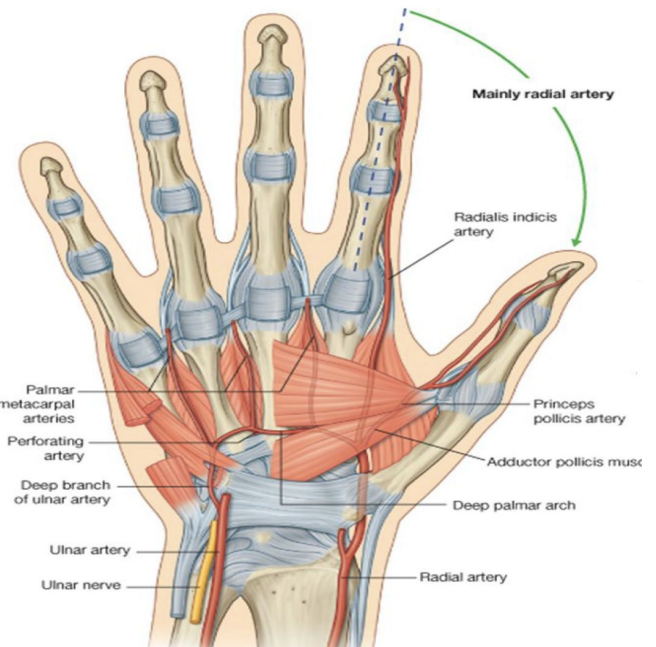
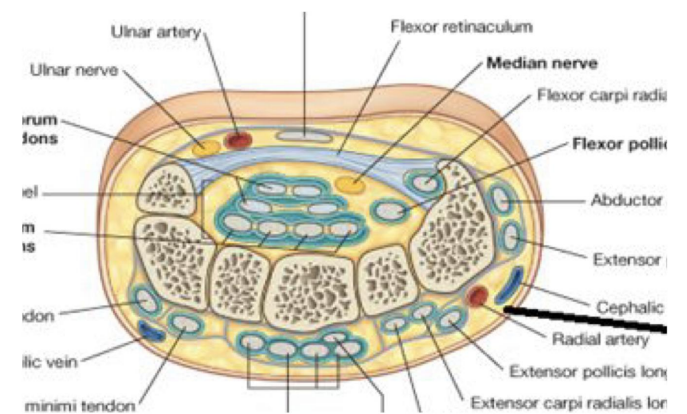
Enters the hand:

- **anterior** to the flexor retinaculum

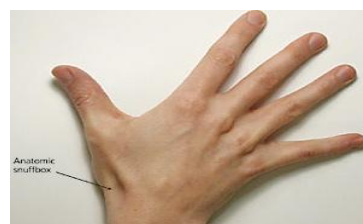
- on the **lateral** side of the ulnar nerve and pisiform bone

- Gives a **deep branch**

Continue as the **superficial palmar arch**.



1st dorsal interosseous muscle



Anatomic snuffbox

The superficial palmar arch

- Is the direct continuation of the **ulnar artery**, as it curves laterally behind the palmar aponeurosis

-Is completed by **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 fingers.

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.

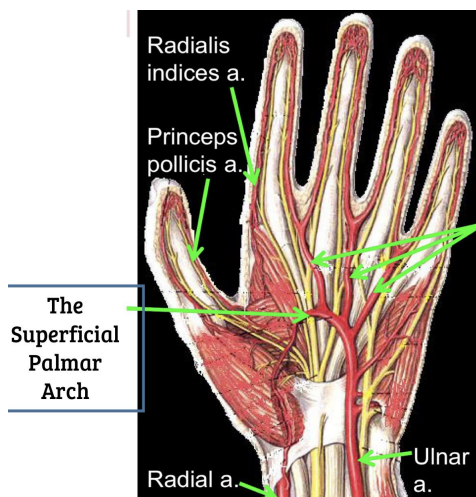
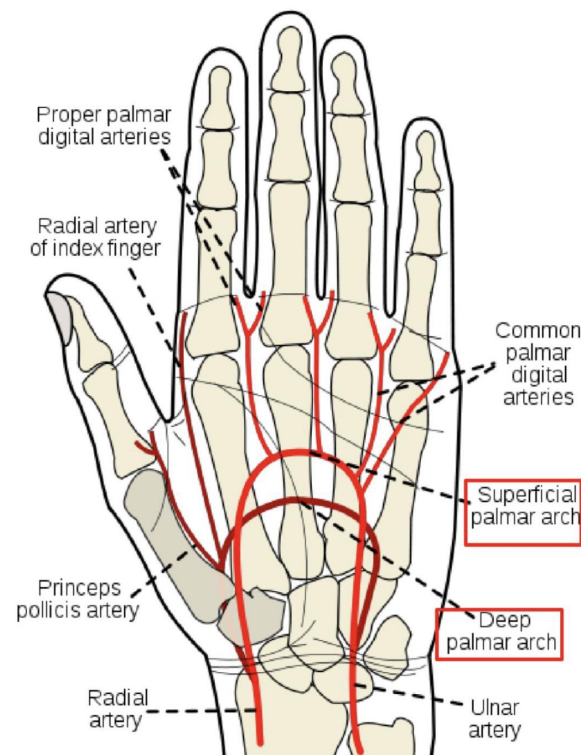
-Is completed on the medial side by **deep branch of ulnar artery.**

-Lies at a level of the **Proximal Border of Extended thumb.**

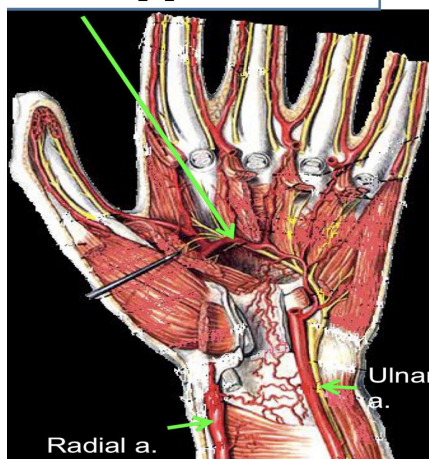
It sends branches:

- 1- **superiorly** to share in anastomosis around the wrist joint
- 2- **inferiorly** to join branches of the superficial palmar arch.

The superficial palmar arch is more distal than the deep palmar arch



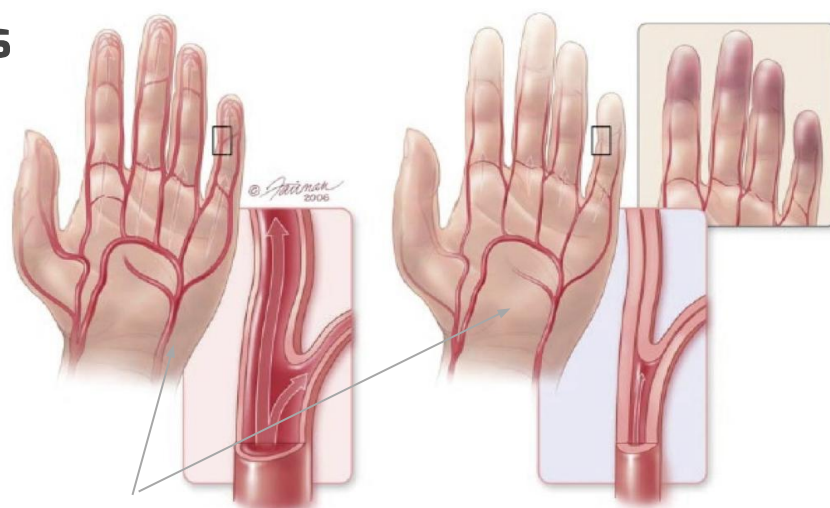
The deep palmar arch



-Arterial Innervation And Raynaud's Disease

→ **Raynaud's disease** is a vasospastic disease involves digital arteries

. It may require **Cervicodorsal preganglionic sympathectomy**, to prevent **necrosis of the fingers.**



Vascular changes that occur during acute **Raynaud's disease**



-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 deep veins

accompany the arteries, and constitute the **venae comitantes** of those vessels.

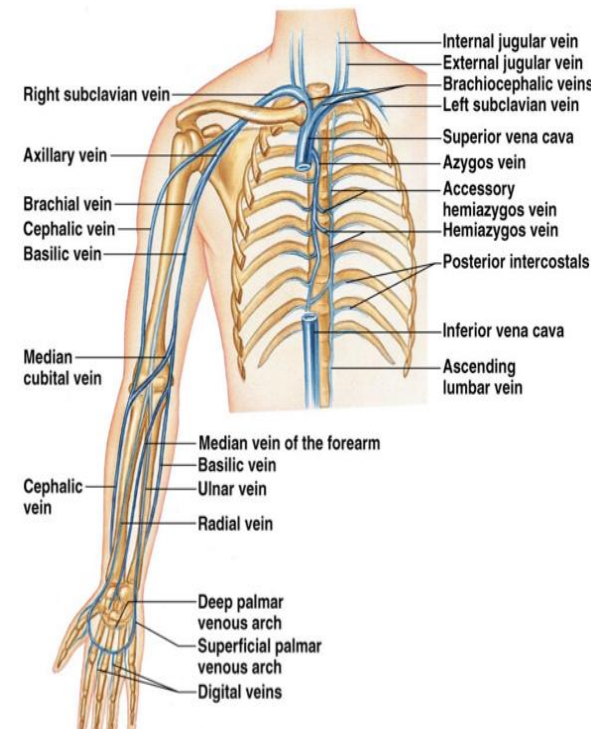
- Axillary
- Subclavian
- Brachial veins

The superficial veins

placed immediately beneath the skin, in the **superficial fascia**

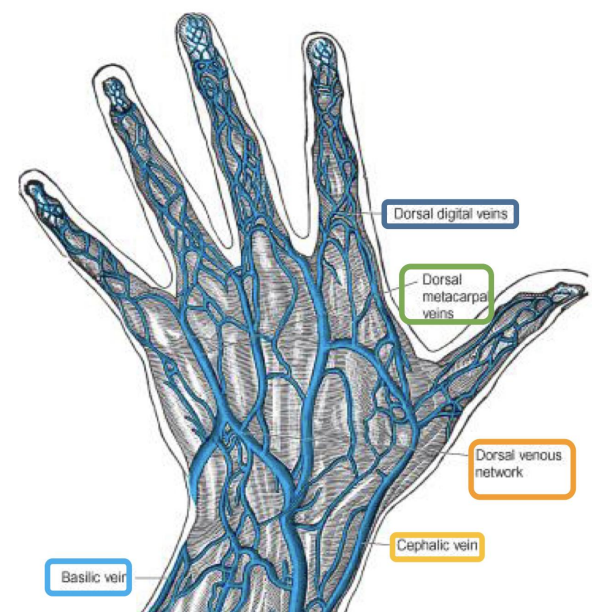
- Cephalic
- Basilic
- Median cubital

Note: we study the veins from distal to proximal because they return the blood back to the heart



-Superficial Veins

- 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, **in the subcutaneous tissue, proximal to the metacarpophalangeal joints**.
- Drains into the **cephalic vein** laterally, and **basilic vein** medially.



Cephalic

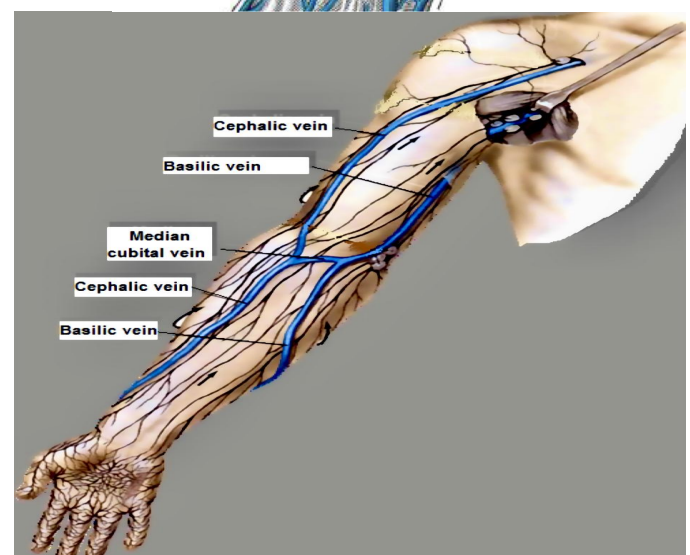
- Arises from the **lateral end** of the dorsal venous arch of hand
- Ascends on **radial side** of the forearm to the elbow and continues up to the arm in the **deltopectoral groove**.
- It pierces **clavipectoral fascia** to drain into the **axillary vein**.

Basilic

- 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**.

Median cubital

- Links **cephalic vein** and **basilic vein** in the cubital fossa.
- Is a frequent site for **venipuncture**.



-Deep Veins :Accompany the arteries of the same region and bear similar names

Vena comitantes

-They are generally arranged in **pairs**.

situated one on either side of the corresponding artery. connected at intervals by short transverse branches.

-The superficial and deep palmar arterial arches are each accompanied by a pair of venæ comitantes which:
A- constitute the **superficial and deep palmar venous arches**.
B- receive the veins corresponding to the branches of the arterial arches.

-The **deep veins of the forearm** are the **venæ comitantes** of the radial and ulnar arteries.

brachial vein

-placed one on either side of the **brachial artery**.

Axillary vein

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

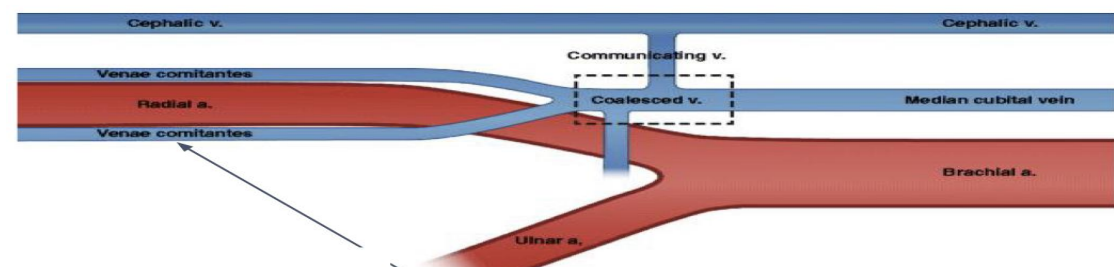
-Ends at the **outer border of the first rib** as the subclavian vein.

-Receives:
1- The **brachial veins**.
2- The **cephalic vein** (close to its termination).

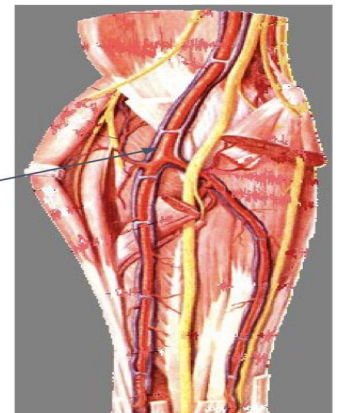
Subclavian vein

-Is the continuation of the **axillary vein**.

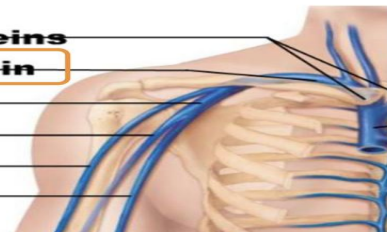
-Extends from the **outer border of the first rib** to the **sternal end of the clavicle**, where it unites with the internal jugular to form the Brachiocephalic (Innominate) vein.



Venæ comitantes



- Brachiocephalic veins
- Right subclavian vein
- Axillary vein
- Brachial vein
- Cephalic vein
- Basilic vein



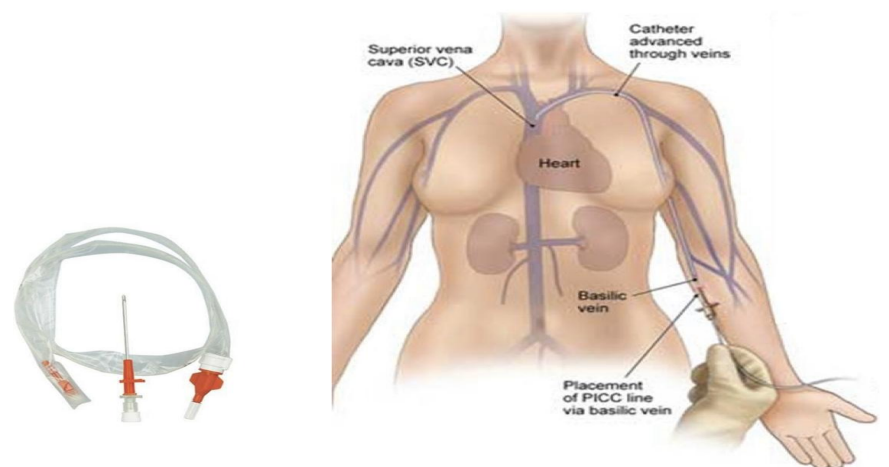
-Vein Catheterization

-The **Basilic vein** is the vein of choice for central venous catheterization.(قسطرة)
Because:

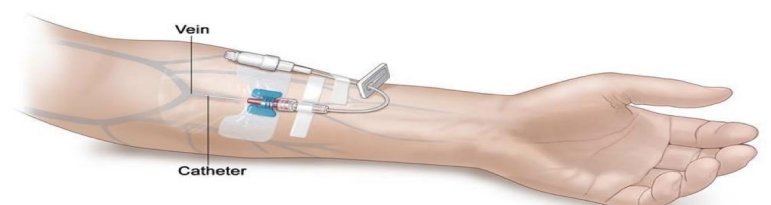
From the cubital fossa until reaching the axillary vein it **increases** in diameter and lies in direct line with the axillary vein.

Abduction of the arm will overcome the troublesome caused by the valves in the axillary vein, and permits the catheter to move past the obstruction

-While The **Cephalic vein**: does not increase in size as it ascends in the arm, and frequently divides into small branches At it's termination it joins the axillary vein at right angle ,so it is **difficult to maneuver the catheter around this angle**



Peripheral Venous Catheter



MCOs

Q1: where does the axillary artery begin ?

- A. Medial border of the 1st rib
- B. Lateral border of the 1st rib
- C. Lateral border of the 2nd rib
- D. Medial border of the 2nd rib

Q2: One of the branches of the 3rd part in axillary artery is

- A. Anterior circumflex humeral
- B. Thoracoacromial
- C. Highest thoracic Artery
- D. Lateral thoracic.

Q3: the axillary artery is a continuation of

- A. Axillary artery
- B. Subclavian artery
- C. Subscapular artery
- D. Radial artery

Q4: One of the branches in the brachial artery is

- A. Highest thoracic Artery
- B. Radial artery
- C. Lateral thoracic
- D. Profunda brachii

Q5: where does the ulnar artery begin ?

- A. Radial tuberosity of radius
- B. Neck of the radius
- C. Olecranon fossa of humerus
- D. Fibula

Q6: what's the smallest terminal branches of the brachial artery ?

- A. Radial artery
- B. Ulnar artery
- C. Axillary artery
- D. Subscapular artery

Q7: The deep palmar arch is more proximal than

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

Q8: Which is the vein of choice for injection

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

Q9: which one of the following links cephalic vein and basilic vein in the cubital fossa?

- A. Median vein
- B. Brachial vein
- C. Median cubital vein
- D. Radial vein

Q10: Cephalic vein pierces:

- A. clavipectoral fascia
- B. deep fascia
- C. Deltopectoral groove
- D. venæ comitantes

Q11: it begins at the lower border of the Teres major, as the continuation of the basilic vein:

- A. Subclavian vein
- B. Axillary vein
- C. Subclavian artery
- D. Axillary artery

Q12: Choose the correct about the basilic vein?

- A. lies in indirect line with the axillary vein
- B. Ascends on the radial side
- C. Ascends on the ulnar side
- D. both A&B

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

SAOs

Q1: How many parts does the Axillary artery have ? Explain each part



Q2: what's the branches of radial artery

Q3: Name two arteries of the palm?

Q4: What arteries are effected by Raynaud's disease ?

1)The Axillary artery is divided into three parts: 1st, 2nd & 3rd
The 1st part Extends from the lateral border of 1st rib to upper border of the pectoralis minor muscle It gives: ONE branch: Highest thoracic branches
The 2nd part lies behind the pectoralis minor muscle It gives: TWO branches
1-Thoracoacromial .
2-Lateral thoracic.
The 3rd part Extends from the lower border of pectoralis minor muscle to the lower border of teres major muscle It gives: THREE Branches:
1-Anterior circumflex humeral
2-Posterior circumflex humeral.
3-Subscapular
2)
1-Muscular 2-Recurrent branch (for anastomosis around the elbow joint).
3-Superficial palmar branch , joins the ulnar artery to form the superficial palmar arch.
3) Ulnar and radial
4)Digital arteries

This lecture is done by:

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SPECIAL THANKS TO THE AMAZING
#MED438 ANATOMY TEAM