

**The University Of Jordan  
Faculty Of Medicine**



# **Joints of Upper Limb**

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## The Shoulder Girdle

It is formed of the clavicle (anteriorly) and scapula (posteriorly) and surrounds the upper part of the side of the chest.

The 2 bones articulate at the **acromioclavicular joint**.

The shoulder girdle is connected to the axial skeleton via:

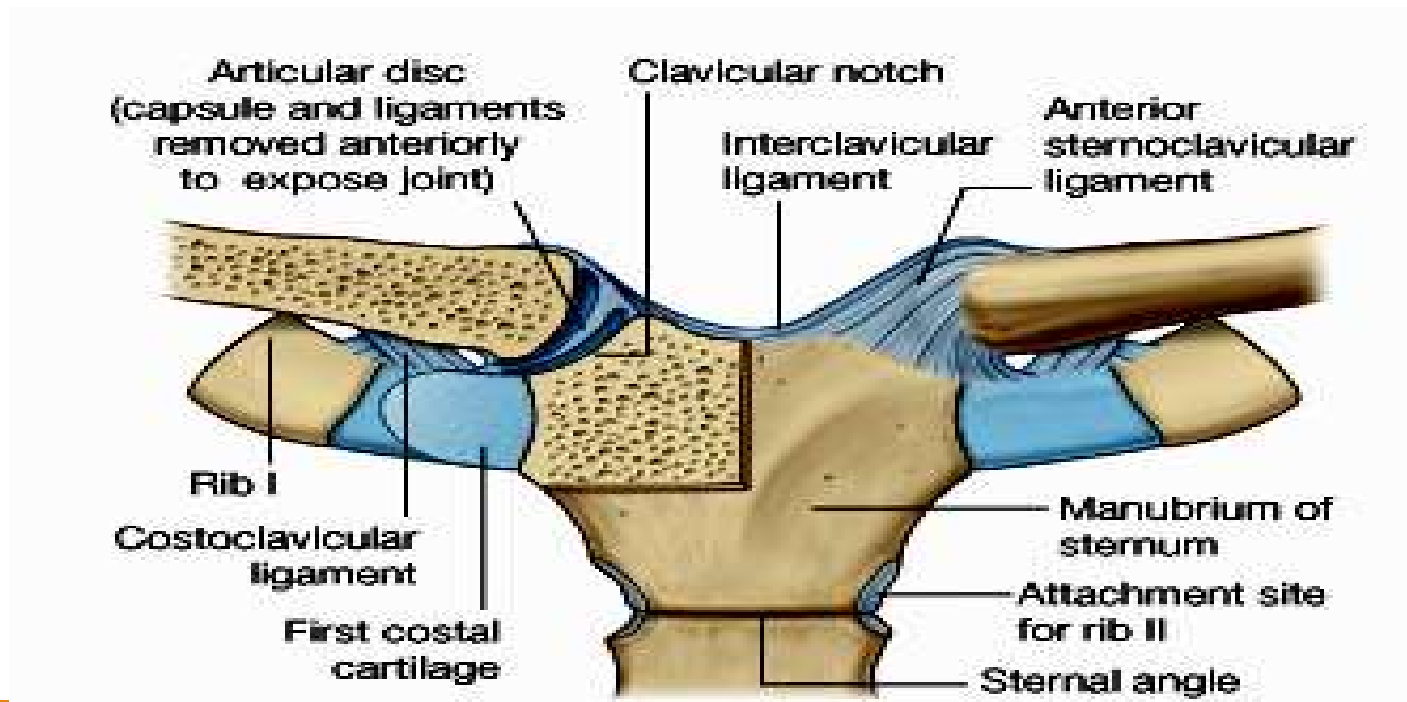
- ❑ Sternoclavicular joint (**anteriorly**).
- ❑ Muscles of the back (**posteriorly**).

**Function:** It suspends the upper limb from the axial skeleton and increases its range of movement.

## Sternoclavicular joint

**Type :** It is synovial joint (modified saddle joint)

**Articular surfaces:** the **medial end of the clavicle** and the **clavicular notch** of the **manubrium of sternum** together with a small part of the **first costal cartilage**.



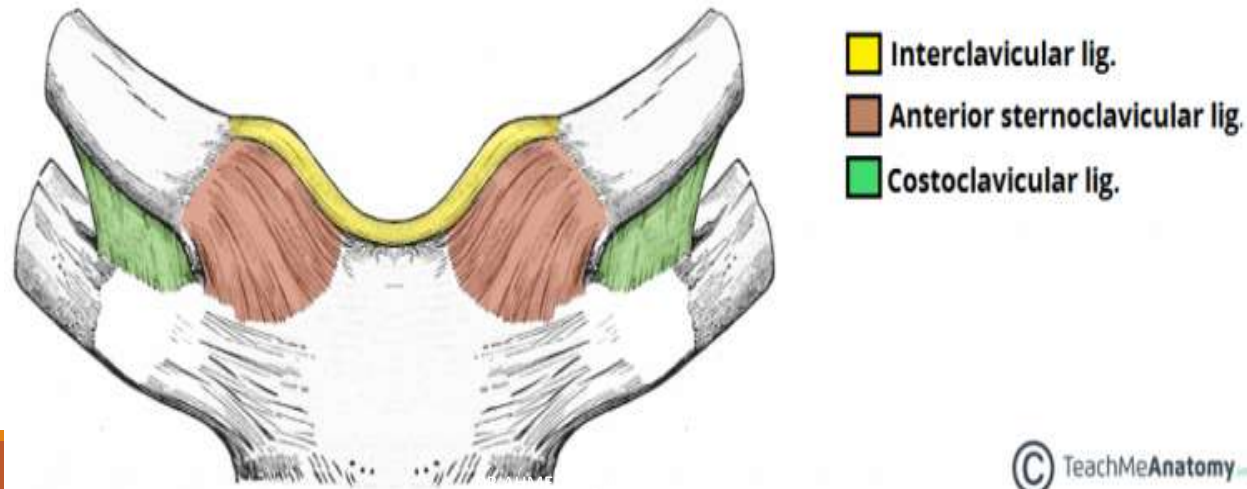
## Ligaments:

1. Anterior sternoclavicular ligament .

2. Posterior sternoclavicular ligament .

**3. Interclavicular ligament:** connects the sternal ends of the 2 clavicles above the upper border of the manubrium.

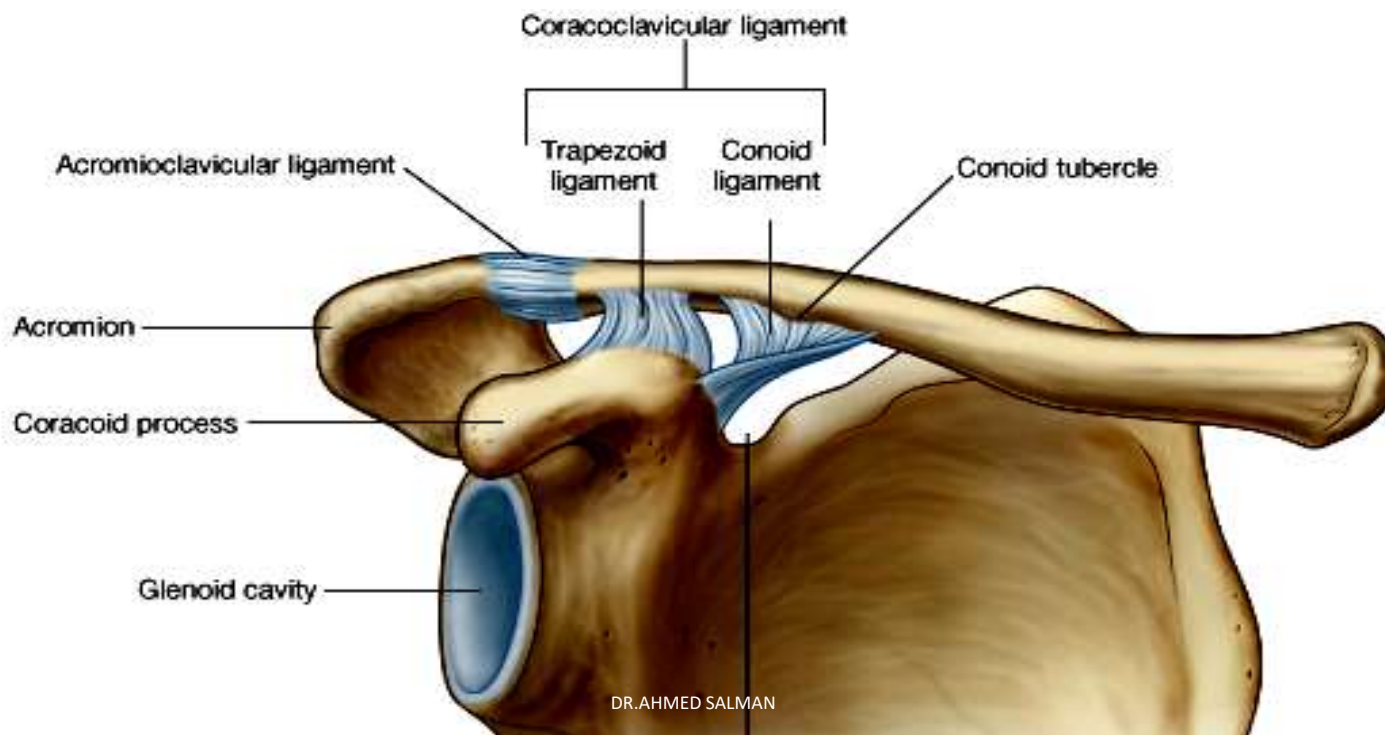
**4. Costoclavicular ligament:** extends from the 1<sup>st</sup> costochondral junction to the inferior surface of the clavicle near its medial end (it is the main stabilizing factor).



## Acromioclavicular joint

**Type:** It is a plane synovial joint

**Articular surfaces:** Medial border of acromion and lateral end of the clavicle.



## Ligaments:

**1. Acromioclavicular ligament** covers the upper aspect of the joint.

**2. Coracoclavicular ligament:** has 2 parts:

**a. Trapezoid part** (thin quadrangular): extends from the **coracoid process** to the trapezoid ridge of the clavicle.

**b. Conoid part** (thick cone-like): extends from the **coracoid process** to conoid tubercle of the clavicle.

## Coracoacromial ligament:

The ligament together with the acromion and the coracoid process forms the **coracoacromial arch**

The ligament is separated from the capsule of the shoulder joint by the **subacromial bursa**.

## **Movements at the joints of the shoulder girdle:**

Slight gliding and rotation occur at the 2 joints of the shoulder girdle.

### **Movements of the scapula**

#### **Elevation:**

- a. Upper fibers of trapezius.
- B. Levator scapulae.

#### **Depression:**

- a. Lower fibers of trapezius.
- b. Pectoralis minor.

#### **Protraction (forward movements):**

- a. Serratus anterior.
- b. Pectoralis minor

#### **Retraction (backward movement):**

- a. Rhomboids minor and major
- b. Middle fibers of trapezius

## Shoulder separation

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It happens as a result of Acromioclavicular Dislocation

The acromion being pushed below the lateral end of the clavicle, tearing the coracoclavicular ligament.



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## Shoulder (Glenohumeral) Joint

**Type :** It is Synovial ball-and-socket joint

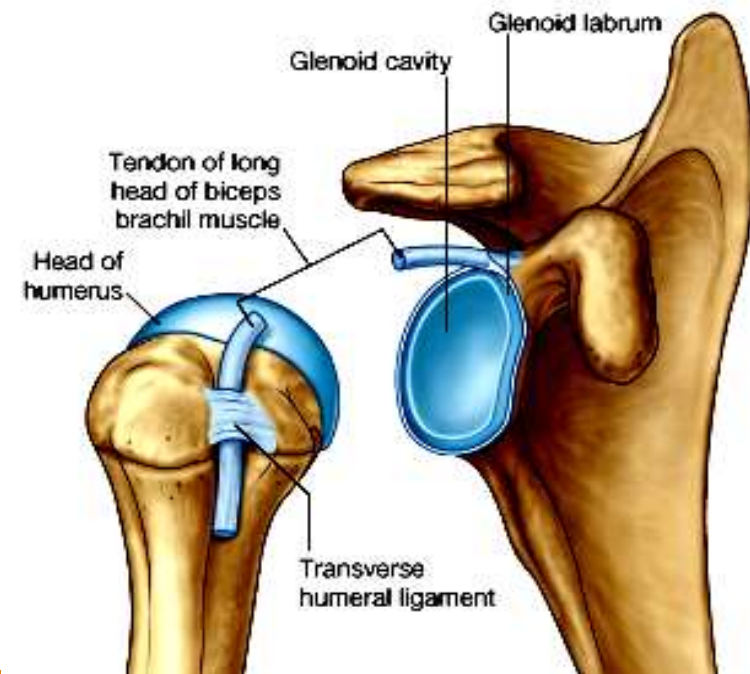
**Articular surfaces:** The head of the humerus and the glenoid cavity of the scapula. The glenoid cavity is deepened by the presence of a fibrocartilaginous rim called the glenoid labrum.

**Fibrous capsule :**

**Attachments:**

**Medially:** to the margin of the glenoid cavity

**Laterally:** to the anatomical neck of the humerus



## Ligaments:

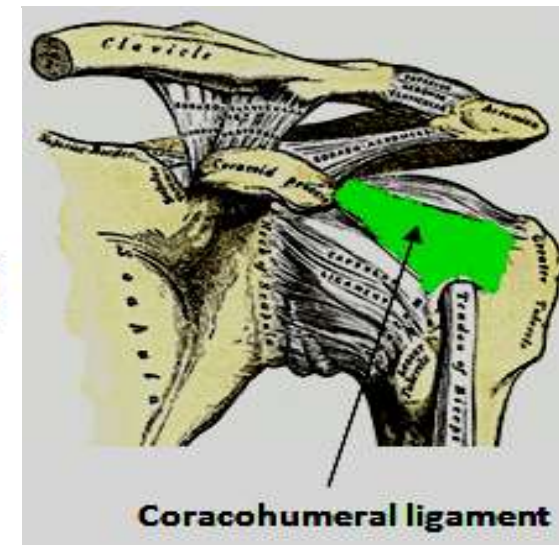
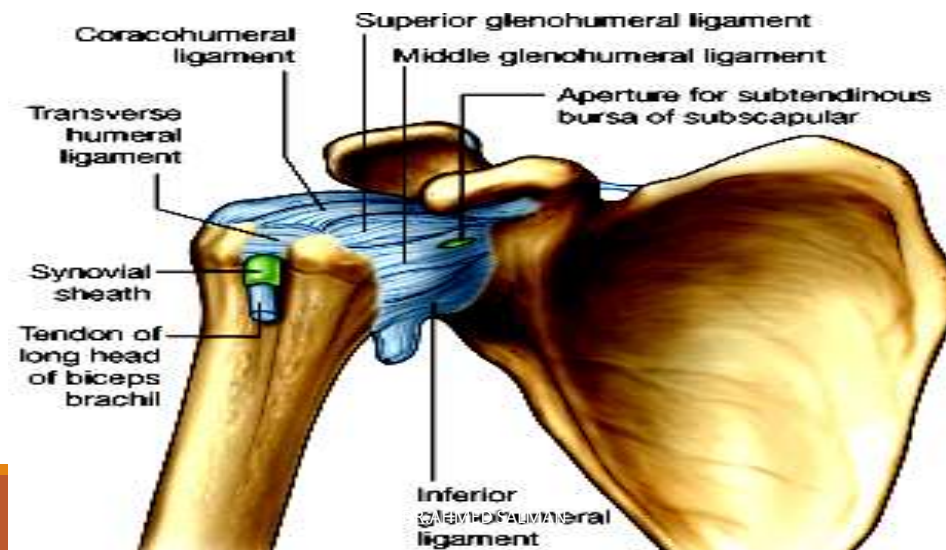
1-Superior, middle, and inferior **Glenohumeral** ligaments strengthen the front of the capsule.

2-**Coracohumeral ligament** extends from the coracoid process to the greater tuberosity of the humerus.

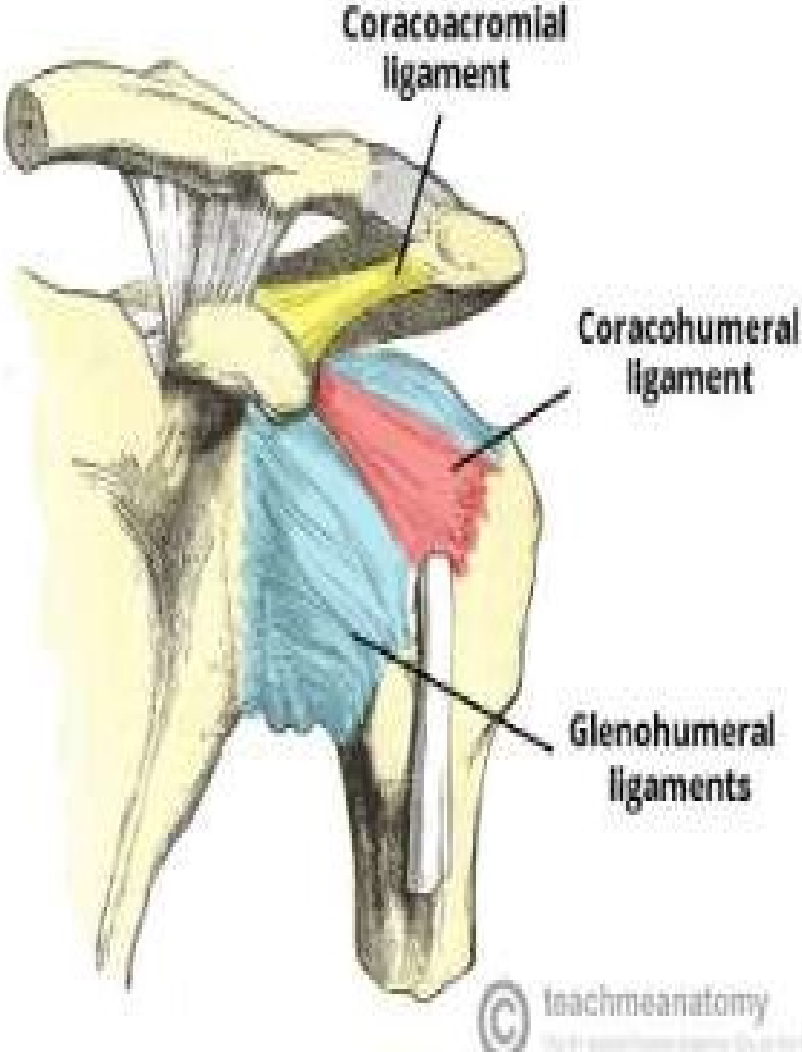
3-The **transverse humeral** extends between the greater & lesser tuberosities.

4-The **coracoacromial** ligament extends between the coracoid process and the acromion.

It protects the superior aspect of the joint



**Coracoacromial ligament**



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**Arterial blood supply:**

1. Suprascapular artery.
2. Anterior circumflex humeral artery.
3. Posterior circumflex humeral artery.

**Nerve supply:**

1. Suprascapular nerve.
2. Axillary nerve.
3. Lateral pectoral nerve.

## MOVEMENTS:

**Flexion:** by the anterior fibers of the deltoid, pectoralis major, biceps, and coracobrachialis

**Extension:** by the posterior fibers of the deltoid, latissimus dorsi, and teres major

**Abduction:** The middle fibers of the deltoid, assisted by the supraspinatus

**Adduction:** by the pectoralis major, latissimus dorsi, and teres major.

**Lateral rotation:** by infraspinatus, the teres minor, and the posterior fibers of the deltoid

**Medial rotation:** by the subscapularis, the latissimus dorsi, the teres major, pectoralis major and the anterior fibers of the deltoid muscle.

**Circumduction:** This is a combination of the above movements

## **Causes of weakness of shoulder joint**

- 1-Wide range of movement
- 2-Large size of head with shallow glenoid cavity
- 3-Lax capsule
- 4- Opening in the capsule

## **Factors strength shoulder joint**

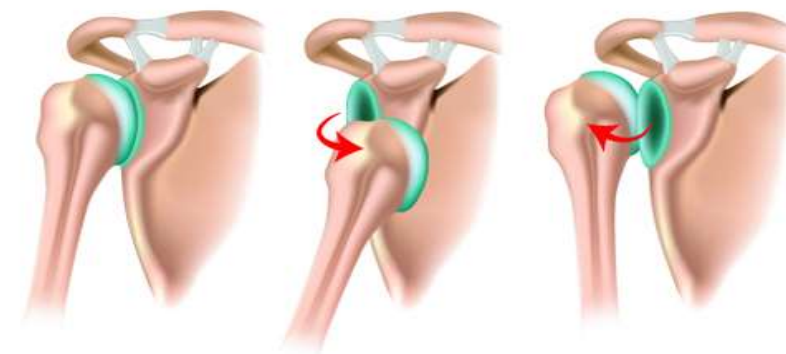
- 1- Coracoacromial arch
- 2-Rotator cuff muscles
- 3- Glenoid labrum

**Clinical note:**

Dislocation of the shoulder joint occurs commonly downwards at the least supported part. This may injury the axillary nerve that runs close to the surgical neck of the humerus.



Shoulder Dislocation



Normal anatomy

Anterior dislocation

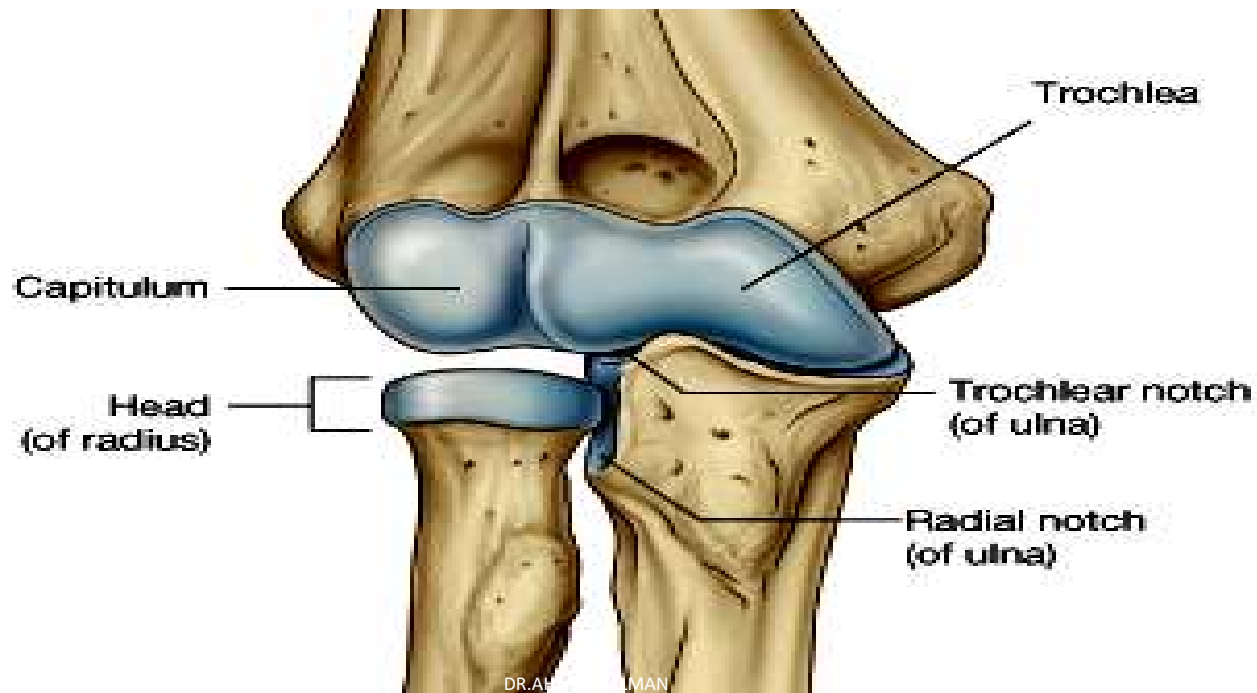
Posterior dislocation

## ELBOW JOINT

**Type:** Synovial hinge joint

**Articular surfaces:**

- The trochlea of the humerus with the trochlear notch of the ulna
- Capitulum of the humerus with the head of the radius.





## **Fibrous capsule:**

### **Attachments:**

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#### **Proximal (upper) attachment:**

- To the front of the humerus above the coronoid and radial fossae.
- To the back of the humerus above the olecranon fossa. (The 3 fossae are intracapsular).
- Medially: to the margin of the trochlea.
- Laterally and posteriorly: to the margin of the capitulum (the roots of the lateral and medial epicondyles are **extracapsular**).

#### **Distal (lower) attachment:**

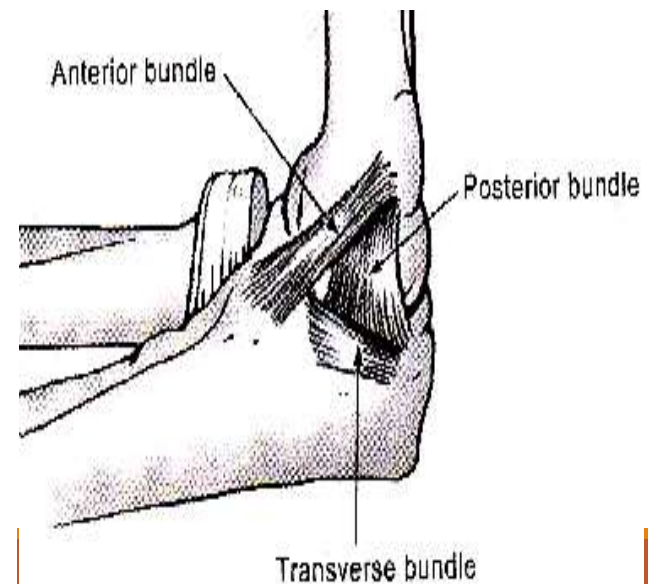
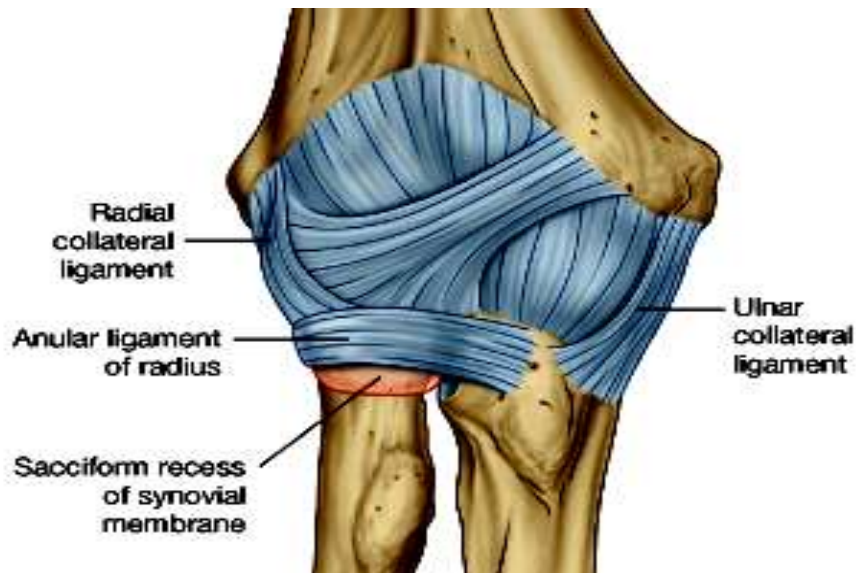
- Anteriorly: to coronoid process and annular ligament.
- Medially and posteriorly: to the margins of the coronoid and olecranon processes.
- Laterally and posteriorly: to the annular ligament.

**Note:** From the above mentioned attachments, it is clear that the capsule of the elbow joint is continuous with that of the superior radioulnar joint laterally.

## Ligaments:

- **Lateral (radial) collateral** :from the lateral epicondyle of the humerus to the annular ligament.
- Medial (**ulnar**) **collateral** ligament consists of Anterior, Posterior & Transverse bands

It extends from the medial epicondyle of humerus to the coronoid & olecranon processes of ulna.



**Arterial blood supply:** from the anastomosis around the elbow.

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**Nerve supply:**

- Main supply: from the musculocutaneous, radial and ulnar nerves.
- Contributions: from the median and anterior interosseous nerves.

## Movements:

- **Flexion:** brachialis (main flexor), biceps brachii (flexor of supinated forearm) and brachioradialis (with forearm in midprone position).
- **Extension:** By Triceps & anconeus muscles

## Stability of Elbow Joint

- The elbow joint is stable because of the wrench-shaped articular surface of the olecranon and the pulley-shaped trochlea of the humerus.
- Strong Ligament



## **Arthrocentesis of the Elbow Joint**

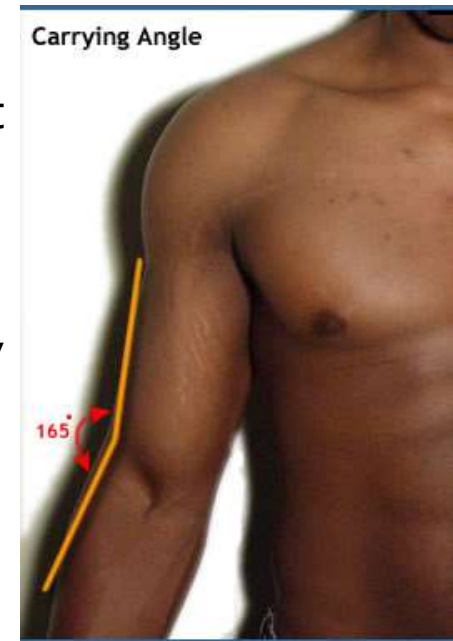
When the joint is distended with fluid, the posterior aspect of the joint becomes swollen as posterior walls of the capsule are weak.

Aspiration of joint fluid can easily be performed through the back of the joint



## The carrying angle:

- It is the angle between the long axis of the arm and that of the fully extended and supinated forearm.
- It is directed laterally measuring about  $165^{\circ}$ .
- It allows for holding objects in the hand in full extension of the elbow
- **It is caused by**
  - ❑ The medial edge of the trochlea of the humerus which projects about 1/2cm below the lateral edge,
  - ❑ The obliquity of the superior articular surface of the coronoid process
- The angle **disappears** when the extended forearm is pronated or fully flexed.





Cubitus varus



Normal



Cubitus valgus

**Carrying angle**

## Superior (Proximal) Radioulnar Joint

**Type :**It is a synovial pivot joint

**Articular surfaces:** the head of the radius ,the radial notch on the ulna and the annular ligament

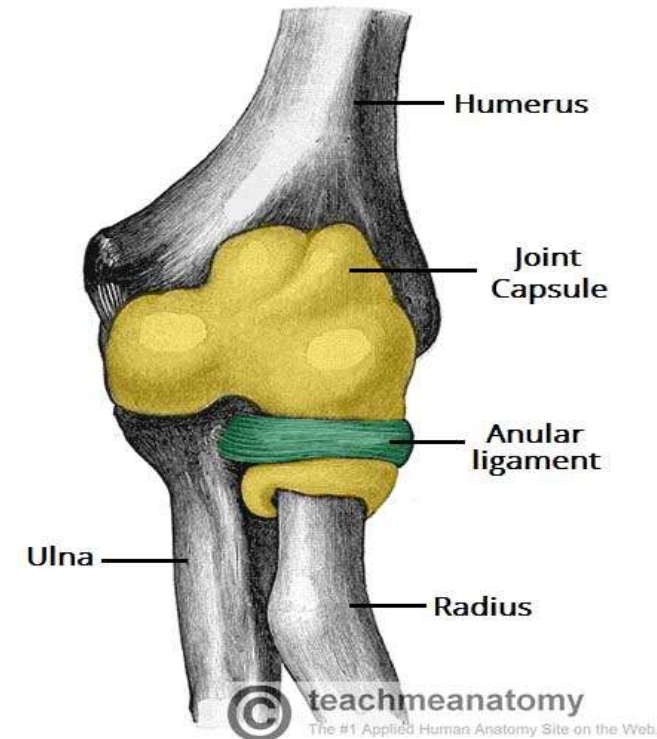
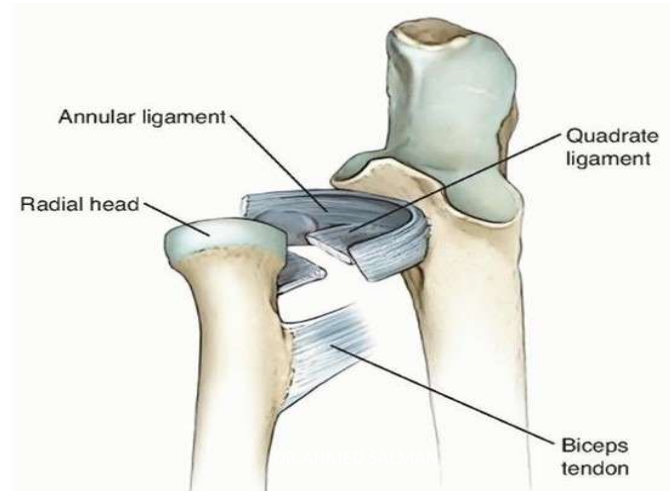
**Ligament:**

### 1. Annular ligament:

Is attached to the anterior and posterior margins of the radial notch of ulna and forms a collar around the head of the radius

### 2. Quadrate ligament:

Extends from the lower margin of the radial notch of the ulna (medially) to the neck of the radius (laterally).





## Inferior (Distal) Radioulnar Joint

**Type :** Synovial pivot joint

**Articular surfaces:** the head of the ulna and the ulnar notch of the radius

**Articular disc :** It is a triangular fibro cartilagenous disc , It separates the inferior radioulnar joint from the wrist joint

**Movements of superior and inferior radioulnar joints:**

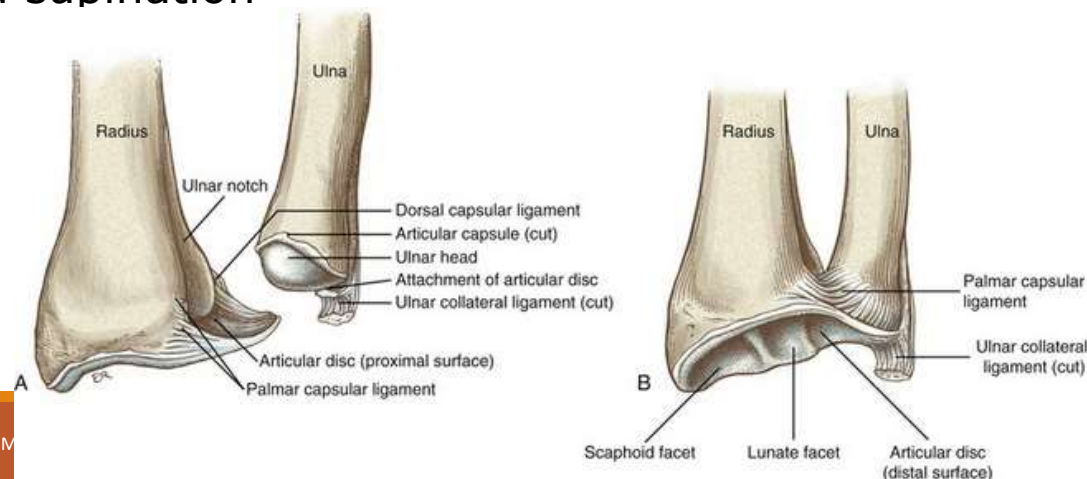
- **Pronation:** by the pronator teres and the pronator quadratus.
- **Supination:** by the biceps brachii and the supinator.
- Brachioradialis initiates both pronation and supination

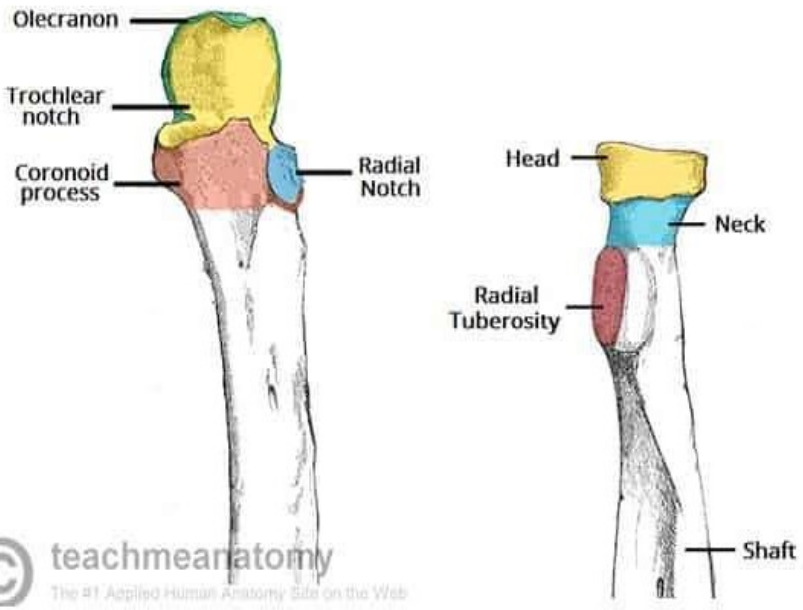
## The middle radio-ulnar joint

**Type :** Syndesmosis

Composed of

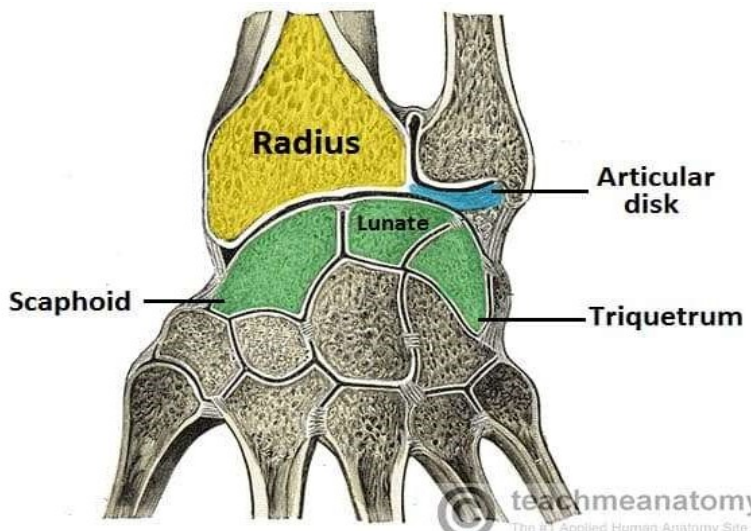
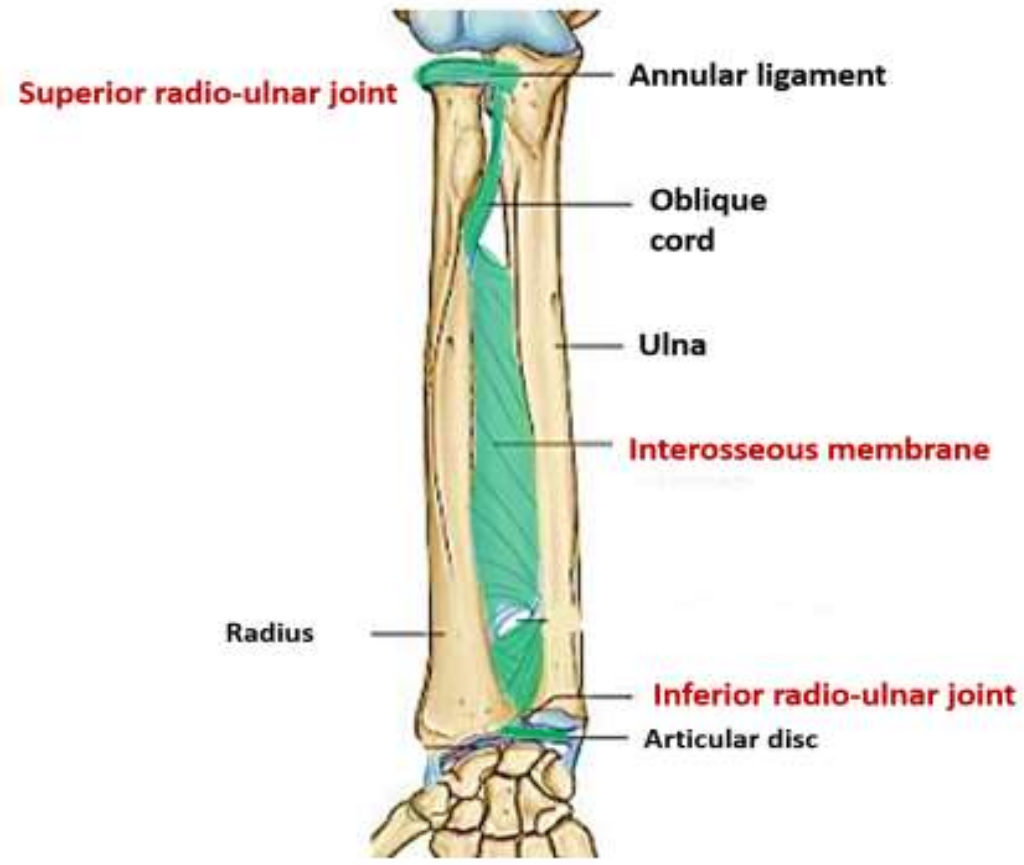
1-Oblique cord 2-Interosseous membrane





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### Radioulnar Joints



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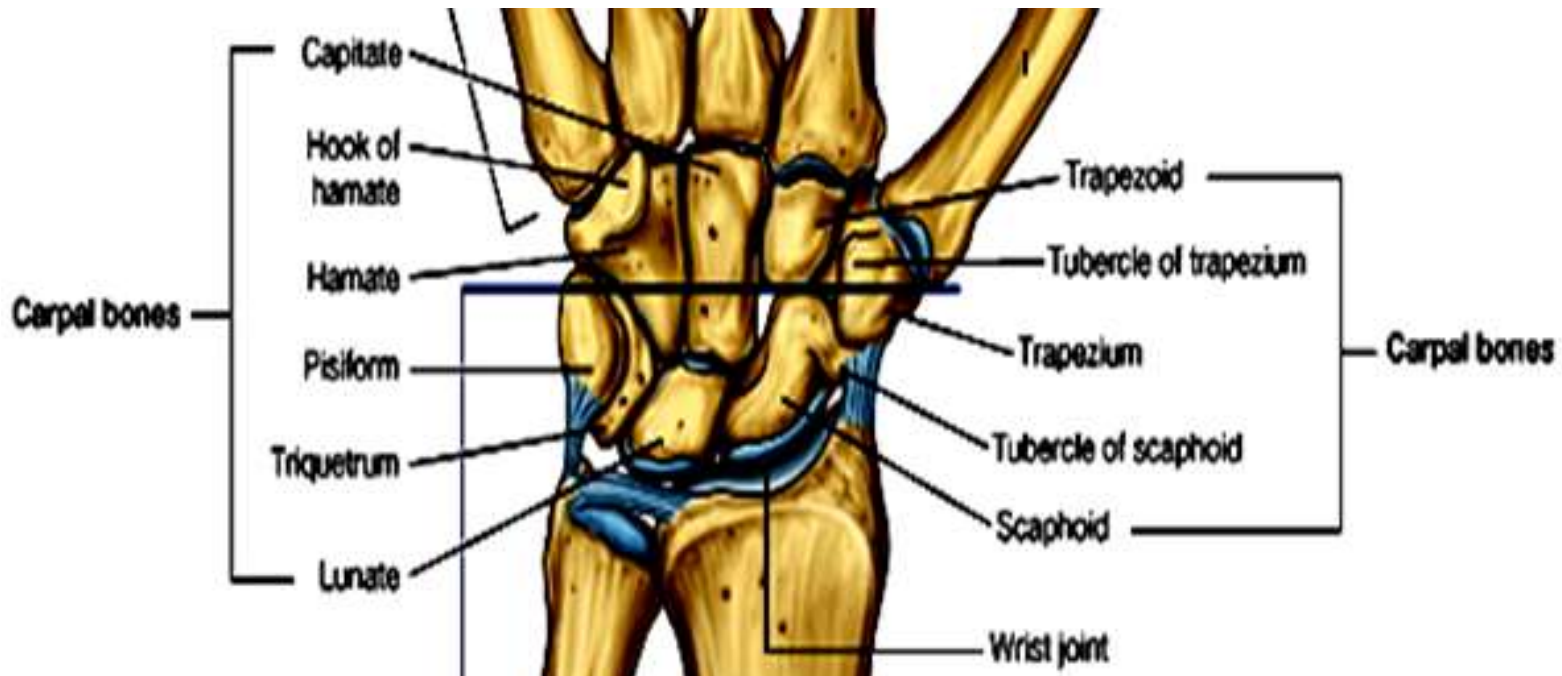
## Wrist Joint (Radiocarpal Joint)

**Type** : Synovial ellipsoid joint

**Articular surfaces:**

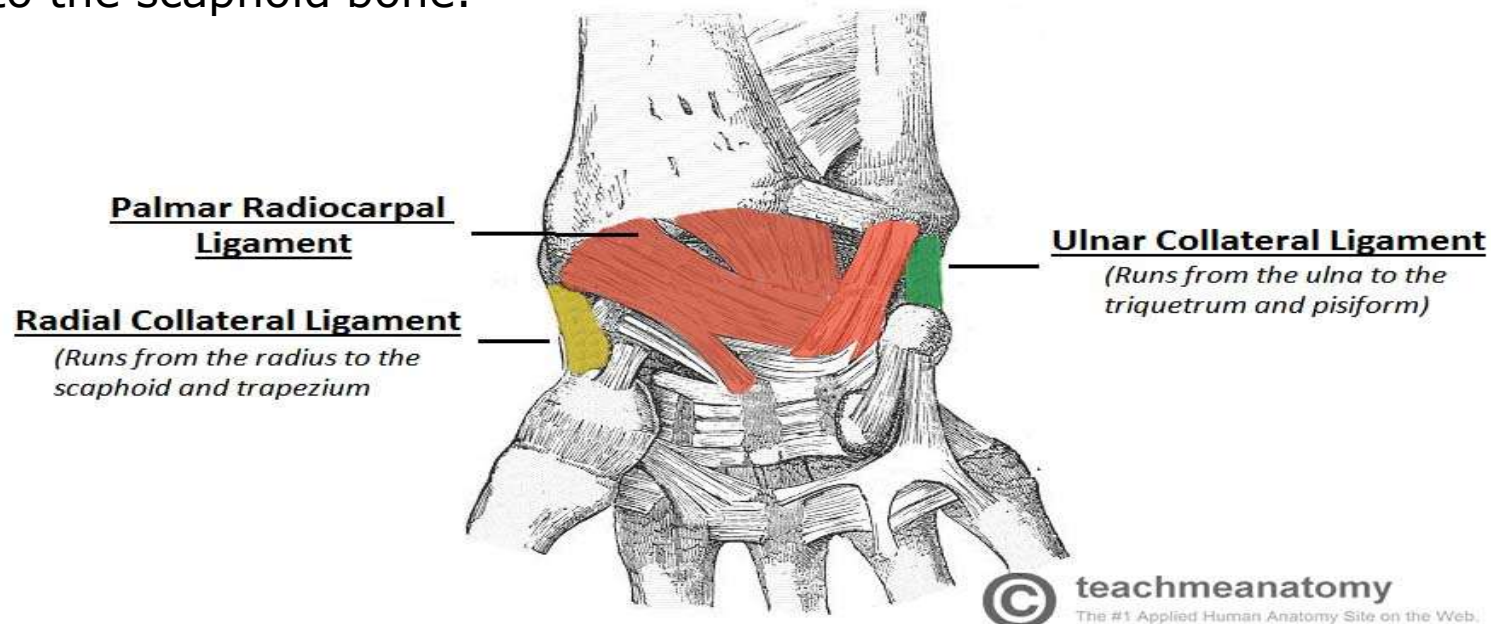
**Above** : the distal end of the radius and the articular disc of inferior Radioulnar Joint

**Below** : the scaphoid, lunate, and triquetral bones.



## Ligaments:

- **Anterior and posterior radiocarpal** ligaments strengthen the capsule.
- **Medial (ulnar) collateral ligament** is attached to the styloid process of the ulna and to the triquetral bone.
- **Lateral (radial) collateral ligament** is attached to the styloid process of the radius and to the scaphoid bone.



## Movements:

**Flexion:** flexor carpi radialis, flexor carpi ulnar and palmaris longus ,flexor digitorum superficialis, flexor digitorum profundus and flexor pollicis longus.

**Extension:** extensor carpi radialis longus, extensor carpi radialis brevis and extensor carpi ulnaris ,extensor digitorum, extensor digiti minimi, extensor indicis and extensor pollicis longus.

**Abduction:** flexor carpi radialis, extensors carpi radialis longus and brevis.

**Adduction:** flexor carpi ulnaris and extensor carpi ulnaris.

The range of adduction is greater than abduction because of the shortness of the styloid process of the ulna (being proximal than that of the radius).



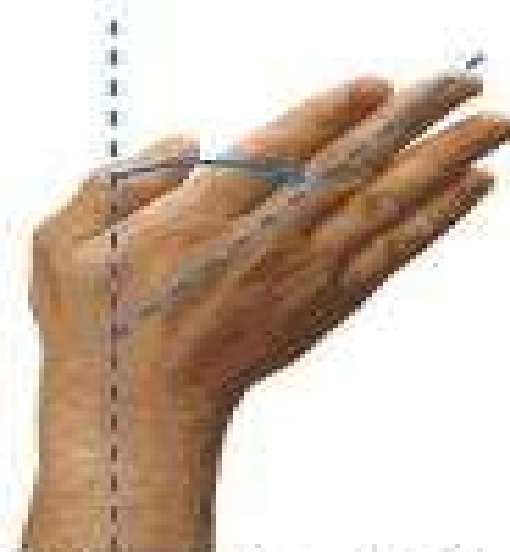
**Flexion**



**Extension**



**Radial Deviation**



**Ulnar Deviation**



**Pronation**



**Supination**

## Carpometacarpal joint of the thumb

**Type :** synovial saddle joint

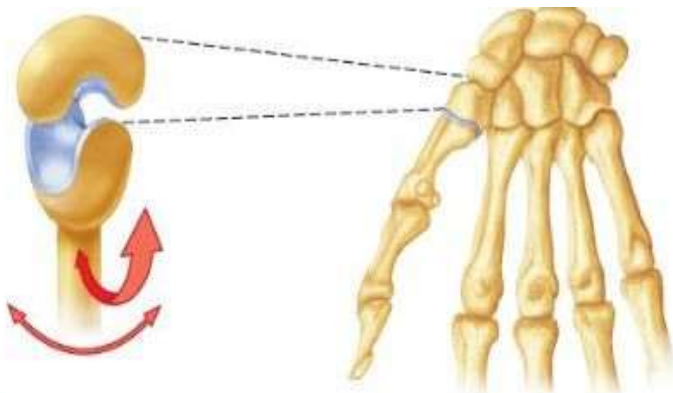
**Articular surfaces:** between 1<sup>st</sup> metacarpal and the trapezium.

**Movements :** flexion, extension, abduction, adduction and opposition

## Metacarpophalangeal joints of medial four fingers

**Type:** ellipsoid synovial

**Articular surfaces:** the heads of the metacarpal bones and the proximal phalanges.



e Saddle joint (carpometacarpal joint of thumb)

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thank  
you