ARM & ELBOW

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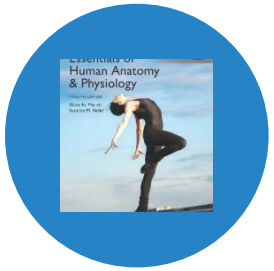
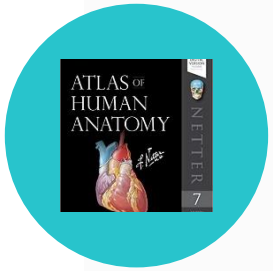
Objectives

- Describe the attachments, actions and innervations of:
  - *Biceps brachii*
  - *Coracobrachialis*
  - *Brachialis*
  - *Triceps brachii*
- Demonstrate the following features of the elbow joint:
  - *Articulating bones*
  - *Capsule*
  - *Lateral & medial collateral ligaments*
  - *Synovial membrane*
- Demonstrate the movements; flexion and extension of the elbow.
- List the main muscles producing the above movements.
- Define the boundaries of the cubital fossa and enumerate its contents.

Resources



ESSENTIAL OF HUMAN ANATOMY & PHYSIOLOGY



ATLAS OF HUMAN ANATOMY

GRAY'S ANATOMY

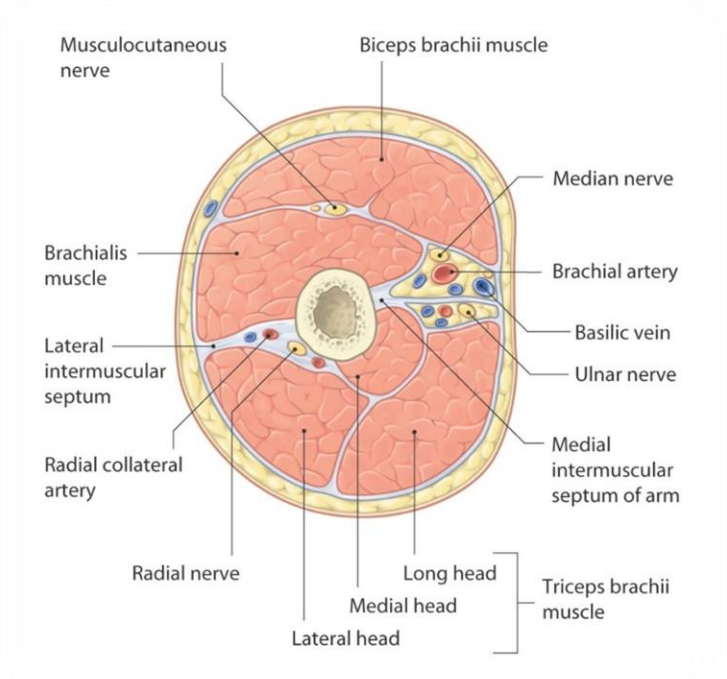
KENHUB

THE ARM

Introduction

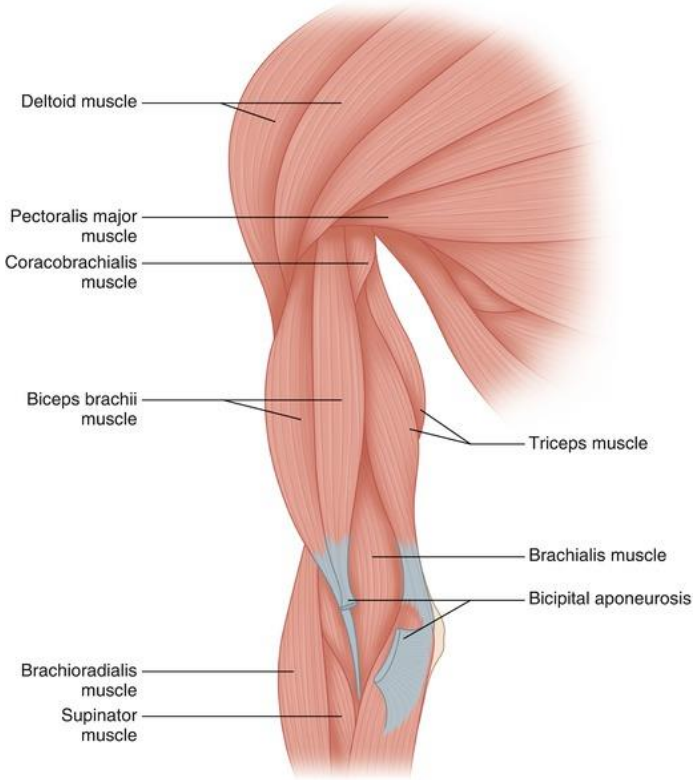
- The arm is located between the shoulder joint and elbow joint.
- It contains four main muscles.
- An aponeurotic sheet separating those muscles, including lateral and medial humeral septa.
- The lateral and medial intermuscular septa divide the distal part of the arm into two compartments:
  - Anterior compartments
    - also known as the flexor compartment
  - Posterior compartments
    - also known as the extensor compartment

Anterior Compartment



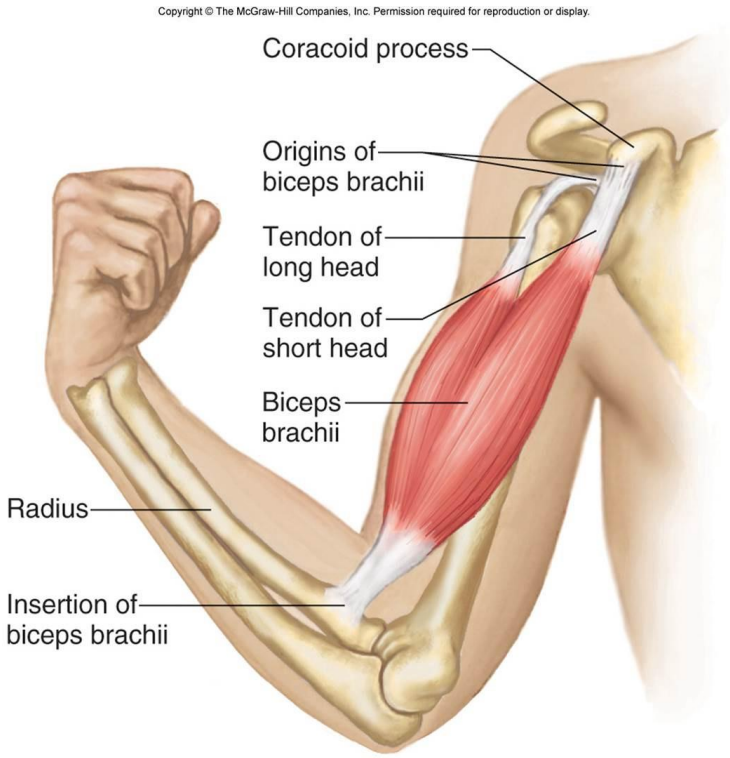
- **Muscles:** Biceps brachii, Coracobrachialis & Brachialis.
- **Blood Vessels:** Brachial artery and Basilic vein.
- **Nerves:** Musculocutaneous and Median.

Muscles of Anterior Compartment



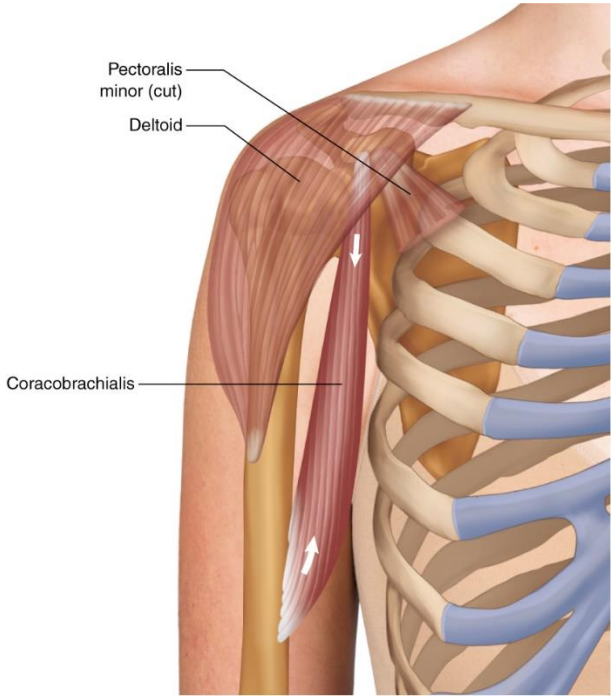
- Biceps brachii
- Coracobrachialis
- Brachialis

Biceps Brachii



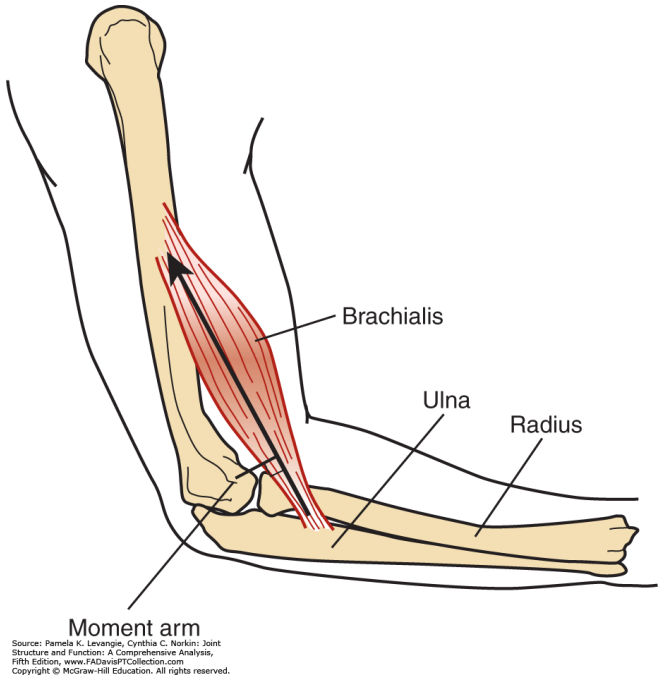
- Origin:
  - Long Head from supraglenoid tubercle of scapula (intracapsular)
  - Short Head from the tip of coracoid process of scapula
  - The two heads join in the middle of the arm
- Insertion:
  - In the posterior part of the radial tuberosity.
  - Into the deep fascia of the medial aspect of the forearm through bicipital aponeurosis.
- Nerve supply:
  - Musculocutaneous
- Action:
  - Strong supinator of the forearm
    - used in screwing.
  - Powerful flexor of elbow
  - Weak flexor of shoulder

Coracobrachialis



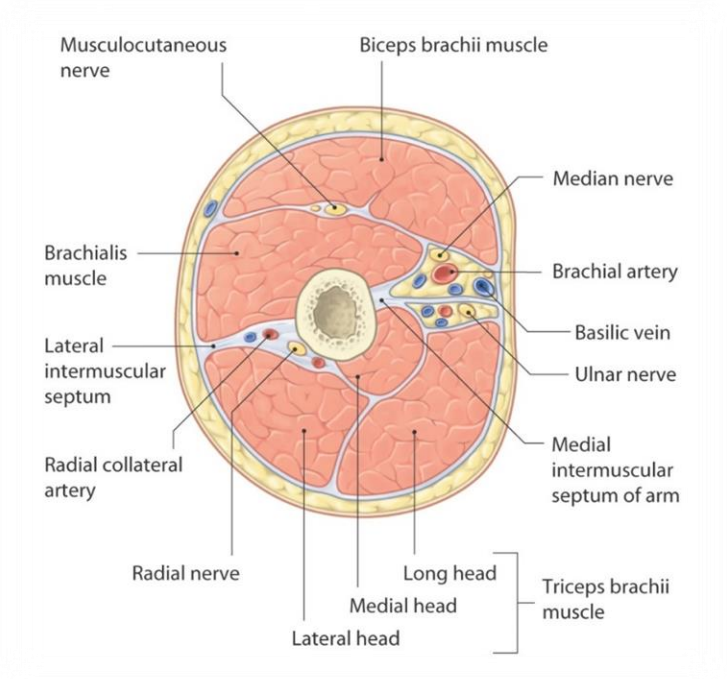
- Origin:
  - Tip of the coracoid process
- Insertion:
  - Middle of the medial side of the shaft of the humerus
- Nerve supply:
  - Musculocutaneous
- Action:
  - Flexor
  - Weak adductor of the arm

Brachialis



- **Origin:**
  - Front of the lower half of humerus
- **Insertion:**
  - Anterior surface of coronoid process of ulna
- **Nerve supply:**
  - Musculocutaneous and Radial
- **Action:**
  - Strong flexor of the forearm

Posterior Compartment

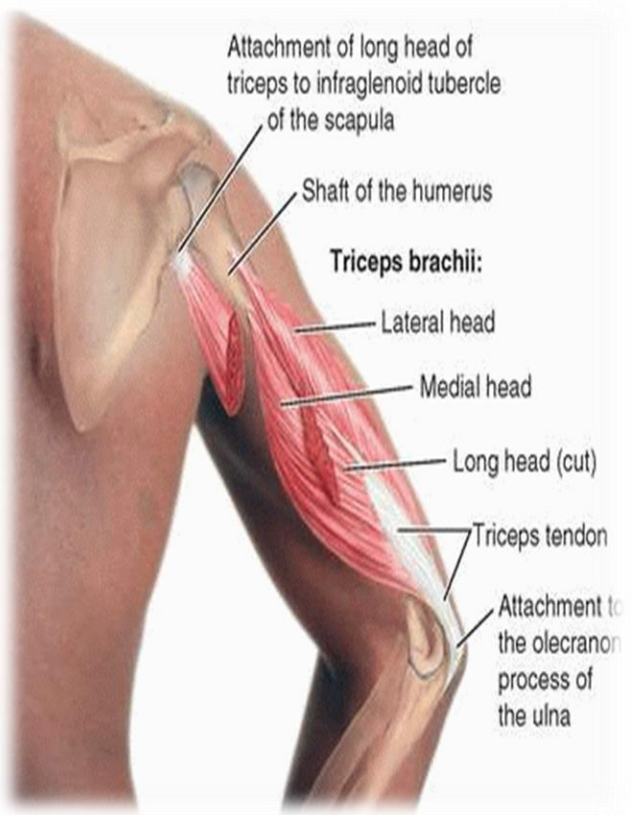


- **Muscles:** Triceps brachii.
- **Blood Vessels:** Profunda brachii and Ulnar collateral arteries.
- **Nerves:** Radial and Ulnar.

Muscles of Posterior Compartment

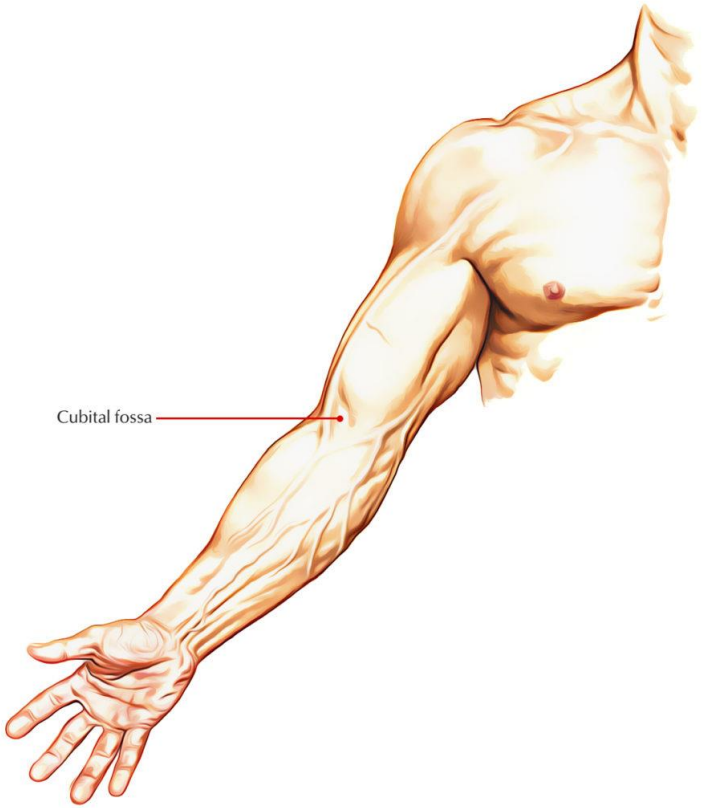
- Triceps brachii

Triceps Brachii



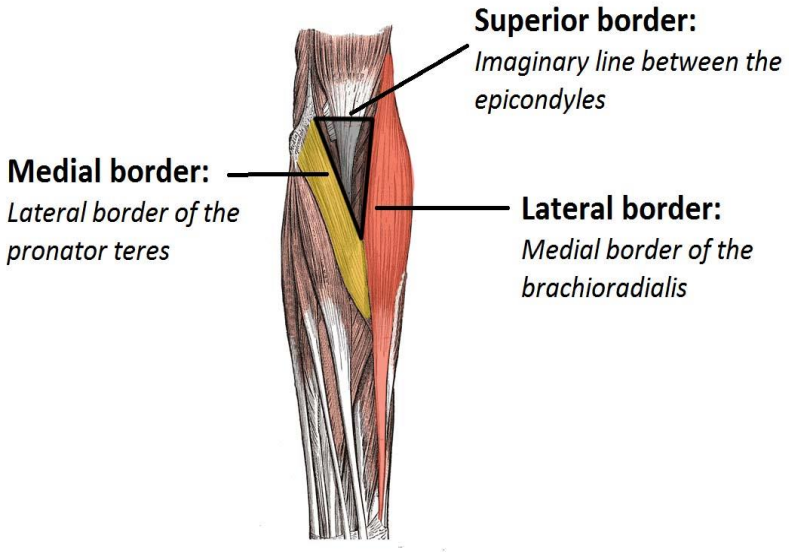
- Origin:
  - Long Head from infrglenoid tubercle of the scapula.
  - Lateral Head from the upper half of the posterior surface of the shaft of humerus above the spiral groove.
  - Medial Head from the lower half of the posterior surface of the shaft of humerus below the spiral groove.
- Insertion:
  - Common tendon inserted into the upper surface of the olecranon process of ulna.
- Nerve supply:
  - Radial
- Action:
  - Strong extensor of the elbow joint.

Cubital Fossa



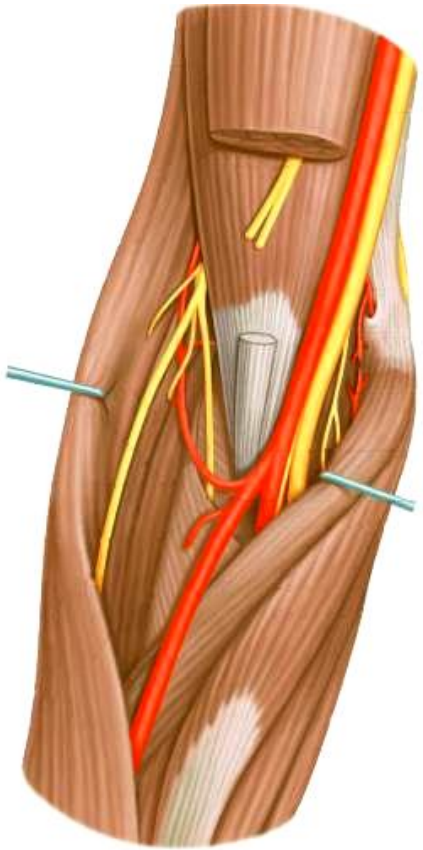
- It is an area of transition between the anatomical arm and the forearm.
- It is located as a triangular depression on the anterior surface of the elbow joint.

Boundaries



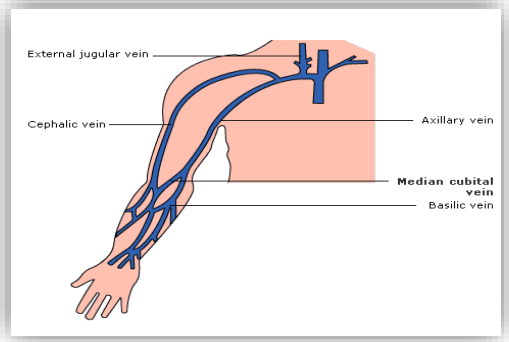
- **Base:**
  - Line drawn through the two epicondyles of humerus.
- **Lateral:**
  - Brachioradialis.
- **Medial:**
  - Pronator teres
- **Roof:**
  - Skin, superficial & deep fascia and bicipital aponeurosis.
- **Floor:**
  - Brachialis medially and supinator laterally.

Content



- Biceps brachii tendon
- Brachial artery
  - divides into radial & ulnar arteries.
- Median nerve
- Deep branch of radial nerve

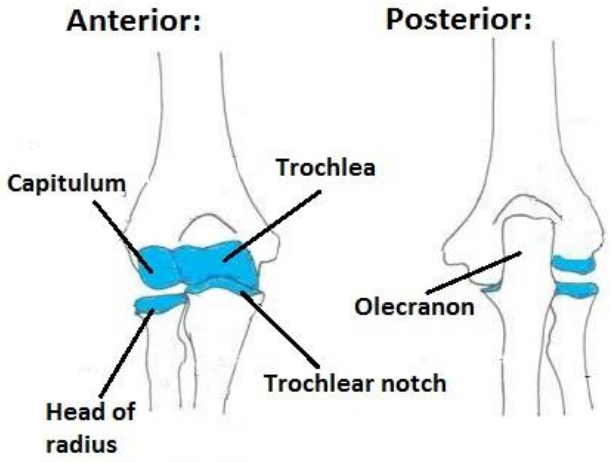
Clinical Significance

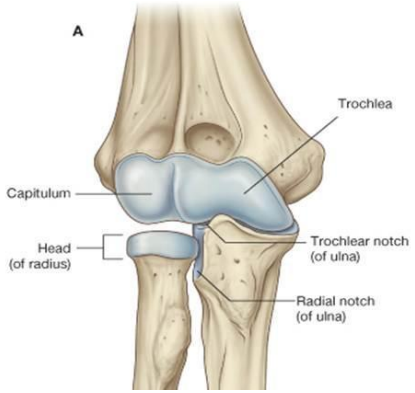


- The **brachial pulse** can be felt by palpating immediately medial to the biceps tendon in the cubital fossa.
- The median cubital vein is located superficially within the roof of the cubital fossa.
- It connects the **basilic** and **cephalic** veins and can be accessed easily – this makes it a common site for **venipuncture**.

ELBOW JOINT

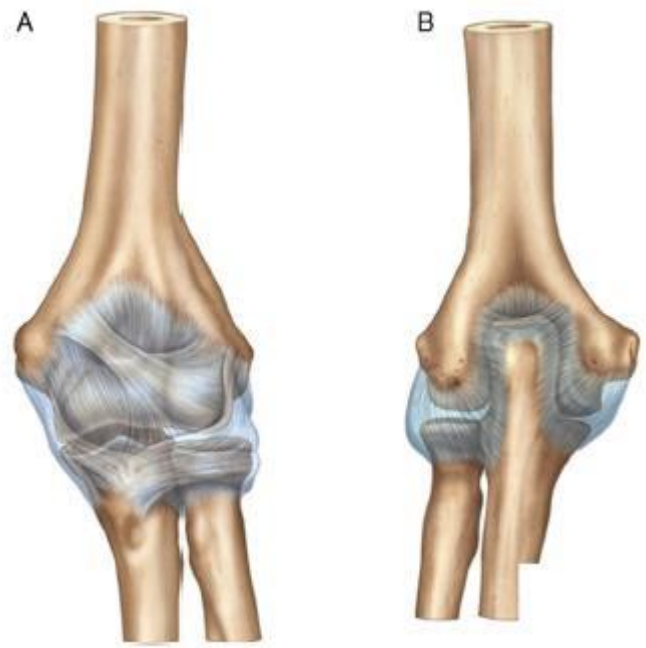
Articulating Surfaces





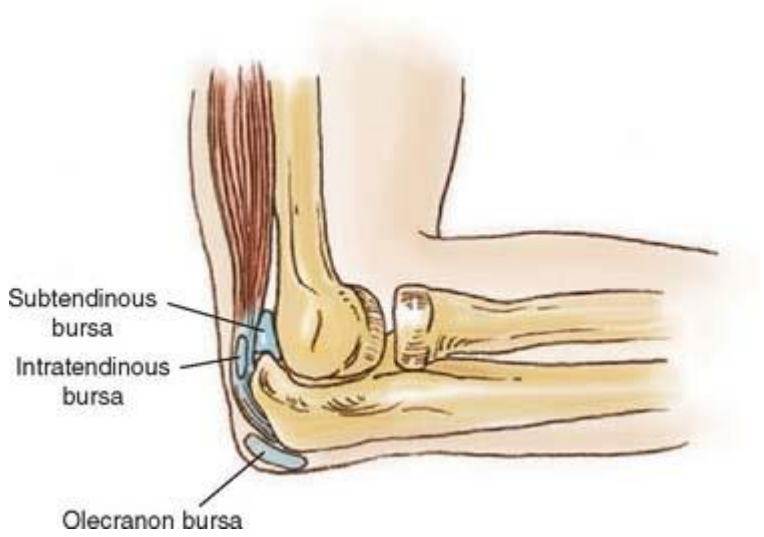
- The elbow is the joint connecting the upper **arm** to the **forearm**.
- It is classed as a **hinge synovial joint**.
- It consists of two separate articulations:
  - **Trochlea** and **capitulum** of the humerus above.
  - **Trochlear notch** of ulna and the **head** of radius below.
- The articular surfaces are covered with **hyaline cartilage.**

Capsule



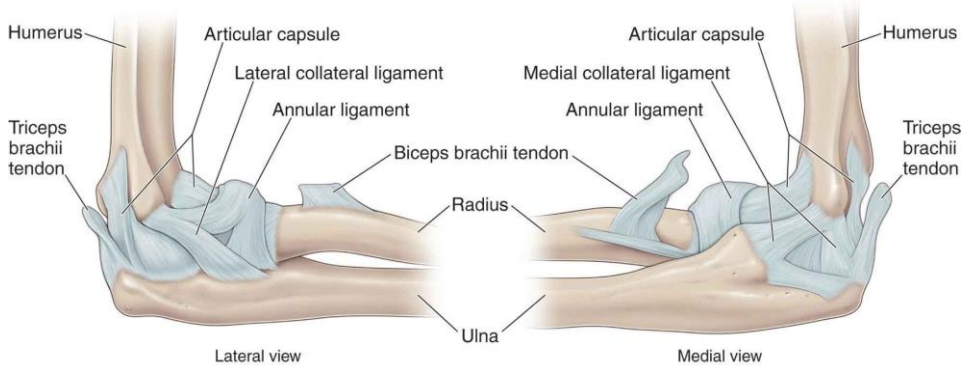
- The elbow joint has a capsule enclosing the joint.
- This is strong and fibrous, strengthening the joint.
- The joint capsule is thickened medially and laterally to form collateral ligaments, which stabilize the flexing and extending motion of the arm.

Bursae



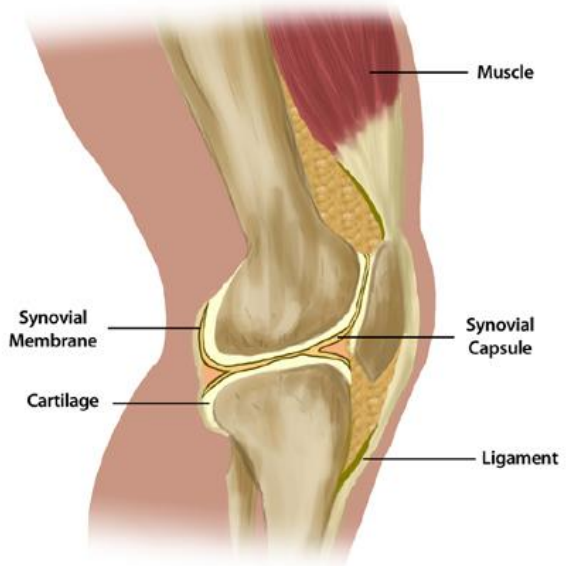
- A bursa is a membranous sac filled with synovial fluid.
- It acts as a cushion to reduce friction between the moving parts of a joint, limiting degenerative damage.
- There are many bursae in the elbow, but only a few have clinical importance:
  - **Intratendinous** located within the tendon of the triceps brachii.
  - **Subtendinous** between the olecranon and the tendon of the triceps brachii, reducing friction between the two structures during extension and flexion of the arm.
  - **Subcutaneous** (olecranon) between the olecranon and the overlying connective tissue (implicated in olecranon bursitis).

Ligaments



- Lateral (Radial Collateral) Ligament
  - Triangular
  - **Apex** attached to the lateral epicondyle of humerus
  - **Base** attached to the upper margin of annular ligament.
- Medial (Ulnar Collateral) Ligament
  - **Anterior strong cord-like band** between medial epicondyle and the coronoid process of ulna
  - **Posterior weaker fan-like band** between medial epicondyle and the olecranon process of ulna
  - **Transverse band** passes between the anterior and posterior bands

Synovial Membrane

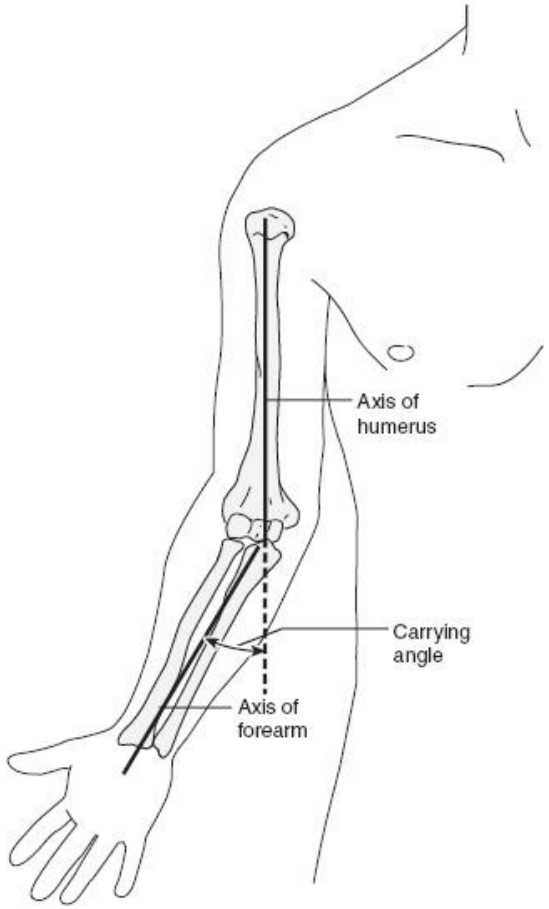


- This lines the capsule and covers fatty pads in the floors of the coronoid, radial, and olecranon fossae.
- Is continuous below with synovial membrane of the superior radio-ulnar joint

Movement

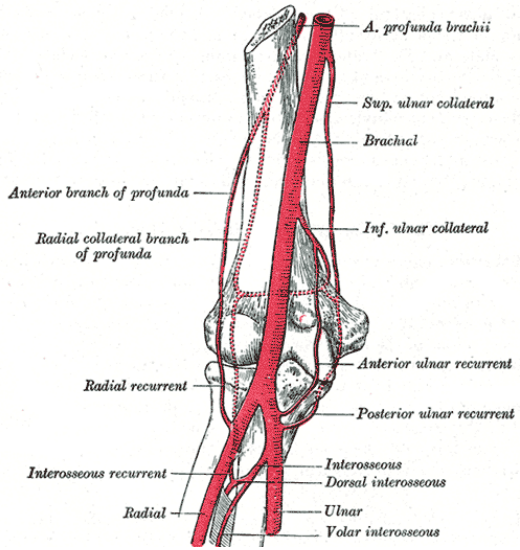
- The elbow joint is a **hinge joint**, movement is in only one plane.
- Flexion
  - It is limited by the anterior surfaces of the forearm and arm coming into contact.
- Extension
  - It is limited by the tension of the anterior ligament and the brachialis muscle.
- The joint is supplied by branches from the:
  - Median
  - Ulnar
  - Musculocutaneous
  - Radial nerves

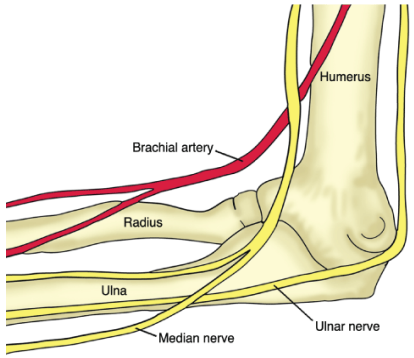
Carrying Angle



- Angle
  - Between the long axis of the extended forearm and the long axis of the arm.
- Open
  - Laterally
- Degree
  - 170^{o} in male and 167^{o} in females
- Disappears
  - When the elbow joint is flexed
- Permits
  - The forearms to clear the hips in swinging movements during walking and is important when carrying objects.

Blood Supply & Innervation



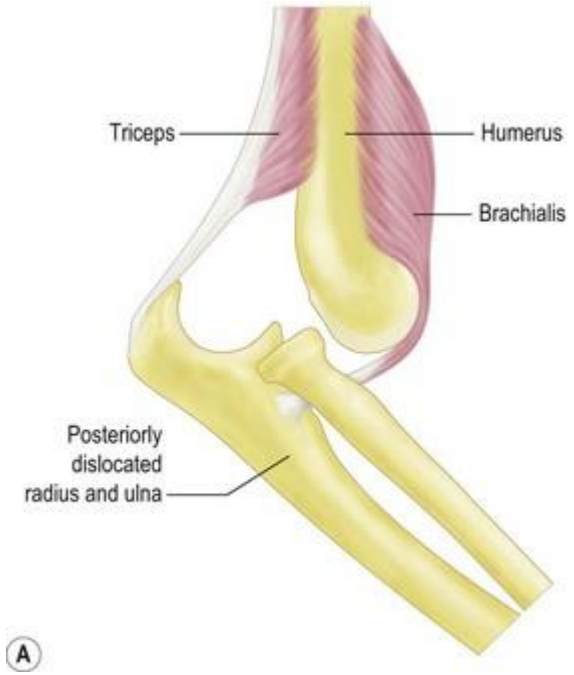


- The **arterial supply** to the elbow joint is from the cubital anastomosis, which includes recurrent and collateral branches from the **deep brachial arteries**.
- The **innervation** of elbow joint is provided by the **median**, **musculocutaneous** and **radial** nerves anteriorly, and the **ulnar** nerve posteriorly.

Bursitis

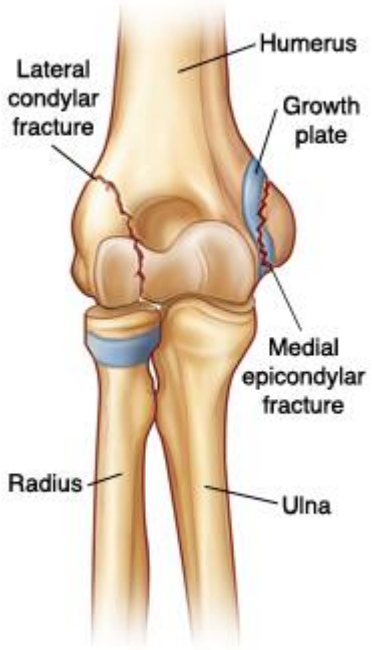
- Subcutaneous bursitis
  - Repeated friction and pressure on the bursa can cause it to become inflamed.
  - Because this bursa lies relatively superficially, it can also become infected (example, cut from a fall on the elbow)
- Subtendinous bursitis
  - This is caused by repeated flexion and extension of the forearm, commonly seen in assembly line workers.
  - Usually flexion is more painful as more pressure is put on the bursa.

Dislocation



- An elbow dislocation usually occurs when a young child falls on a hand with the elbow flexed.
- The distal end of the humerus is driven through the weakest part of the joint capsule, which is the anterior side.
- The ulnar collateral ligament is usually torn and there can also be ulnar nerve involvement
- Most elbow dislocations are posterior, and it is important to note that elbow dislocations are named by the position of the ulna and radius, not the humerus.

Fractures



- Elbow fractures may result from a **fall**, a **direct impact** to the elbow, or a **twisting** injury to the arm.
- **Sprains**, **strains** or **dislocations** may occur at the same time as a fracture.
- **X-rays** are used to confirm if a fracture is present and if the bones are out of place.
- Sometimes, a **CT scan** might be needed to get further investigation.

Questions?

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