VENOUS DRAINAGE OF UPPER LIMB

BY

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Venous drainage of the upper limb

- The venous system of the upper limb drains deoxygenated blood from the arm, forearm and hand.
- It can anatomically be divided into the superficial veins and the deep veins.

**Superficial Veins**
- The major superficial veins of the upper limb are the cephalic and basilic veins.
- As their name suggests, they are located within the subcutaneous tissue of the upper limb.

**Basilic vein**
- Originates from the dorsal venous network of the hand.
Superficial veins conti..

- It ascends the medial aspect of the upper limb
- At the border of the teres major, the vein moves deep into the arm
- Here, it combines with the brachial veins to form the **axillary vein**

**Cephalic vein**

- Arises from the dorsal venous network of the hand
- It ascends the antero-lateral aspect of the upper limb, passing anteriorly at the elbow
- At the shoulder, the cephalic vein travels between the deltoid and pectoralis major muscles (known as the deltopectoral groove), and enters the axilla region via the clavipectoral triangle
Superficial veins conti..

- Within the axilla, the cephalic vein terminates by joining the **axillary vein**.
- At the elbow, the cephalic and basilic veins are connected by the **median cubital vein**.
- Major superficial veins
  - Cephalic veins
  - Basilic vein
  - Median cubital vein
Superficial veins of the upper limb
Variations in the superficial veins of upper limb
Deep veins

- Situated underneath the deep fascia
- They are paired veins that accompany and lie either side of an artery
- **The brachial veins** are the largest in size, and are situated either side of the brachial artery
- The pulsations of the brachial artery aids the venous return
- Veins that are structured in this way are known as vena comitantes
- **Perforating veins** run between the deep and superficial veins of the upper limb, connecting the two systems
Clinical Relevance: Venepuncture

• Venepuncture is the practice to obtain intravenous access
• This can be for intravenous therapy, or obtaining a blood sample
• The main vein for venepuncture is the median cubital vein
• It is commonly used due to its accessible and superficial position
SUPERFICIAL VEINS AND PULSES IN UPPER LIMB

Cephalic vein
Pierces the clavipectoral fascia at upper end of the deltopectoral groove to enter axillary vein

Radial artery
Pulse. Lateral to the tendon of flexor carpi radialis

Brachial artery
Pulse. In the cubital fossa, lateral to the median nerve

Pectoralis major

Deltoid

Medial epicondyle

Basilic vein
Pierces the fascia in the medial mid arm to join the venae commitantes which together, at the inferior border of teres major, become the axillary vein

Dorsal venous arch

Commencement of the basilic vein (medial side)

Commencement of the cephalic vein (lateral side)
Lymphatics of the upper limb

- Functions to drain tissue fluid, plasma proteins and other cellular debris back into the blood stream, and is also involved in immune defense

- Once this collection of substances enters the lymphatic vessels it is known as lymph; lymph is subsequently filtered by lymph nodes and directed into the venous system
Lymphatic drainage of the upper limb

- **Superficial lymphatics**
  - From the thumb, index finger, and lateral part of the hand follow the cephalic vein → infraclavicular lymph nodes.
  - From the medial part of the hand follow the basilic vein → supratrochlear lymph node which lies just above the medial epicondyle of the humerus → lateral group of axillary lymph nodes.

- **Deep lymphatics**: follow the arteries → lateral group of axillary lymph nodes.
Deep Lymphatic Vessels

• These follow the major deep veins (i.e. radial, ulnar and brachial veins), terminating in the humeral axillary lymph nodes

• They function to drain lymph from joint capsules, periosteum, tendons and muscles

• Some additional lymph nodes may be found along the ascending path of the deep vessels
Lymph Nodes

- The majority of the upper lymph nodes are located in the axilla.
- They can be divided anatomically into 5 groups:
  - **Pectoral (anterior)** – 3-5 nodes, located in the medial wall of the axilla. They receive lymph primarily from the anterior thoracic wall, including most of the breast.
  - **Subscapular (posterior)** – 6-7 nodes, located along the posterior axillary fold and subscapular blood vessels. They receive lymph from the posterior thoracic wall and scapular region.
Cervico-axillary canal

Subclavian lymphatic trunk

Right (or left) venous angle

Supraclavicular nodes

Apical nodes

Central nodes

Subscapular (posterior) nodes

Humeral (lateral) nodes

Base of axilla

Pectoral (anterior) nodes
- **Humeral (lateral) – 4-6 nodes**, located in the lateral wall of the axilla, posterior to the axillary vein.
  - They receive the majority of lymph drained from the upper limb.

- **Central – 3-4 large nodes**, located near the base of the axilla (deep to pectoralis minor, close to the 2nd part of the axillary artery).
  - Receive lymph via efferent vessels from the pectoral, subscapular, and humeral axillary lymph node groups.

- **Apical** – Located in the apex of the axilla, close to the axillary vein and 1st part of the axillary artery.
  - Receive lymph from efferent vessels of the central axillary lymph nodes, therefore from all axillary lymph node groups.
  - They also receive lymph from those lymphatic vessels accompanying the cephalic vein.
• Efferent vessels from the apical axillary nodes travel through the cervico-axillary canal, before converging to form the subclavian lymphatic trunk

• **The right subclavian trunk** continues to form the right lymphatic duct, and enters the right venous angle (junction of internal jugular and subclavian veins) directly

• **The left subclavian trunk** drains directly into the thoracic duct

75% of lymphatics from the breast drain to axillary nodes. Others to internal thoracic, abdominal nodes or to other breast

Mnemonic for axillary lymph nodes:
A - Anterior
P - Posterior
I - Infraclavicular
C - Central
A - Apical
L - Lateral
Clinical Relevance: Enlargement of Axillary Lymph Nodes

• Enlargement of these lymph nodes can have a number of either infectious or malignant causes:

• Infection of the upper limb, resulting in lymphangitis (inflammation of lymphatic vessels, with tender, enlarged lymph nodes)

• The humeral group of lymph nodes is usually affected first, and red, warm and tender streaks are visible in the skin of the upper limb

• Infections of the pectoral region and breast

• Metastasis of breast cancers
Axillary Lymph Node Dissection

• Removal and analysis of the axillary lymph nodes is often a vital tool for the staging of breast cancers.

• Interruption of lymphatic drainage from the upper limb can result in lymphoedema, a condition whereby accumulated lymph in the subcutaneous tissue leads to painful swelling of the upper limb.

• During this procedure there is also a risk of damage to either of the long thoracic nerve (potentially causing a winged scapula deformity), or the thoracodorsal nerve.
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