

Ball and socket
e.g. shoulder



Gliding joints
e.g. between
carpals



Hinge joint
e.g. elbow



1.
Ball and Socket
Joint



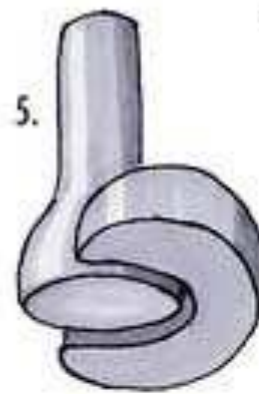
2.
Ellipsoid
Joint



3.
Saddle Joint



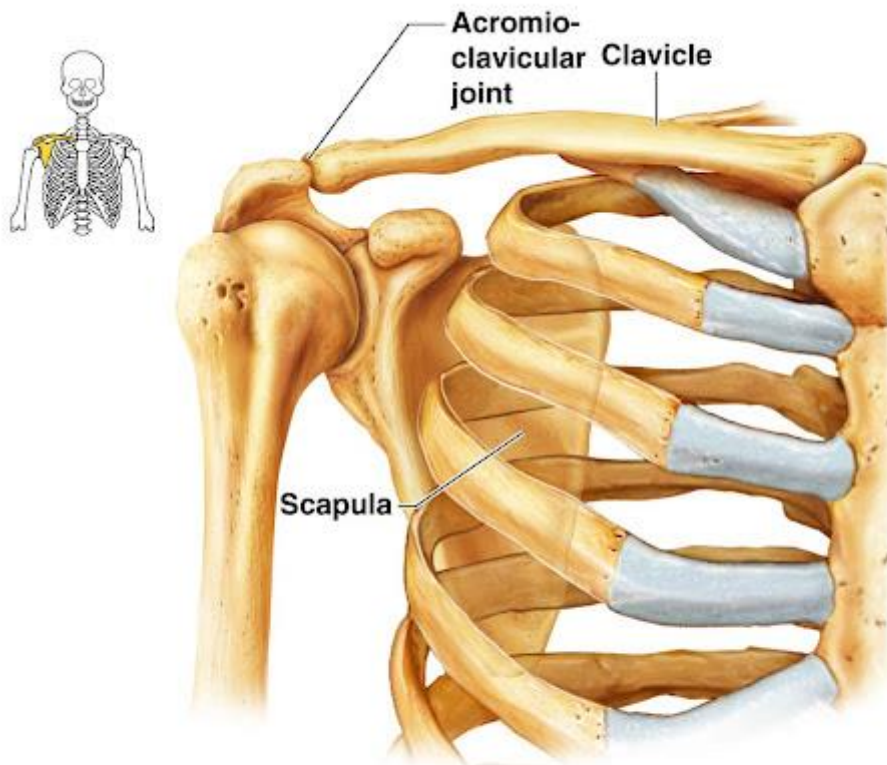
4.
Hinge Joint



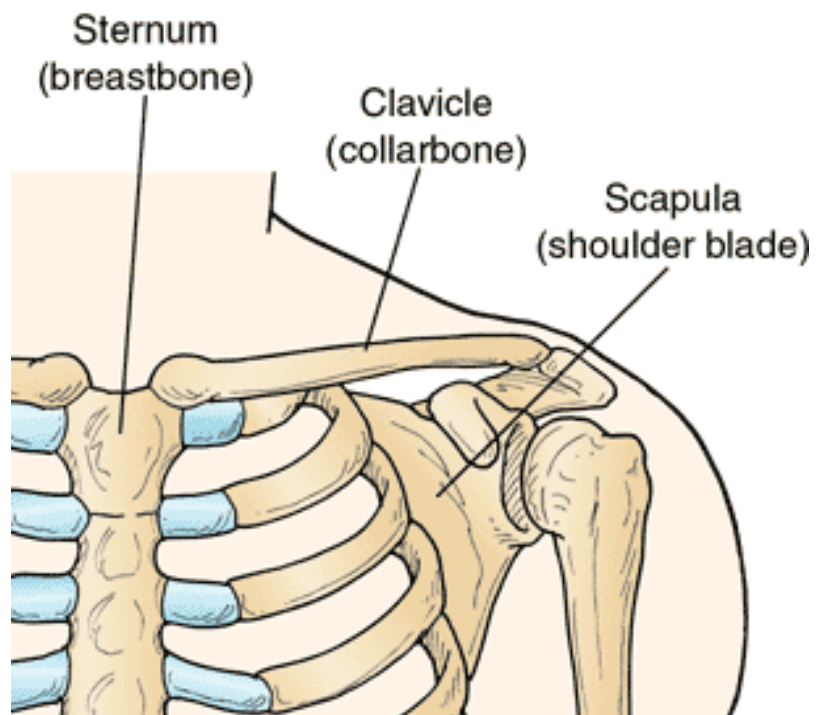
5.
Pivot Joint

Joints of the upper limb

I. Joints of the shoulder girdle



(a) Articulated right shoulder (pectoral) girdle showing the relationship to bones of the thorax and sternum



Joints of Upper Limb

A. The **clavicle** and **sterno-clavicular joint** is the only bone and joint which connects the upper limb to the axial skeleton.

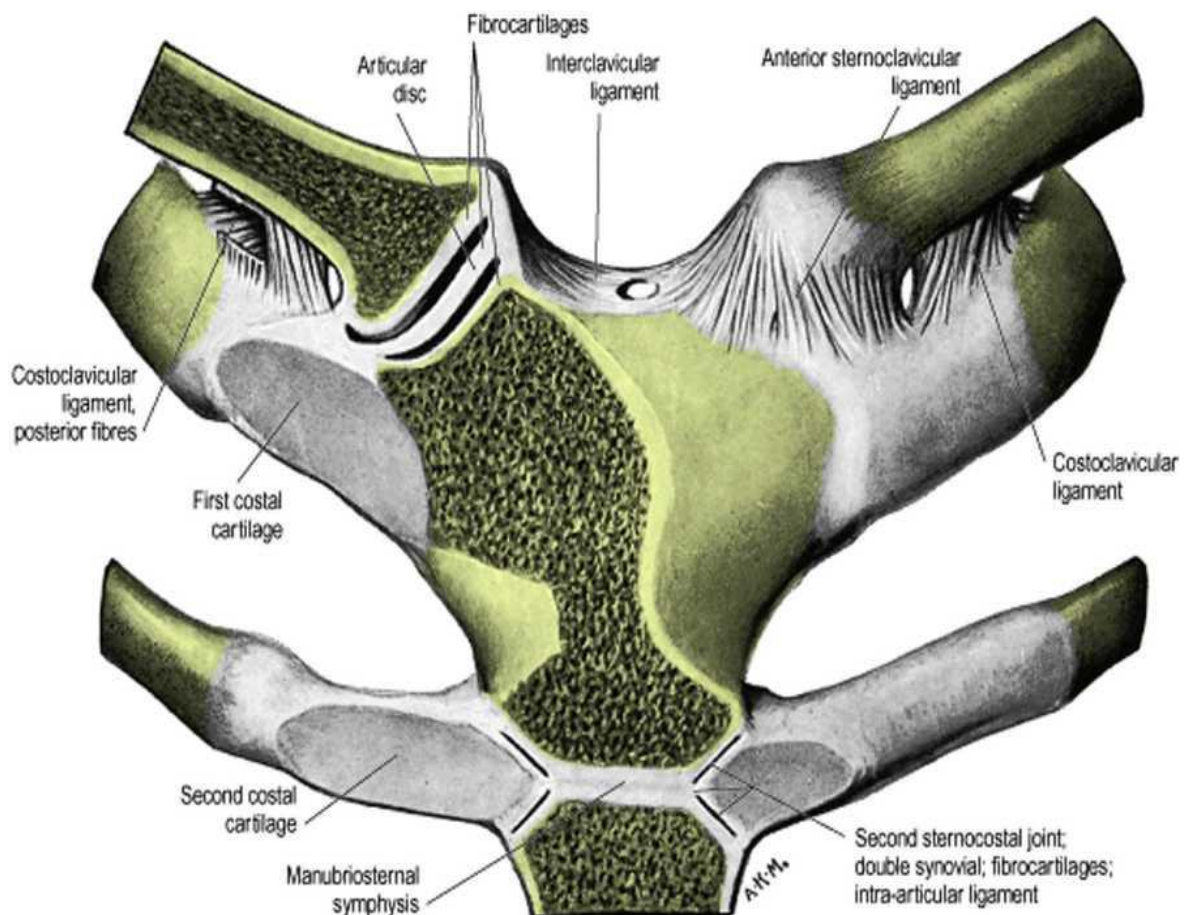
B. The clavicle is connected **to the scapula** by a joint and a ligament.

1. Acromio-clavicular joint

2. Coraco-clavicular ligament

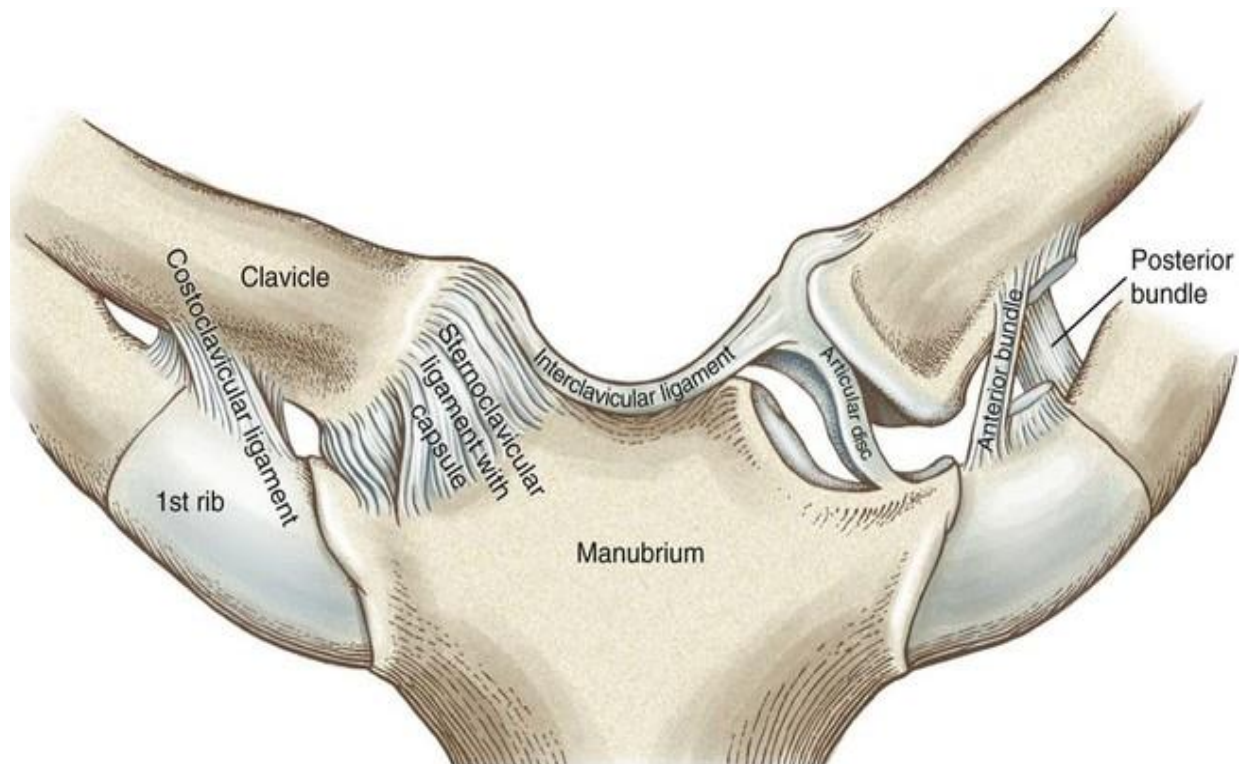
C. The **humerus** articulates with the scapula and not with the clavicle, therefore **forces and weight from the arm are transmitted** as follows :

1. First to the scapula .
2. Then to the clavicle through acromio-clavicular joint & coraco-clavicular ligament.
3. Then to the axial skeleton through the sterno-clavicular joint



Sterno-clavicular Joint

- ★ **Type:** Synovial joint ; modified saddle variety.
- ★ **Articular surfaces :**
 - A. **Clavicular notch** of manubrium sterni and first costal cartilage.
 - B. **Sternal (medial) end** of the clavicle.
- ★ **Capsule:**
 - A. Surround the joint **completely** and attached to the margins of the articular surface.
 - B. Ligaments:**
 - 1. Anterior & posterior sterno-clavicular ligaments:**
 - They are attached to the **front** & **back** of medial end of the clavicle and manubrium sterni respectively.
 - 3. Interclavicular ligament:**
 - Connect 2 **medial ends** of 2 clavicle **on both sides** together , crossing above the suprasternal notch of the manubrium and is attached to it.
 - 4. Costo-clavicular ligament:**
 - Attached below to the **1st costo-chondral junction** and above to **impression** on the inferior surface of the clavicle.
 - This ligament **prevents excessive elevation and protraction** of the clavicle (the same function of **subclavius** muscle which acts as a dynamic ligament).
- ★ **Synovial membrane :**
 - It lines the inner surface of the joint capsule and extends to the margin of the articular surface.



★ **Intra-articular disc of cartilage:**

- A circular disc of fibro-cartilage interposed **between** the articular surfaces of the sternum and the clavicle.
- **Attached** by its circumference to the fibrous capsule.
- **Divides** the joint cavity into two separate cavities.
- **Functions: Absorbs the forces** transmitted to the joint from the upper limb .

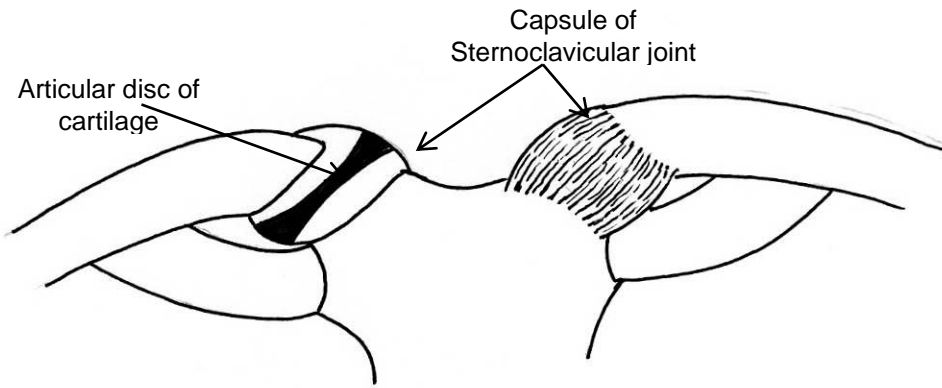
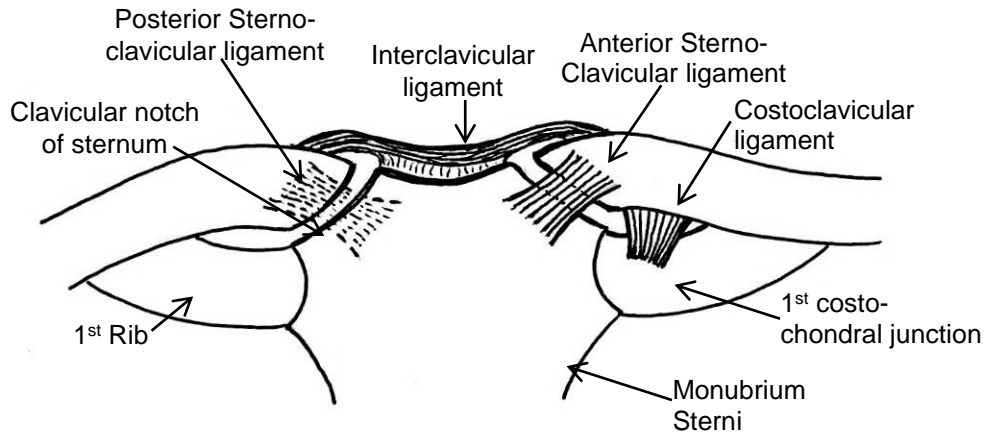
★ **Stability:** It is a **stable** joint due to its ligaments and the intra-articular disc.

★ **Arterial supply:** Supra-scapular & internal thoracic arteries.

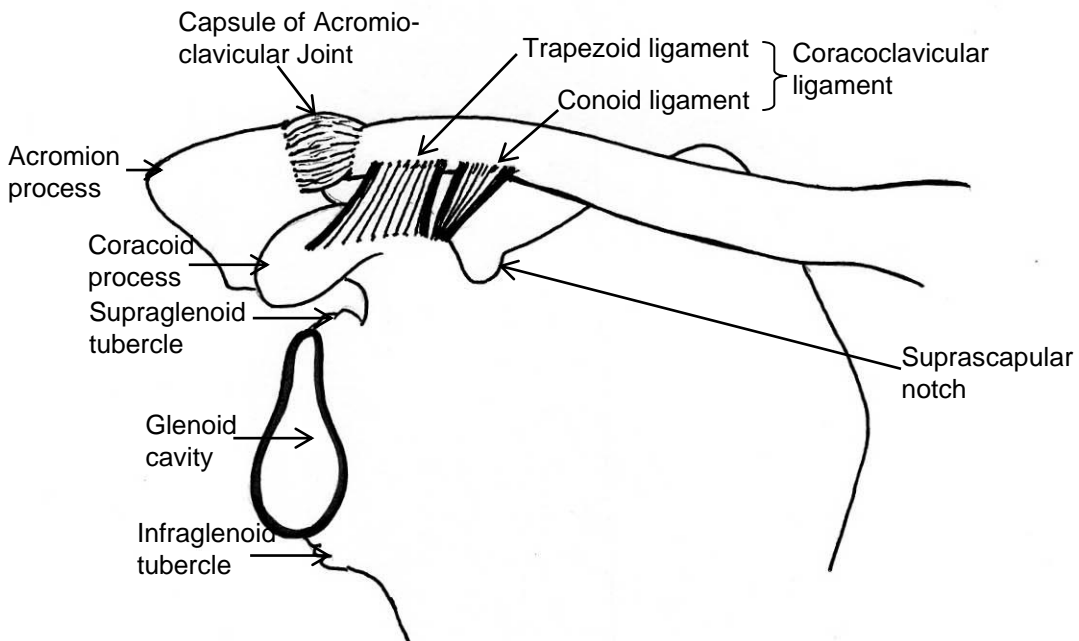
★ **Nerve supply:** Medial supra-clavicular nerve & nerve to subclavius .

★ **Function:** Movements of the shoulder girdle occur mainly at this joint.

Joints of Upper Limb



Sternoclavicular Joint

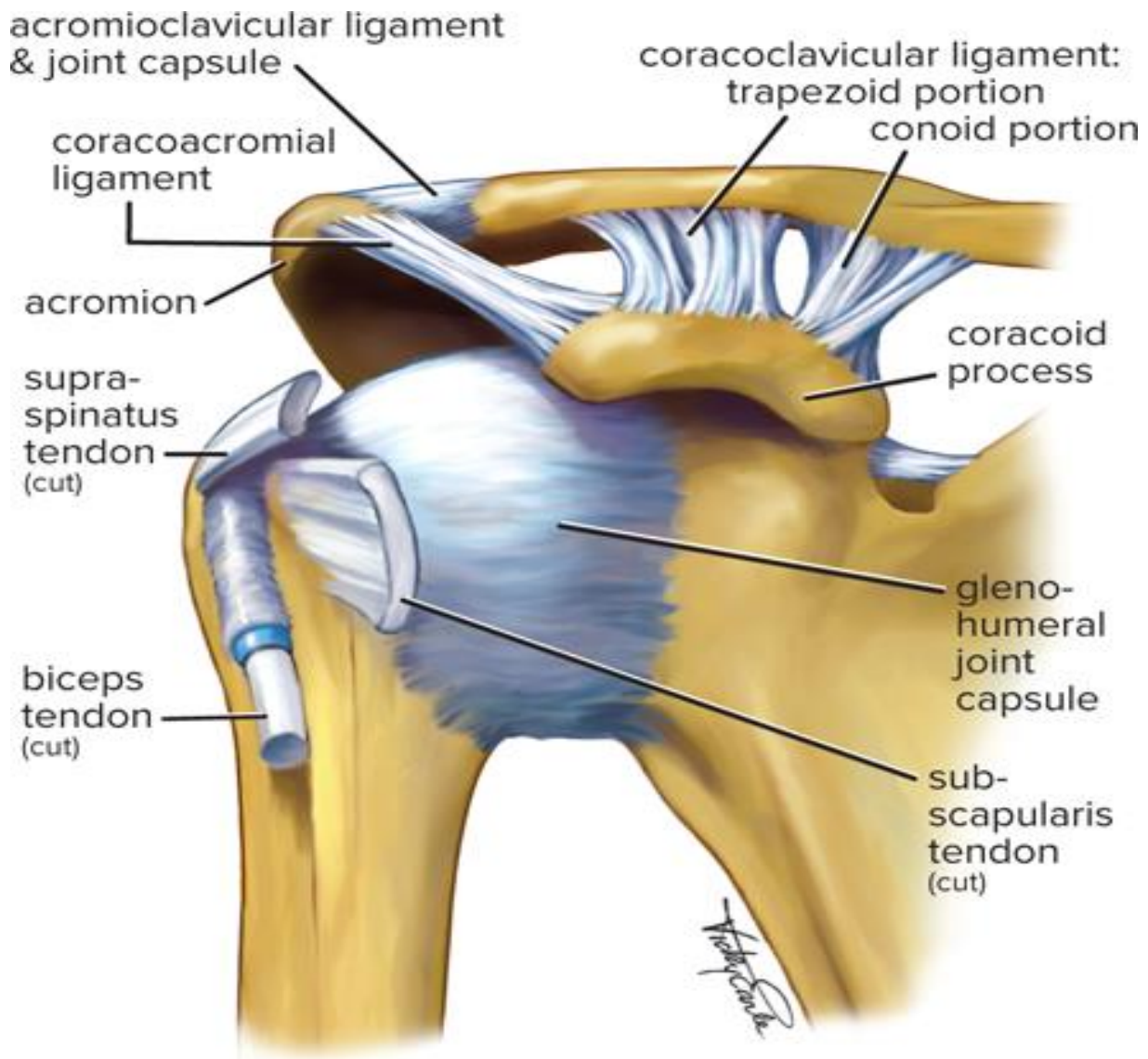


Acromio clavicular Joint

Acromio-Clavicular Joint

- ★ **Type:** Synovial, *plane* variety.
- ★ **Articular surfaces :**
 - **Acromial (lateral) end** of clavicle.
 - Medial border of **acromion process** of the scapula.
- ★ **Capsule:** Completely surrounds the joint.
- ★ **Ligaments :**
 - 1) **Acromio-clavicular ligament:** Strengthened upper part of the capsule .
 - 2) **Coraco-clavicular ligament:**
 - It consists of **trapezoid** & **conoid** parts which attached below to the **coracoid** process and above to the **trapezoid ridge** and **conoid tubercle** on the lower surface of the clavicle.
 - **Function:**
 - Stabilization of acromio-clavicular joint .
 - It is the **main structure** transmitting **weight or forces** from upper limb to clavicle .
- ★ **Arterial supply:** Supra-scapular and thoraco-acromial arteries.
- ★ **Nerve supply:** Supra-scapular and lateral pectoral nerves.

Joints of Upper Limb



Source: Peter Brukner: *Brukner & Khan's Clinical Sports Medicine: Injuries, Volume 1, 5e*: www.csm.mhmedical.com
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Movements of the shoulder girdle

★ The shoulder girdle consists of clavicle and scapula which move mainly at the sterno-clavicular joint as follows.

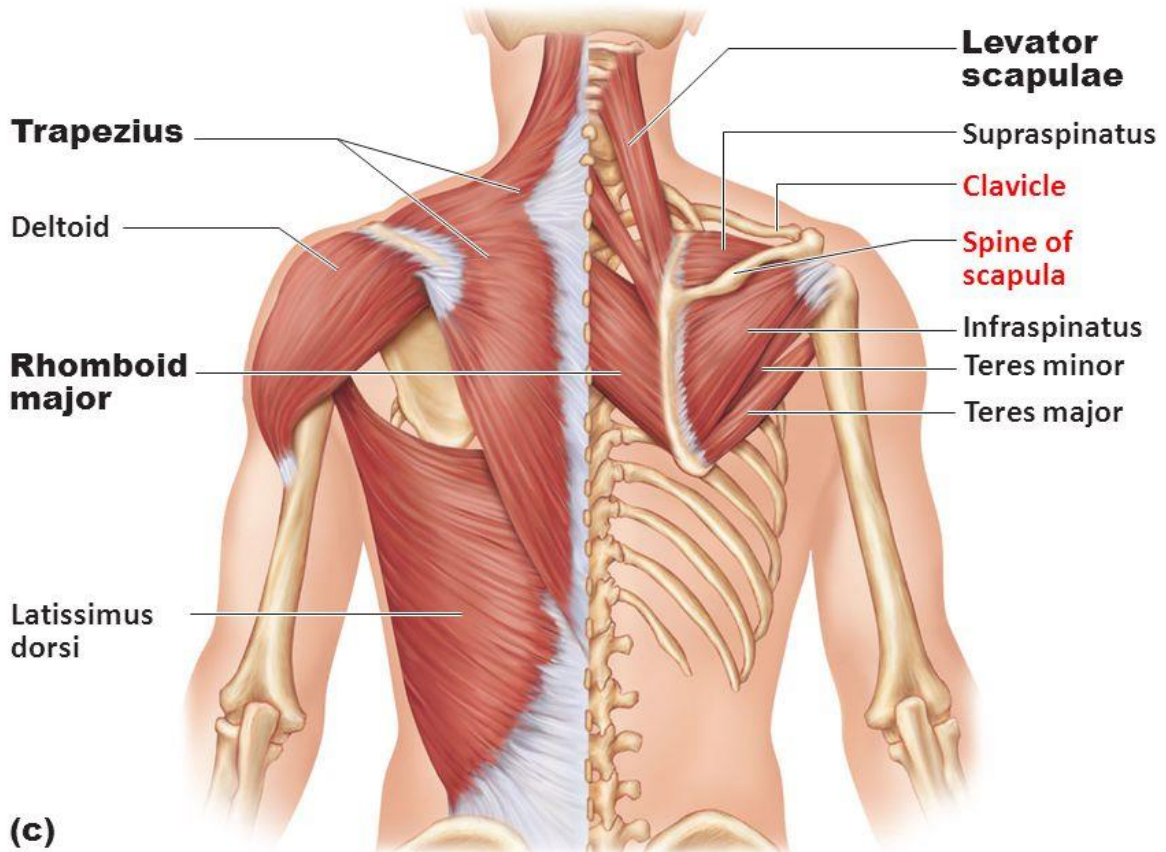
- **Elevation:**

1. Upper fibres of trapezius
2. Levator scapulae

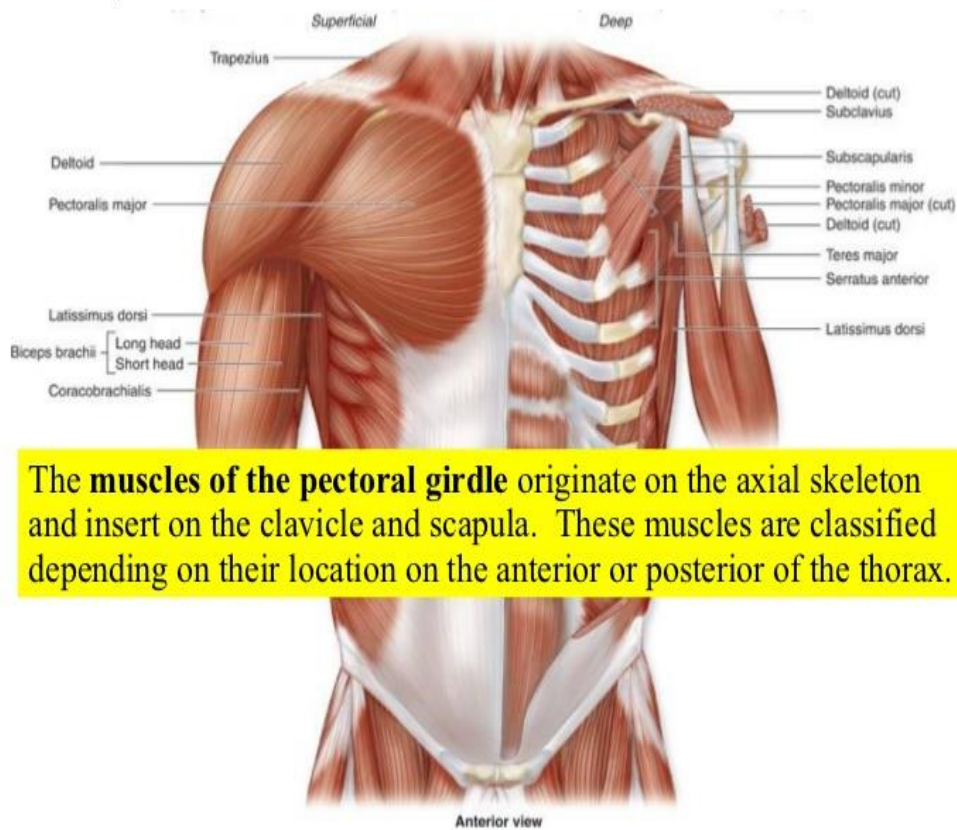
- **Depression**
 1. Pectoralis minor
 2. Pectoralis major
- **Rotation up (glenoid cavity faces upwards):**
 1. Upper and lower fibres of trapezius
 2. Lower fibers of serratus anterior
- **Rotation down (glenoid cavity faces downwards):**
 1. Levator scapulae
 2. Rhomboids major
 3. Rhomboids minor
- **Protraction (pulling forwards):**
 1. Serratus anterior
 2. Pectoralis minor
- **Retraction (pulling backwards towards the vertebrae):**
 1. Middle fibres of trapezius
 2. Rhomboids major
 3. Rhomboids minor

Joints of Upper Limb

Figure 10.13c Superficial muscles of the thorax and shoulder acting on the scapula



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The **muscles of the pectoral girdle** originate on the axial skeleton and insert on the clavicle and scapula. These muscles are classified depending on their location on the anterior or posterior of the thorax.

Shoulder joint (Glenohumeral Joint)

★ **Type:** It is synovial polyaxial of ball and socket variety.

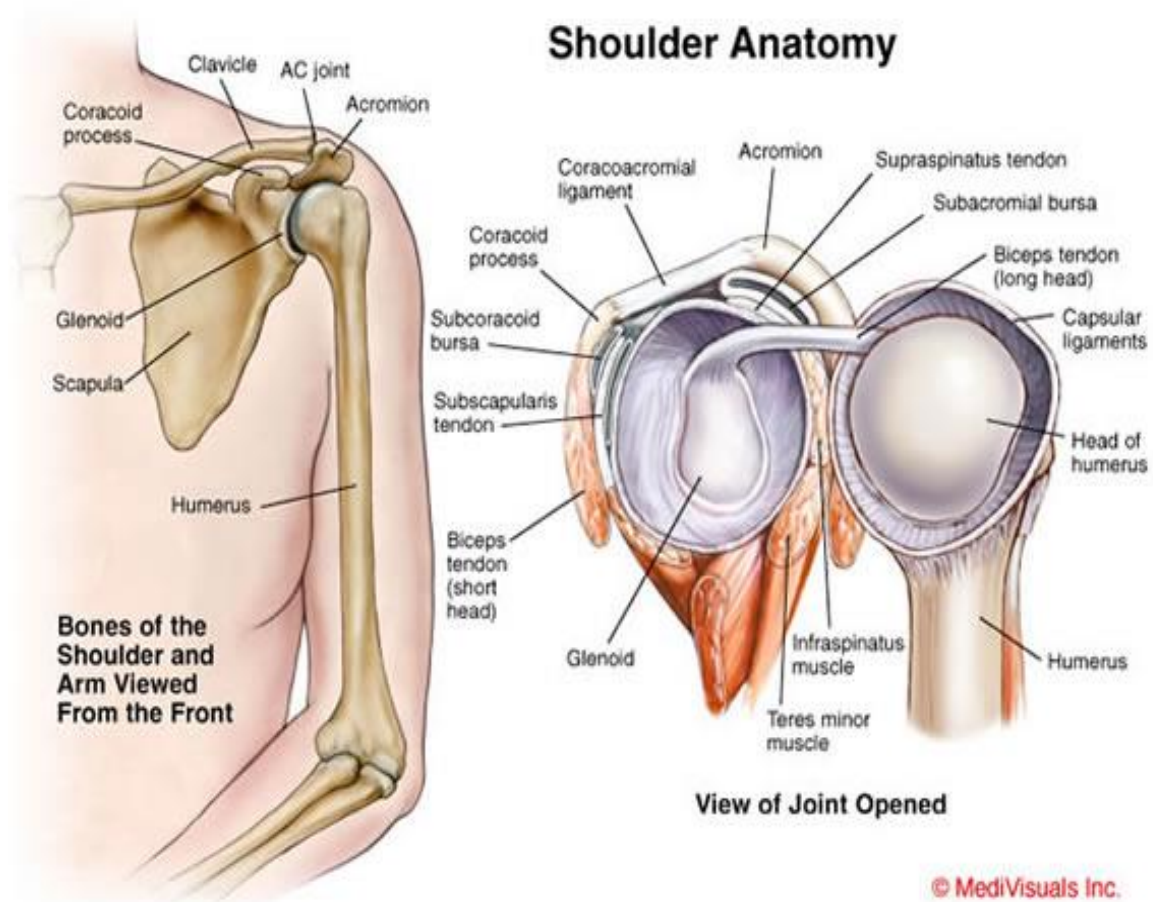
★ **Articular surfaces :**

A. Glenoid cavity:

- A pear-shaped, **shallow** concave fossa .
- Slightly **deepened** by a cartilagenous rim called the **labrum glenoidale**.

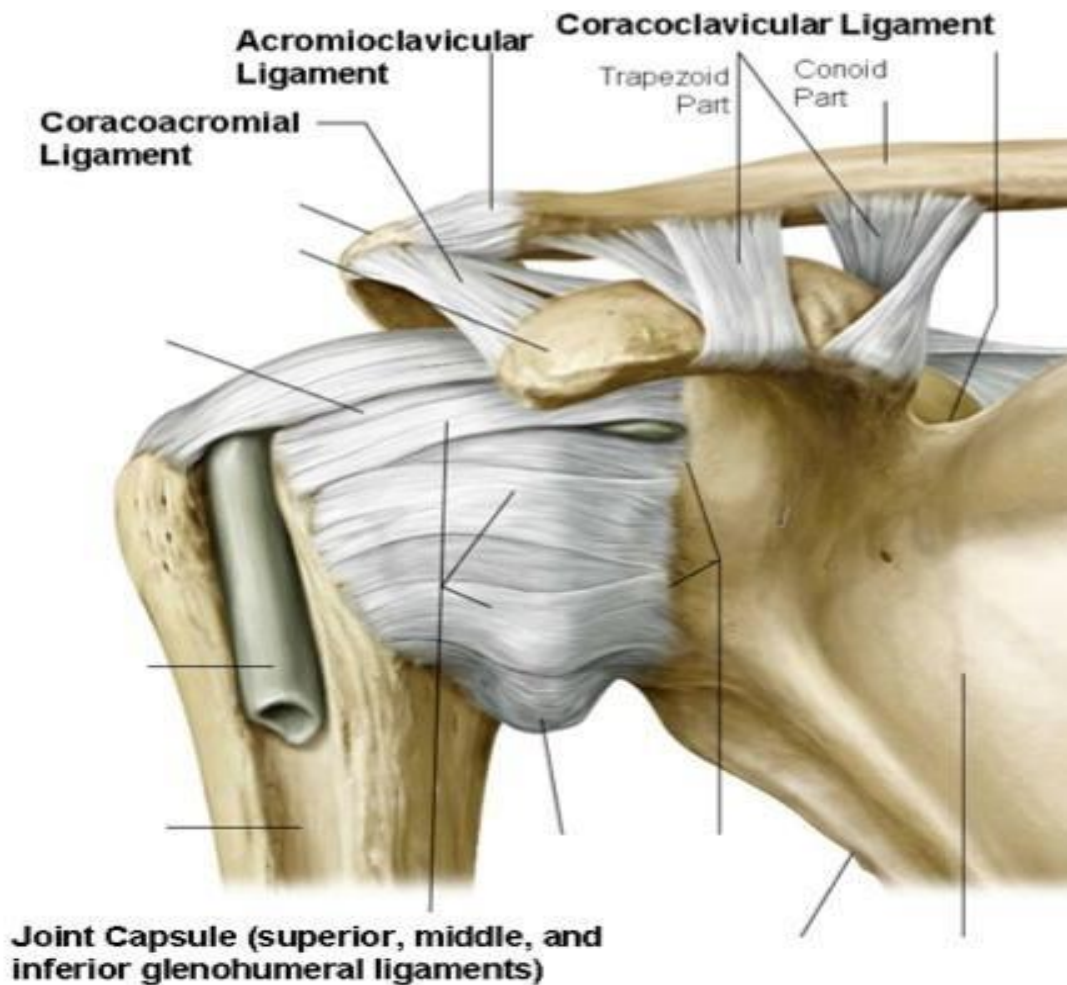
B. Head of humerus:

- It is less than 1/2 of a large sphere. It is much larger than the glenoid cavity .



★ **Fibrous capsule:**

- **Attachment:** It is attached to the margins of the articular surfaces
 1. **Medially:** It is attached to the circumference of the glenoid cavity outside labrum glenoidal with the ***supra-glenoid tubercle*** within the capsule.
 2. **Laterally:** It is attached to the anatomical neck of humerus except below it descends for 1/2 an inch on the medial side of the ***surgical neck*** of the humerus .
- **Strength:** The capsule is ***loose and lax***. It is especially ***weak*** :
 1. ***Anteriorly*** where it shows ***two openings***:
 - One through which the synovial membrane of the joint communicates with the ***subscapular bursa***.
 - Another placed ***between the two tubercles*** of the humerus and gives passage to the ***tendon of long head of biceps*** and its synovial sheath.
 2. ***Inferiorly*** where the capsule is ***lax and is folded*** into the ***quadrangular space*** (to allow abduction).
- **Intra-capsular structures:**
 1. Glenoid cavity and supra-glenoid tubercle
 2. Tendon of long head of biceps.
 3. Labrum glenoidal.
 4. . Head of humerus and medial part of its surgical neck.
 5. Synovial membrane.



★ Ligaments:

1. **Three gleno-humeral ligaments** (are weak):

- Strengthen the **anterior** surface of the capsule.
- Extend from the anterior margin of the **glenoid** cavity to the lesser tuberosity of the humerus.

2. **Coraco-humeral ligament** :(stronger)

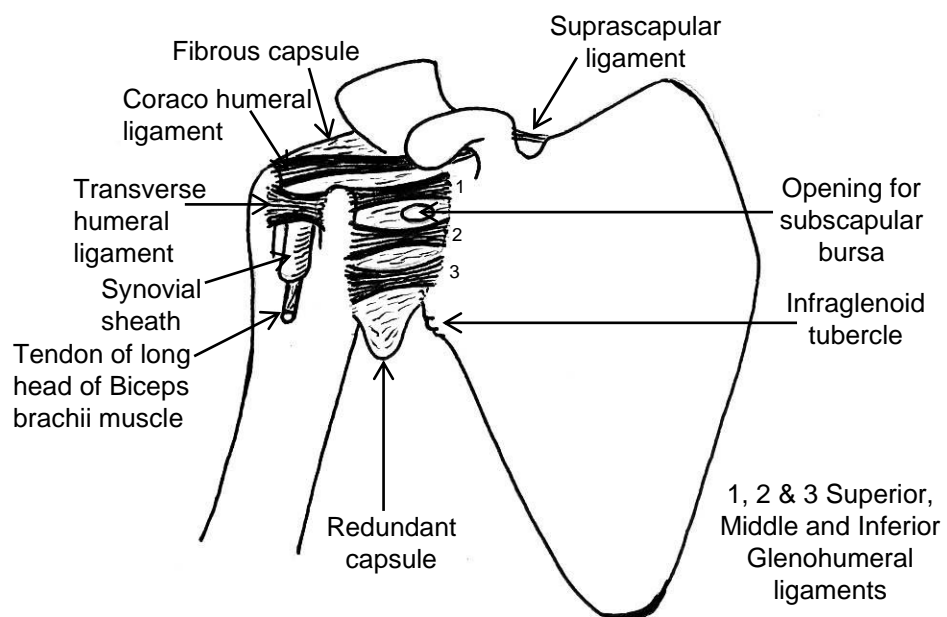
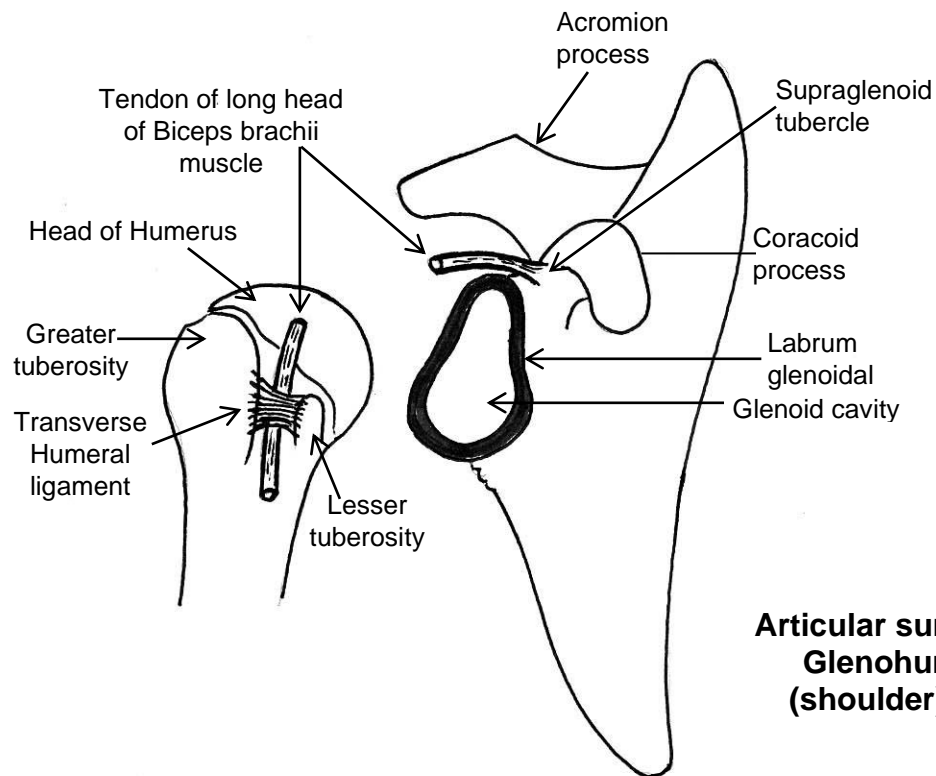
- Strengthens the **upper** part of the capsule.
- Extends from the **coracoid** process , to the upper border of the **greater tuberle** of the humerus.

3. **Transverse humeral ligament.**

- It passing from **lesser to greater tuberle** of the humerus converting the inter-tubercular groove into canal.

Joints of Upper Limb

- It acts as a **retinaculum** for the tendon of long head of biceps.

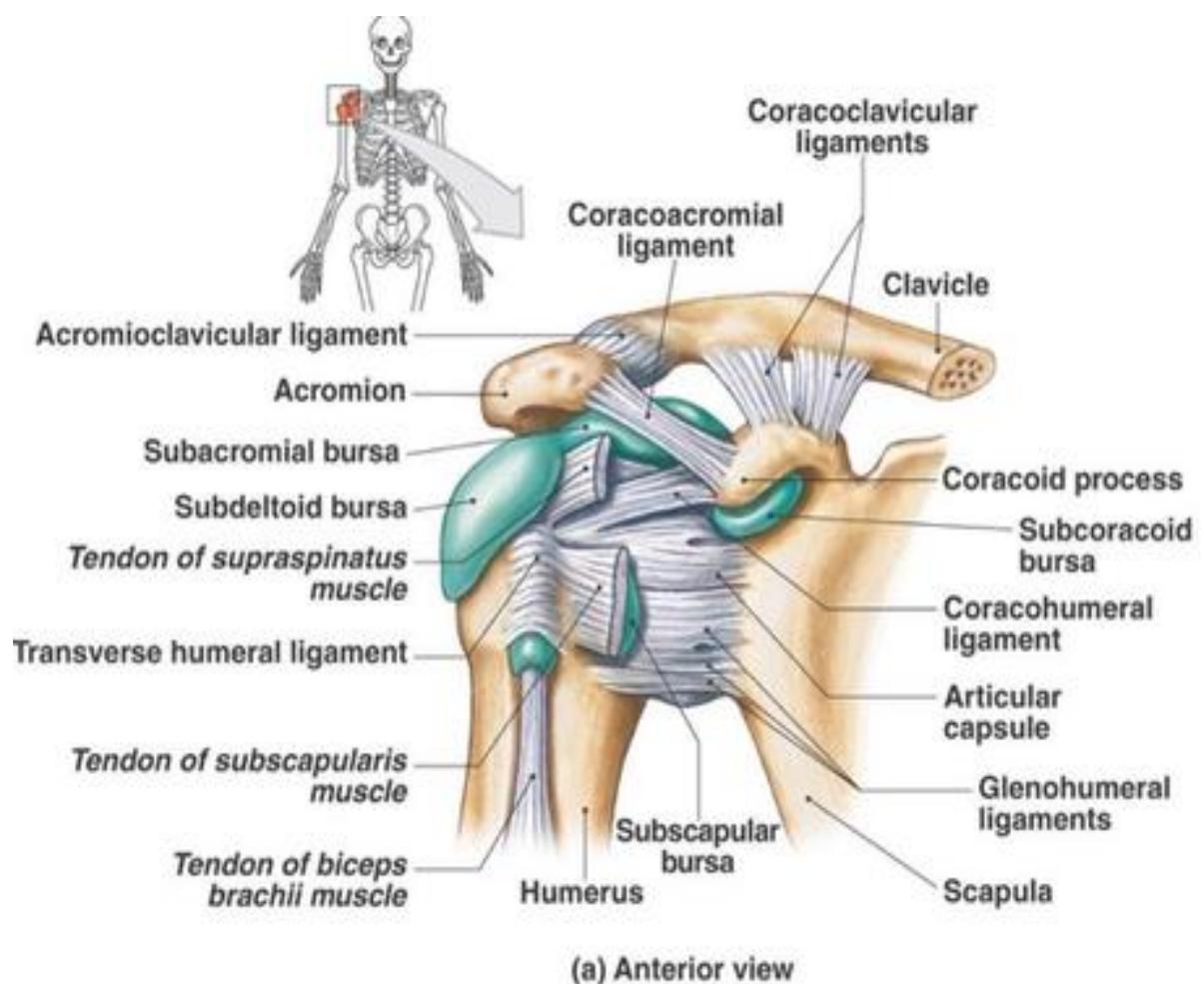


★ **Synovial membrane:**

1. **Lines** the inner surface of the fibrous capsule and **covers** the intracapsular non-articular bony parts.
2. Forms a tubular synovial sheath which encloses the **tendons of long head of biceps** and extends outside the capsule around the tendon into the bicipital groove.
3. Communicates anteriorly with the large **subscapular bursa**.

★ **Synovial bursae lie around the capsule:**

1. Bursa between the tendon of **infra-spinatus and the back** of the capsule.
2. Subscapular bursa: Lies between the tendon of **subscapularis and the front of the capsule**. It communicates with the joint cavity through an opening in the anterior wall of the capsule.



3. **Subacromial bursa:** Lies between **the deltoid and the capsule**. It is **prolonged** under the acromion and coraco-acromial arch separating them from the tendon of **supraspinatus**. It does not communicate with the joint cavity.

★ **Stability:**

A. The shoulder joint is weak, unstable and easily dislocated because:

1. The **poor fitting of its bony parts** together as the head of the humerus is very large compared with the small, shallow, glenoid cavity.
2. The **capsule and its ligaments** are weak and lax.

B. The stability of shoulder joint depends on :

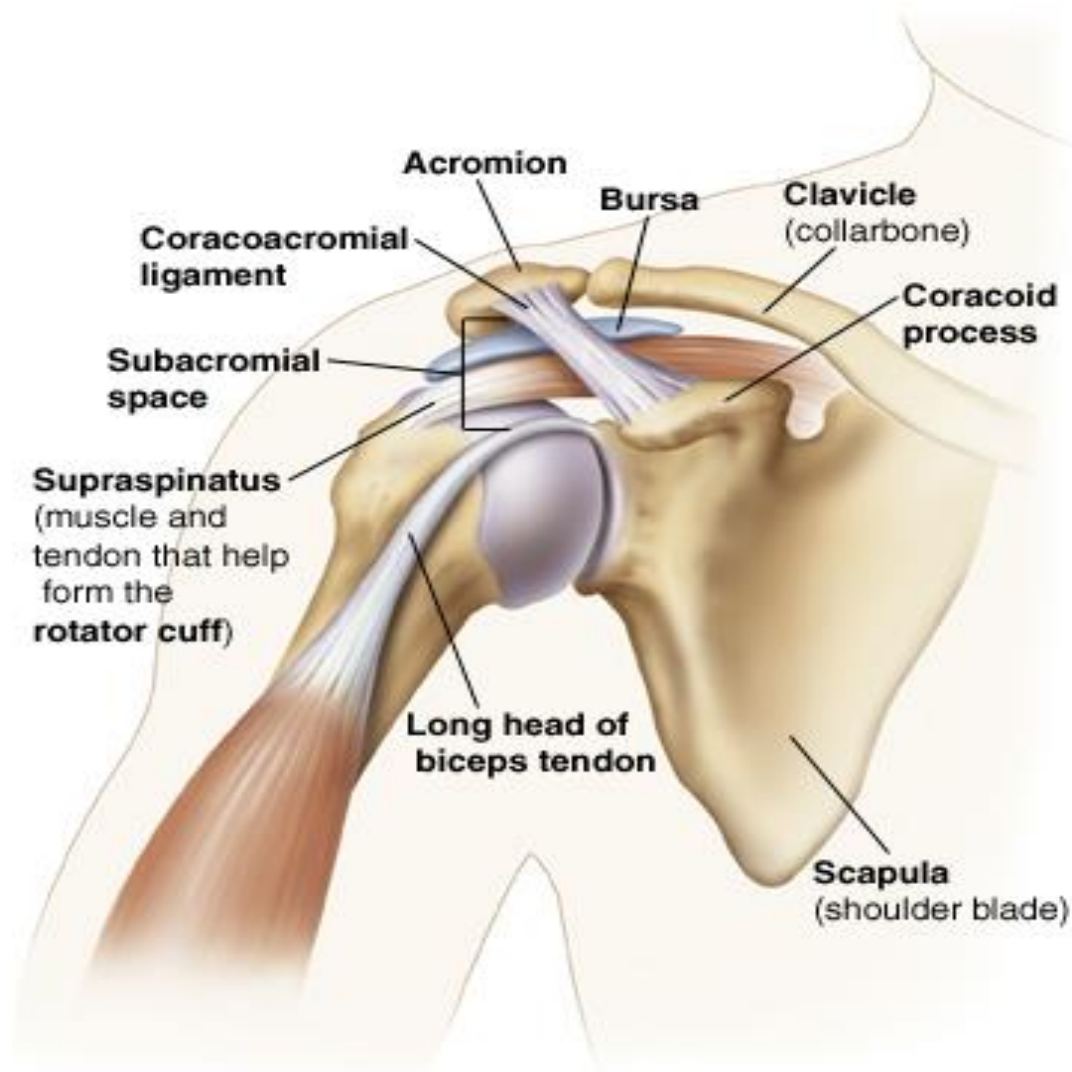
1-The strength of the muscles which surround it: The joint is strengthened:

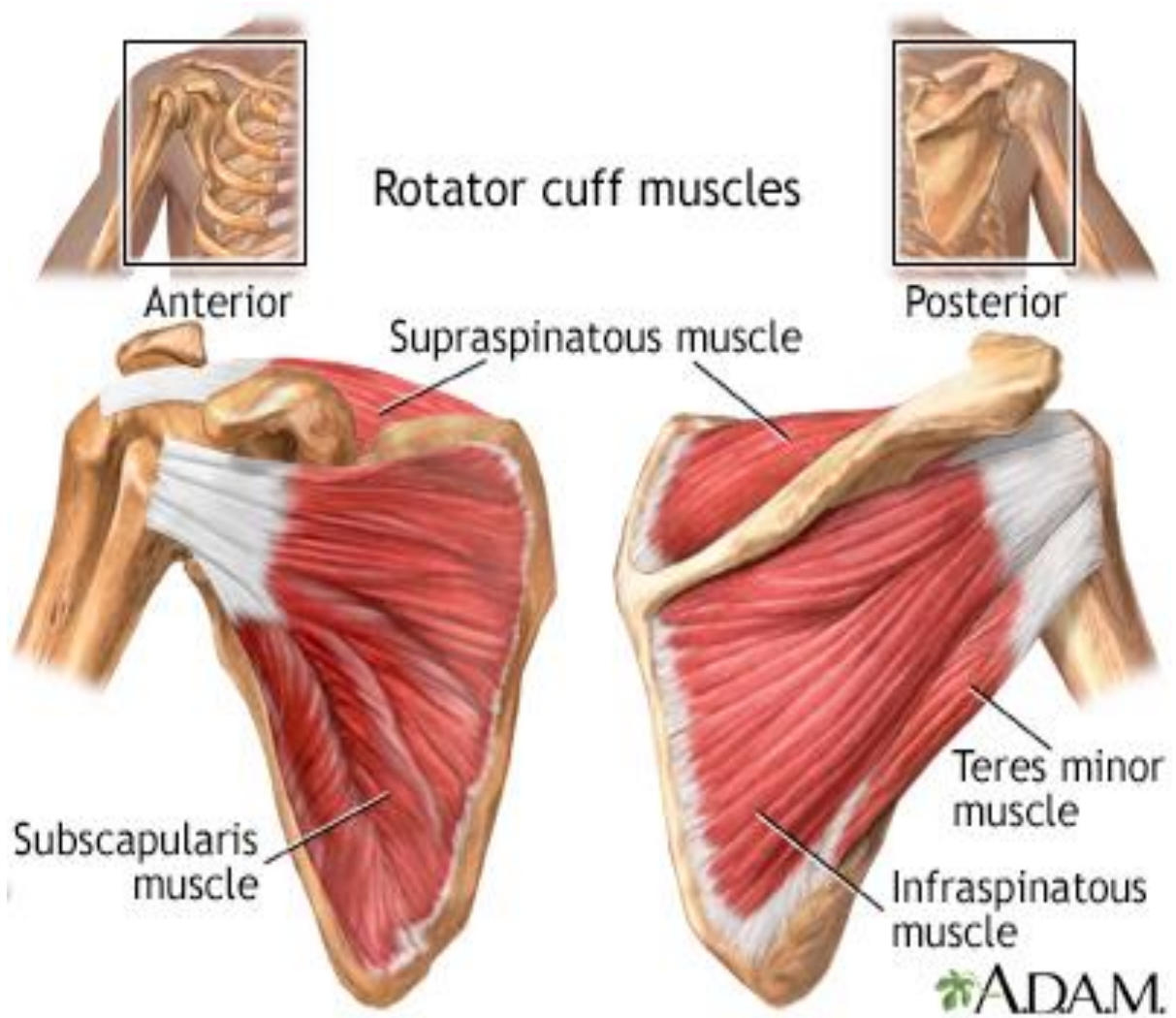
- **Above:** By tendons of supraspinatus and long head of biceps.
- **In front:** By tendon of subscapularis
- **Behind:** By tendons of infraspinatus and teres minor
- These tendons are all closely related to the fibrous capsule and form the **rotator cuff**, which inforce the capsule and provide an active support for the joint during movement.
- The **deltoid muscle** covers the joint in front, behind and laterally.
- **Below:** The joint is **not supported** by any muscle from below where the capsule is lax and forms a fold which bulges downwards into the quadrangular space. This fold is stretched when the arm is fully abducted. **Long head of**

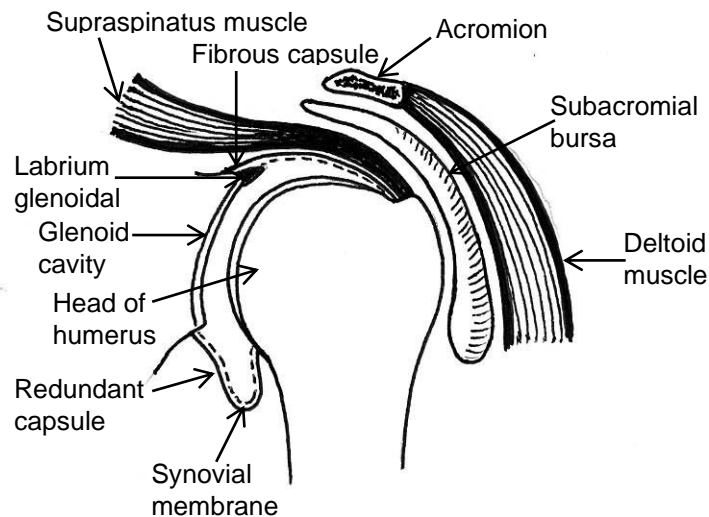
triceps supports the capsule from below when the arm is ***abducted***.

2- Coraco-acromial ligament and arch:

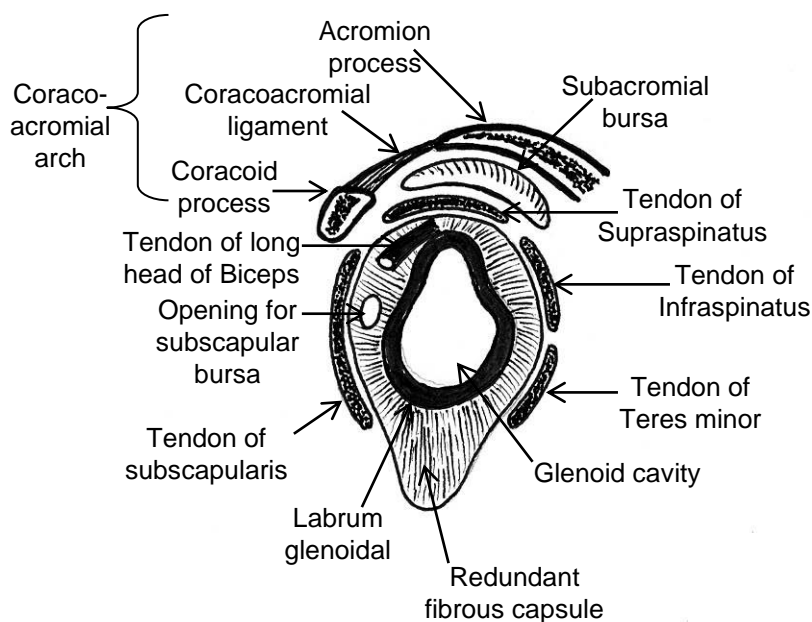
- a. **Coraco-acromial ligament** is a ***strong triangular*** ligament. Its ***apex*** is attached to the tip of the acromion while its ***base*** is attached to the upper surface of the coracoid process.
- b. This ligament together with the two processes forms the ***coraco-acromial arch*** which lies immediately above the shoulder joint forming a ***secondary socket*** for the head of the humerus supporting it from above.







Shoulder (Glenohumeral) Joint



Shoulder (Glenohumeral) Joint Rotator Muscle Cuff

Coracoacromial Arch.

- ★ **Arterial supply:** Anastmosis around shoulder joint from the anterior and posterior circumflex humeral and suprascapular arteries.
- ★ **Nerve supply:** From suprascapular, axillary and lateral pectoral nerves.

★ **Movements:**

- The shoulder joint is structurally weak and has a loose and lax capsule. This construction permits a very wide range of movement but on the expense of the stability of the joint.
- It is polyaxial joint allowing all movement + circumduction.
- All these movements occur in the plane of the scapula.

▪ **Flexion:**

1. Clavicular head of pectoralis major
2. Sternocostal head of pectoralis major(from full extension to coronal plane)
3. Anterior fibres of deltoid
4. Biceps brachii & Coraco-brachialis

▪ **Extension:(TLP)**

1. Sterno-costal head of pectoralis major (from full flexion to coronal plane)
2. Teres major
3. Latissimus dorsi
4. Posterior fibres of deltoid.

▪ **Abduction:**

1. Supra-spinatus (0- 15 degrees)
2. Middle fibres of deltoid (15-90 degrees)

▪ **Adduction:(TLP)**

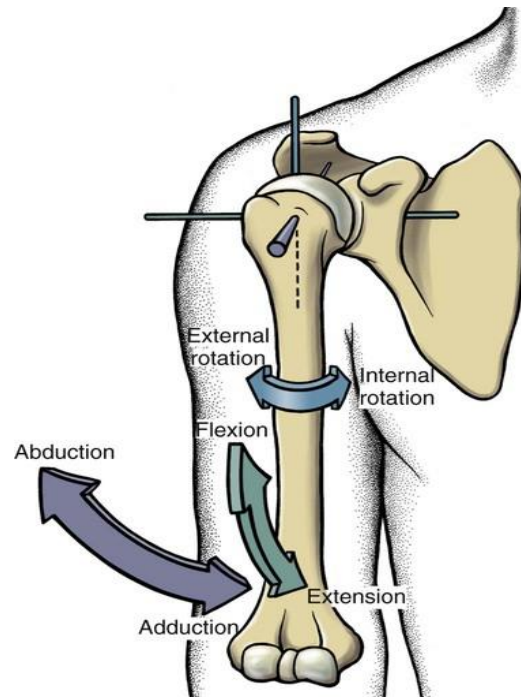
1. Pectoralis major
2. Teres major
3. Latissimus dorsi
4. Coraco-brachialis
5. Subscapularis

▪ **Medial rotation: (TLP)**

1. Pectoralis major
2. Teres major
3. Latissimus dorsi
4. Anterior fibres of deltoid
5. Subscapularis

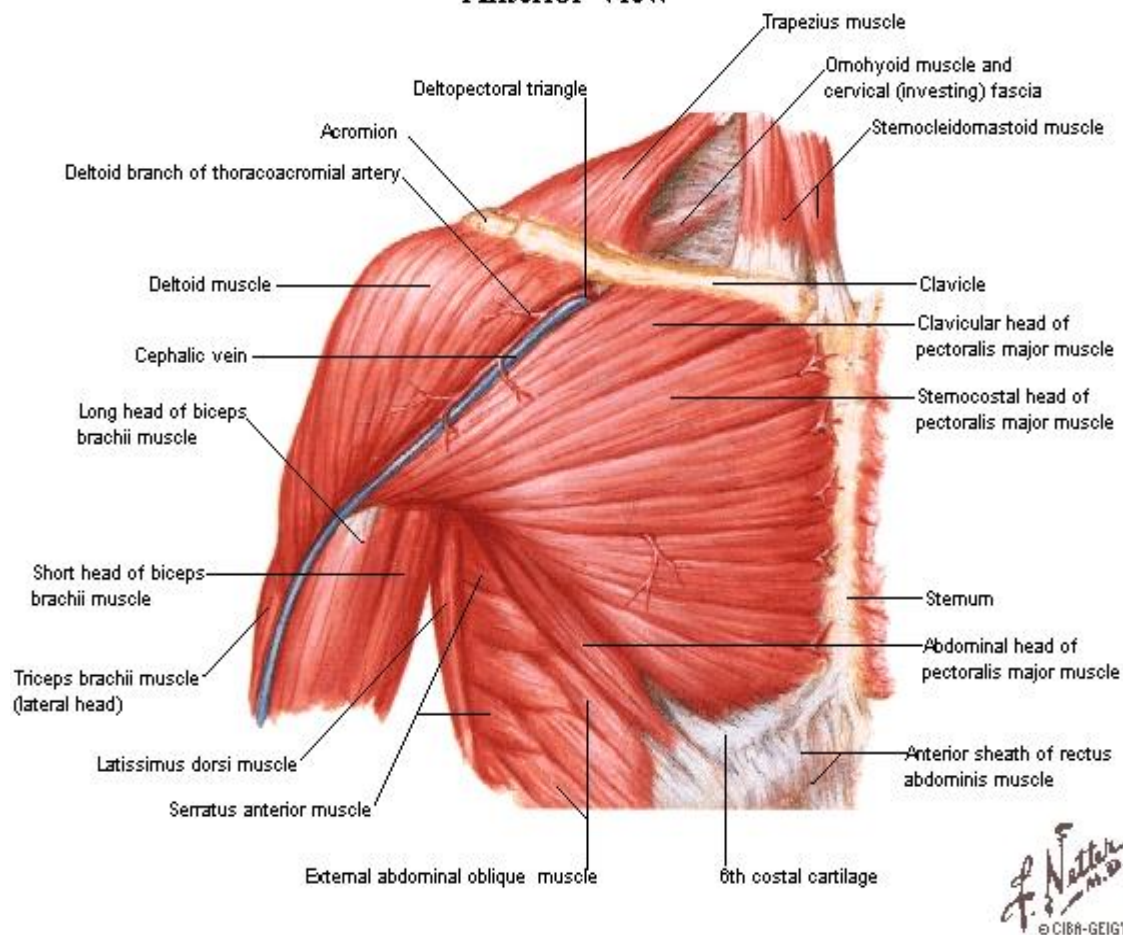
▪ **Lateral rotation:**

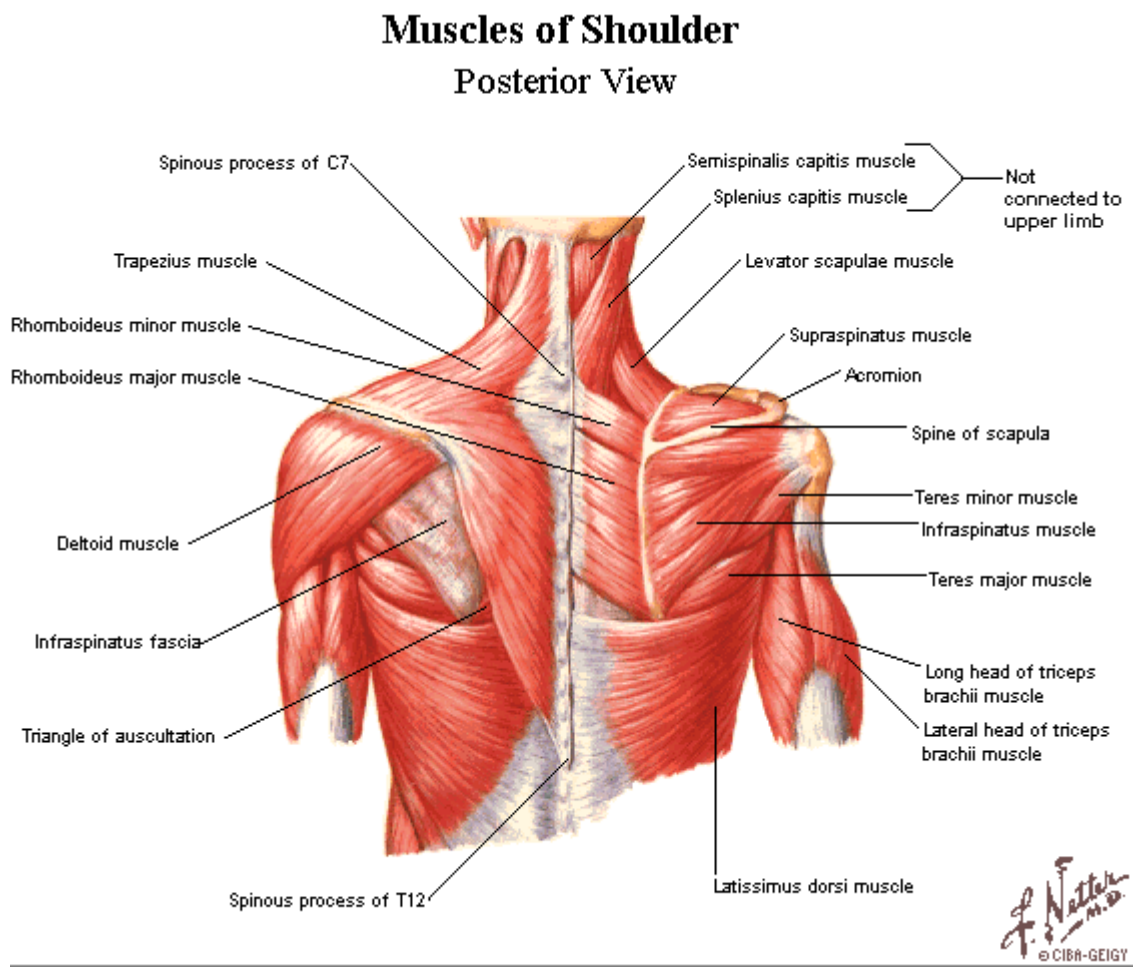
1. Posterior fibres of deltoid
2. Infra-spinatus
3. Teres minor.



Muscles of Shoulder

Anterior View





★ **Mechanism of abduction of the shoulder :**

- ***Supraspinatus*** initiates abduction from 0-15 degrees.
- The middle fibres of ***deltoid*** then continue abduction to 90 degrees. After this range, the head cannot move any more because the humerus impinges on ***coraco-acromial ligament***.
- Raising the arm above the head from 90-180 degrees, it is a movement of the ***shoulder girdle*** so that the glenoid cavity becomes directed upwards. This is done by upper & lower fibers of trapezius and lower fibers of serratus anterior muscles.

The elbow joint

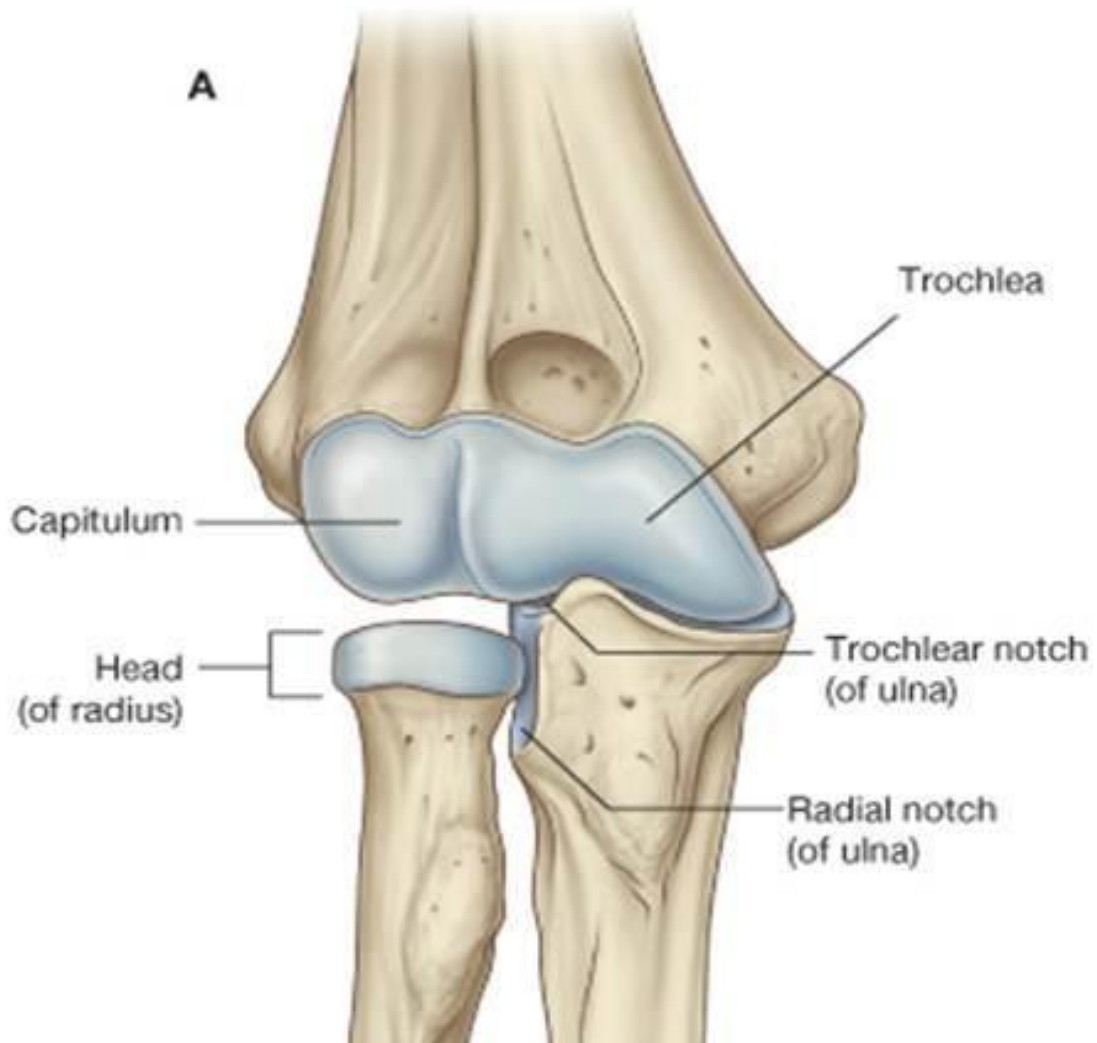
★ **Type:** Synovial joint , uniaxial of hinge variety.

★ **Articular surfaces :**

A. Proximally: trochlea and capitulum of *humerus*.

B. Distally: Trochlear notch of *ulna* and head of *radius*.

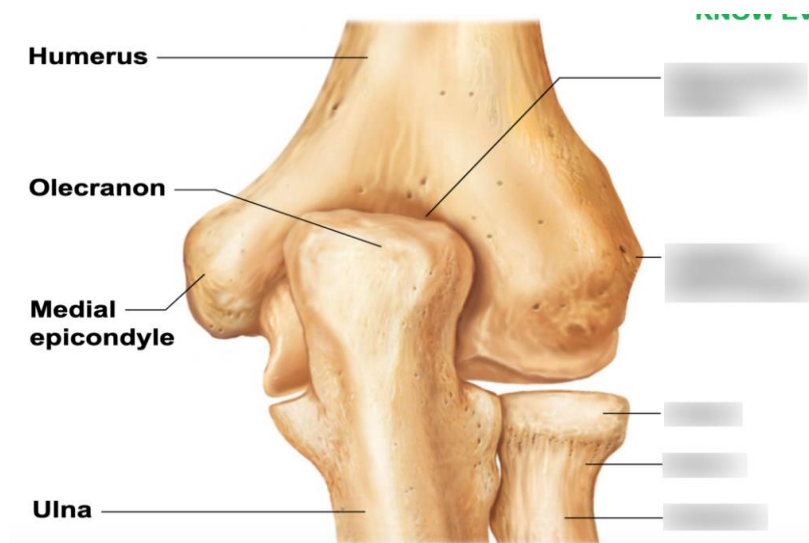
1. Medially trochlea articulates with trochlear notch of ulna.
2. Laterally capitulum articulates with upper surface of the head of radius.



★ Capsule:

A. Attachment: the capsule is attached to the **margins** of the articular surfaces as follows:

- **Proximal** : front & back of base of medial and lateral epicondyles , immediately above the coronoid , radial & olecranon fossae
- **Distal** : Margin of coronoid and olecranon processes as well as annular ligament which surrounds the head of radius.



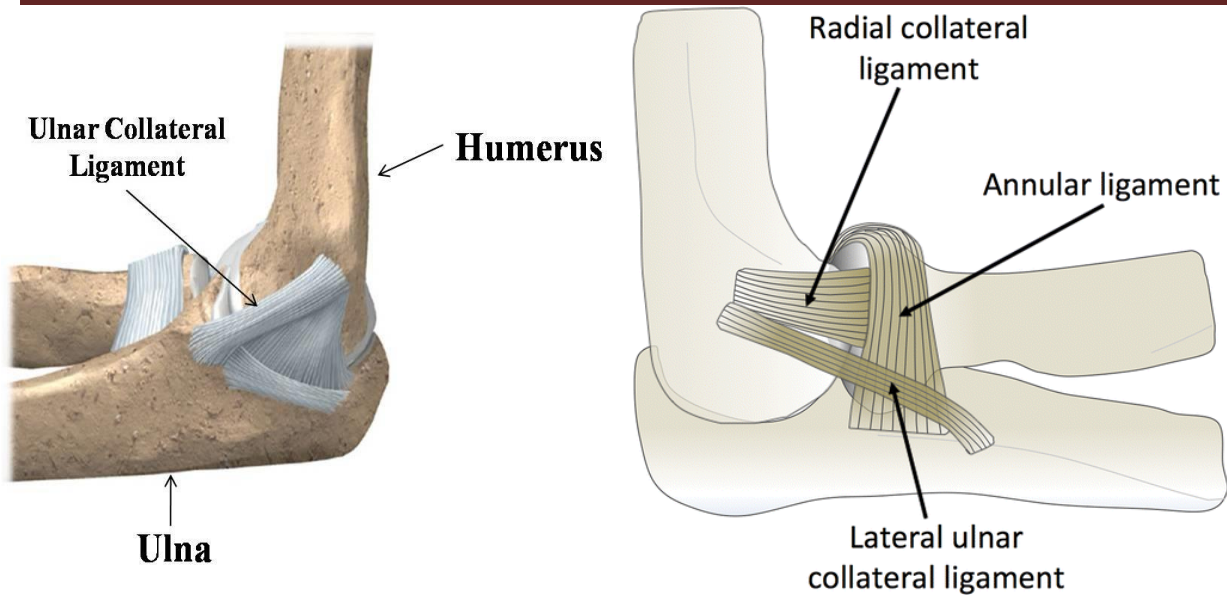
B. Ligaments:

1. **Medial (ulnar) collateral ligament:**

- It **prevents abduction** of the elbow joint & composed of 2 bands attached above to the **medial epicondyle** :
 - **Anterior band:** attached below to the medial border of **coronoid process**.
 - **Posterior band** : attached below to the olecranon process.

2. **Lateral (radial) collateral ligament:** It **prevents adduction** and attached above to the **lateral epicondyle** and below to the outer surface of **annular ligament**.

Joints of Upper Limb



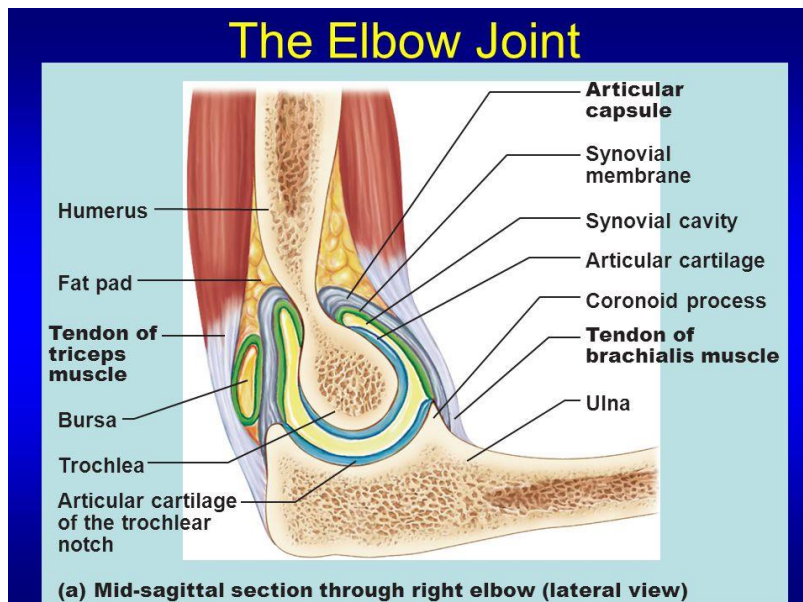
C. Strength: As any hinge joint, the capsule is **thin both in front and behind** to allow flexion and extension and **thick at the sides** to prevent abduction and adduction.

• **N.B. :**

- Medial and lateral epicondyles are extra-capsular.
- The elbow joint & superior radio-ulnar joint have a common capsule.

★ **Synovial membrane:** Is **continuous with** that of superior radio-ulnar joint.

★ **Bursa:** A bursa separates the tendon of triceps from the back of the capsule.



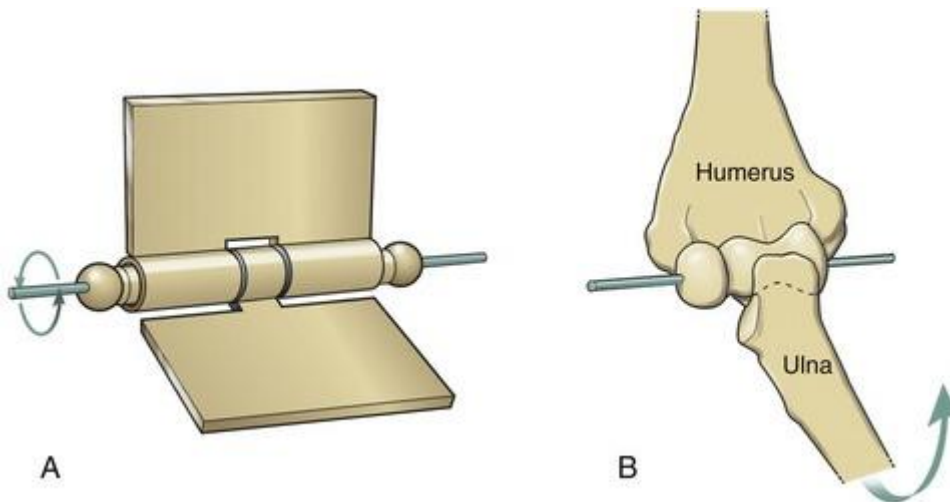
Joints of Upper Limb

★ **Arterial supply:** From the anastomosing arteries around the elbow.

★ **Nerve supply:** from musculo-cutaneous , radial , ulnar & median nerves.

★ **Movements:**

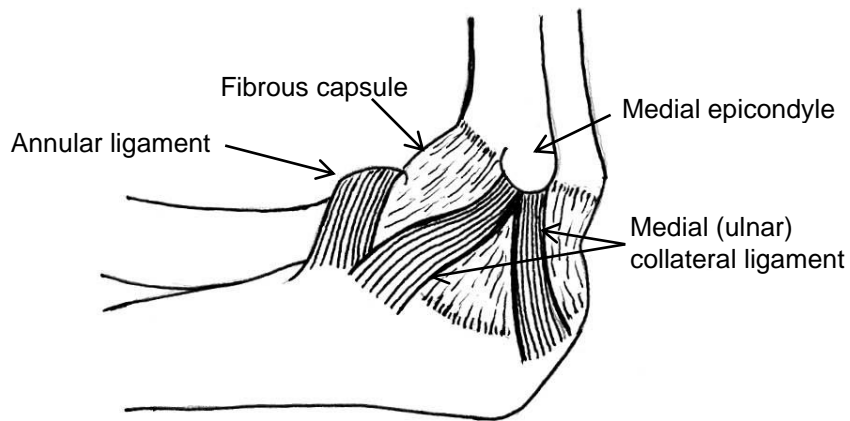
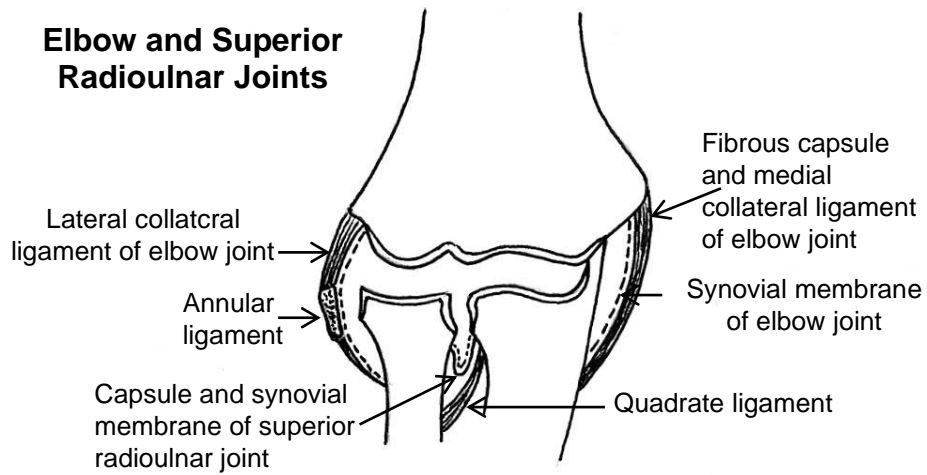
1. **Extension:** Triceps (main extensor) , anconeus and superficial extensors of the forearm .
2. **Flexion:** Brachialis (main flexor), biceps, brachio-radialis (in midprone position) and superficial flexors of the forearm.



★ **Relations :**

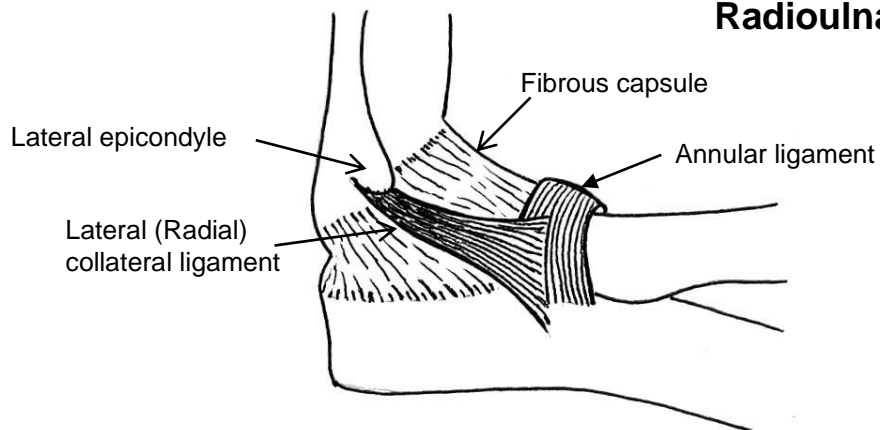
- **Anterior :** Brachialis , brachial artery & median nerve.
- **Posterior :** Triceps & anconeus .
- **Medial:** CFO & ulnar nerve.
- **Lateral :** CEO & radial nerve & termination of the descending branches of profunda brachii .

Elbow and Superior Radioulnar Joints



Medial View

Ligaments of Elbow and Superior Radioulnar Joints

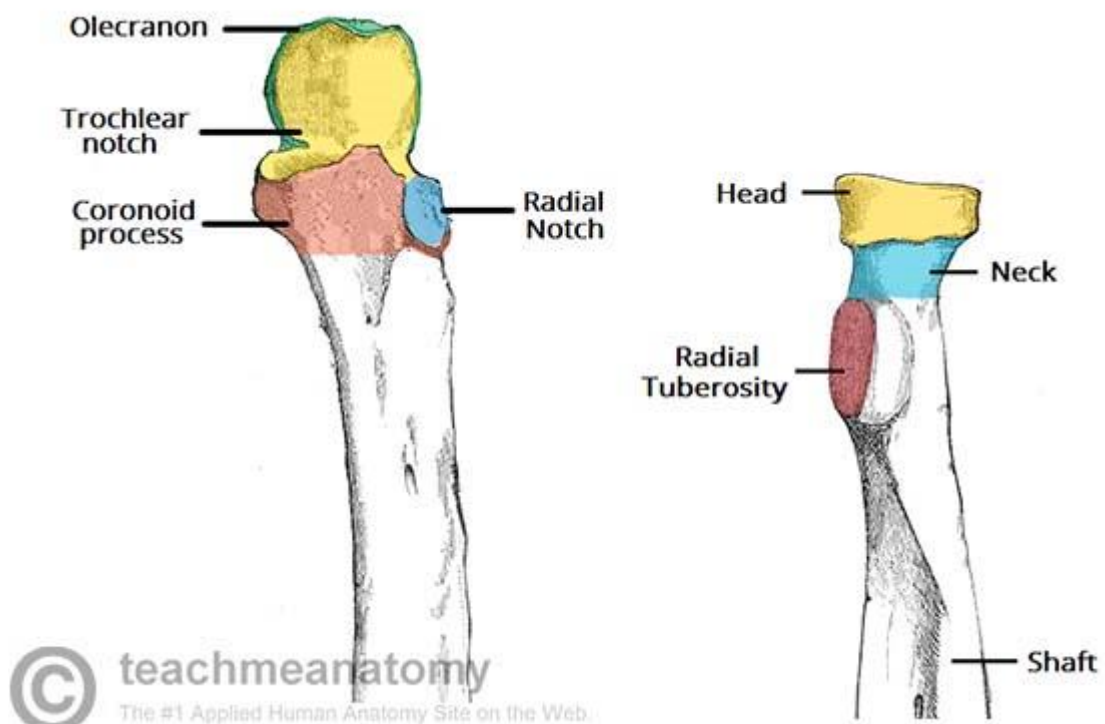


Lateral view

Superior radio-ulnar joint

★ **Type:** Synovial, uniaxial (pivot) joint.

★ **Articular surfaces :** The circumference of the *head of radius* rotates against the *radial notch of ulna*. At any time in pronation or supination only *one quarter* of the circumference of the head of radius articulates with the radial notch of ulna. The *remaining* three quarters of the head articulates with the *annular ligament*.



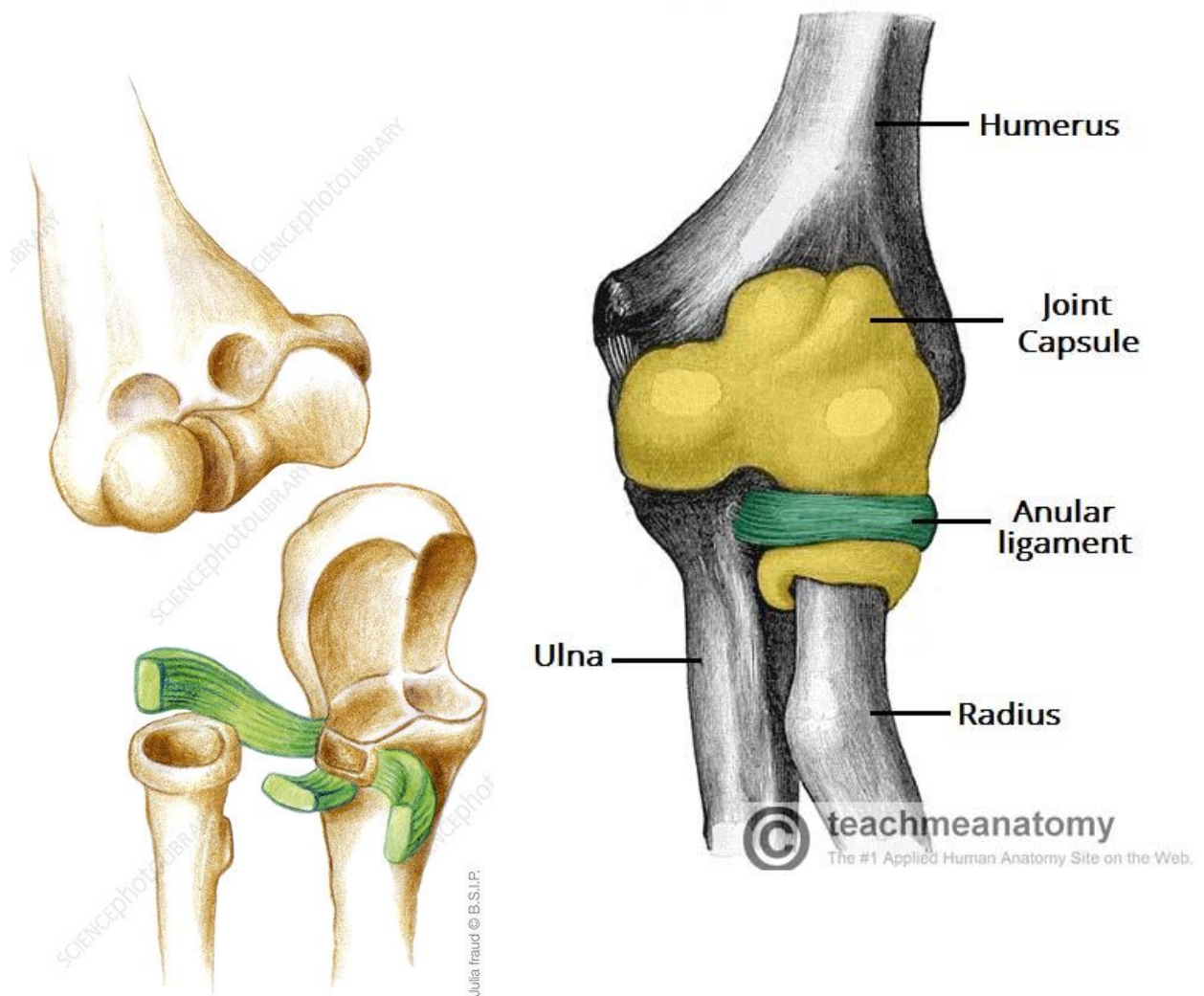
★ **Capsule and Ligaments:**

1. **Continuous above** with the capsule of the elbow joint. Their joint spaces are continuous together.
2. The synovial membrane is a downward prolongation of the synovial membrane of the elbow joint.
3. **Annular ligament:** Is about *three quarters of a circle* attached to the *anterior and posterior margins* of the radial notch of ulna and encircles the head of radius. It gives

Joints of Upper Limb

attachment to the capsule and lateral collateral ligament of the elbow joint. It is slightly **narrower below** than above and this **prevents** the head of radius from being **dislocated** downwards.

4. **Quadrata ligament:** Connects the lower margin of the radial notch of the ulna to the medial aspect of the neck of radius just above its tuberosity.



Inferior radio-ulnar joint

★ **Type:** Synovial, uniaxial (*pivot*) joint.

★ **Articular surfaces :** The *head of ulna* articulates with the *ulnar notch of radius*.

★ **Capsule:**

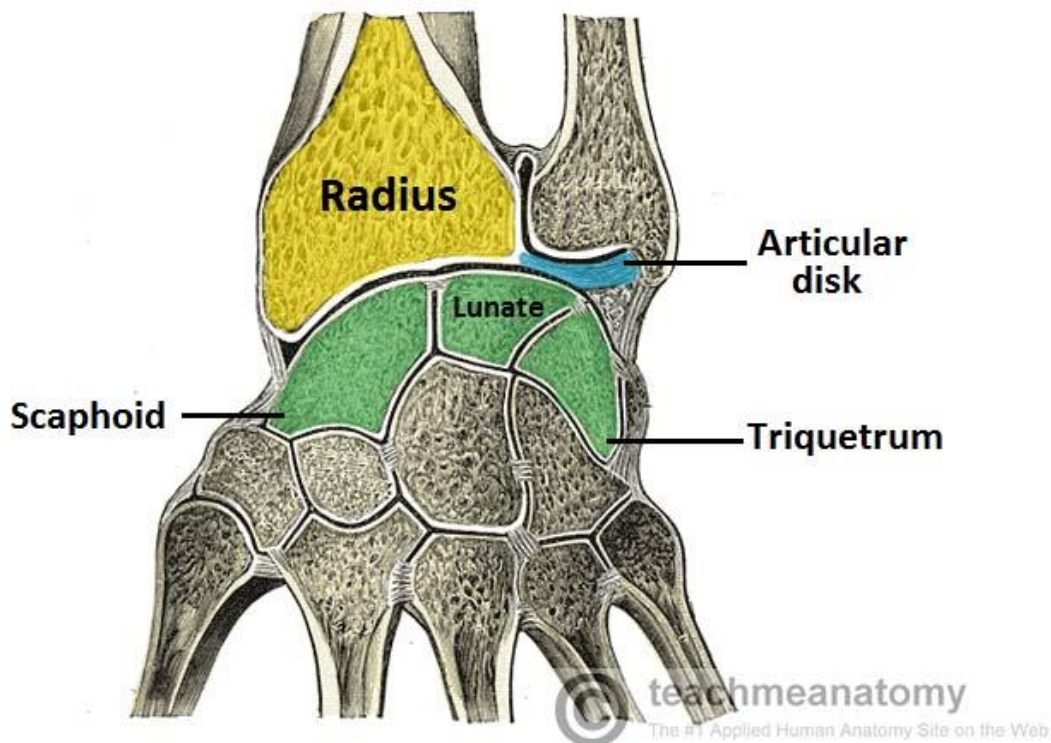
- *Lax* to allow for the *wide range* of pronation.
- *Continuous* above to the lower end of the *interosseous* membrane.
- **The articular disc of cartilage of inferior radio-ulnar joint:**
 1. A thick *triangular* plate of *fibro-cartilage* which lies *below the head of ulna*.
 2. It *separates* the head of ulna from the *triquital* bone, thus the head of ulna does not enter in the formation of the wrist joint which is thus referred to as radio-carpal joint.
 3. It separates the **cavity** of inferior radio-ulnar joint from that of the wrist joint (i.e., the synovial membrane of the inferior radio-ulnar joint is separated from that of wrist joint by the disc).
 4. It is **attached** by its **apex** to a rough impression near the *root of the styloid process* of ulna and by its **base** to the lower margin of the *ulnar notch of radius*. This disc **allows** the radius to rotate around the head of ulna, but **prevents** the separation of the two bones from each other.

★ **Movement at superior & inferior radio-ulnar joints:**

- **Pronation and supination** occur at these joints along a **vertical axis** extending from the **center of head** of radius above to rough **impression** of head of ulna.

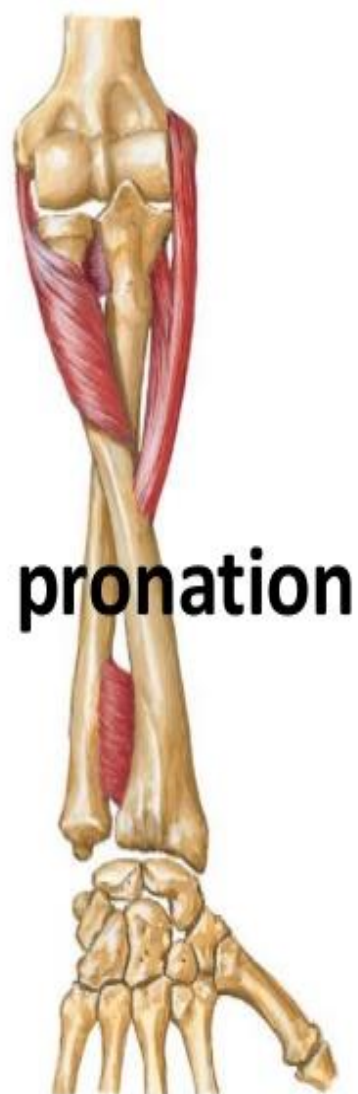
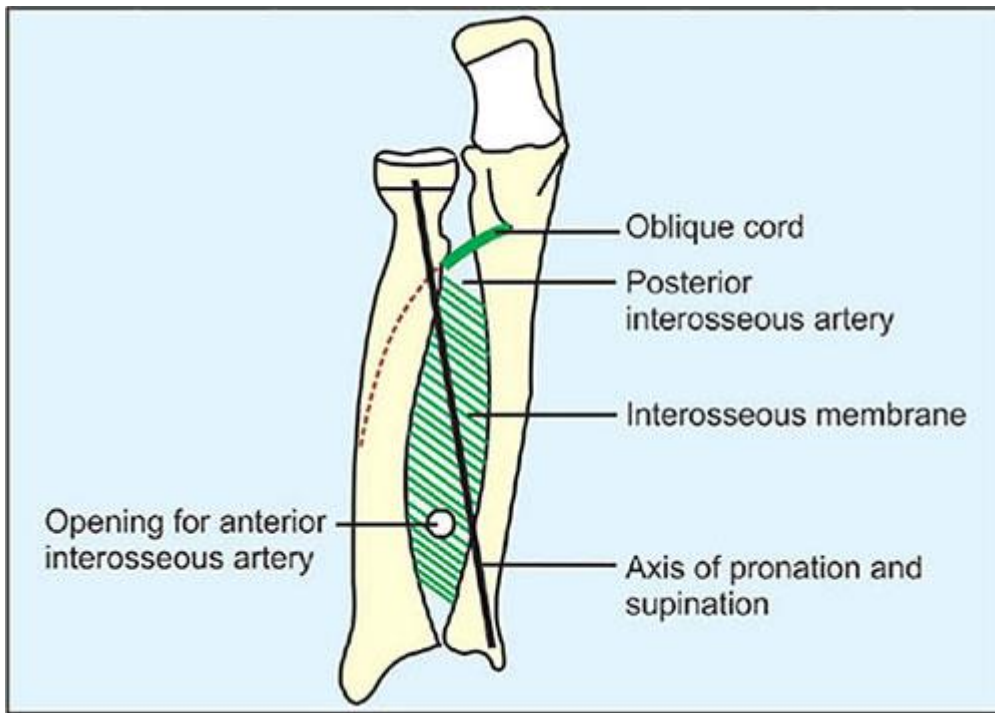
Joints of Upper Limb

- **Supination:** The radius lies parallel to the ulna and the palm of the hand is directed forwards.



- Supination is **produced by supinator** (mainly, produce supination of extended elbow) and biceps (produce supination of flexed elbow).
- **Pronation:** The head of radius rotates within the annular ligament and its lower end rotates around the head of ulna → The radius carrying the hand crosses obliquely in front of ulna with the palm of the hand directed backwards.
 - Pronation is **produced by** pronator teres , pronator quadrates and brachioradialis (bring forearm to midprone position).

Joints of Upper Limb



The Interosseous Membrane

★ **Attachment:** In addition to superior and inferior radio-ulnar joints, the radius and ulna are also joined by a fibrous membrane called interosseous membrane.

1. Laterally: It is attached to the interosseous border of radius.

2. Medially: It is attached to the interosseous border of ulna.

3. Above: It ends at a **free border** one inch below the radial tuberosity.

4. Below: It blends with the capsule of inferior radio-ulnar joint.

★ **Direction of fibres:** The fibres of interosseous membrane run obliquely **downwards and medially from radius to ulna**.

★ **Functions:**

1. Increases the area for **attachement of muscles** of the forearm.

- Muscles which take origin from the anterior surface of interosseous membrane:

- Flexor pollicis longus
- Flexor digitorum profundus

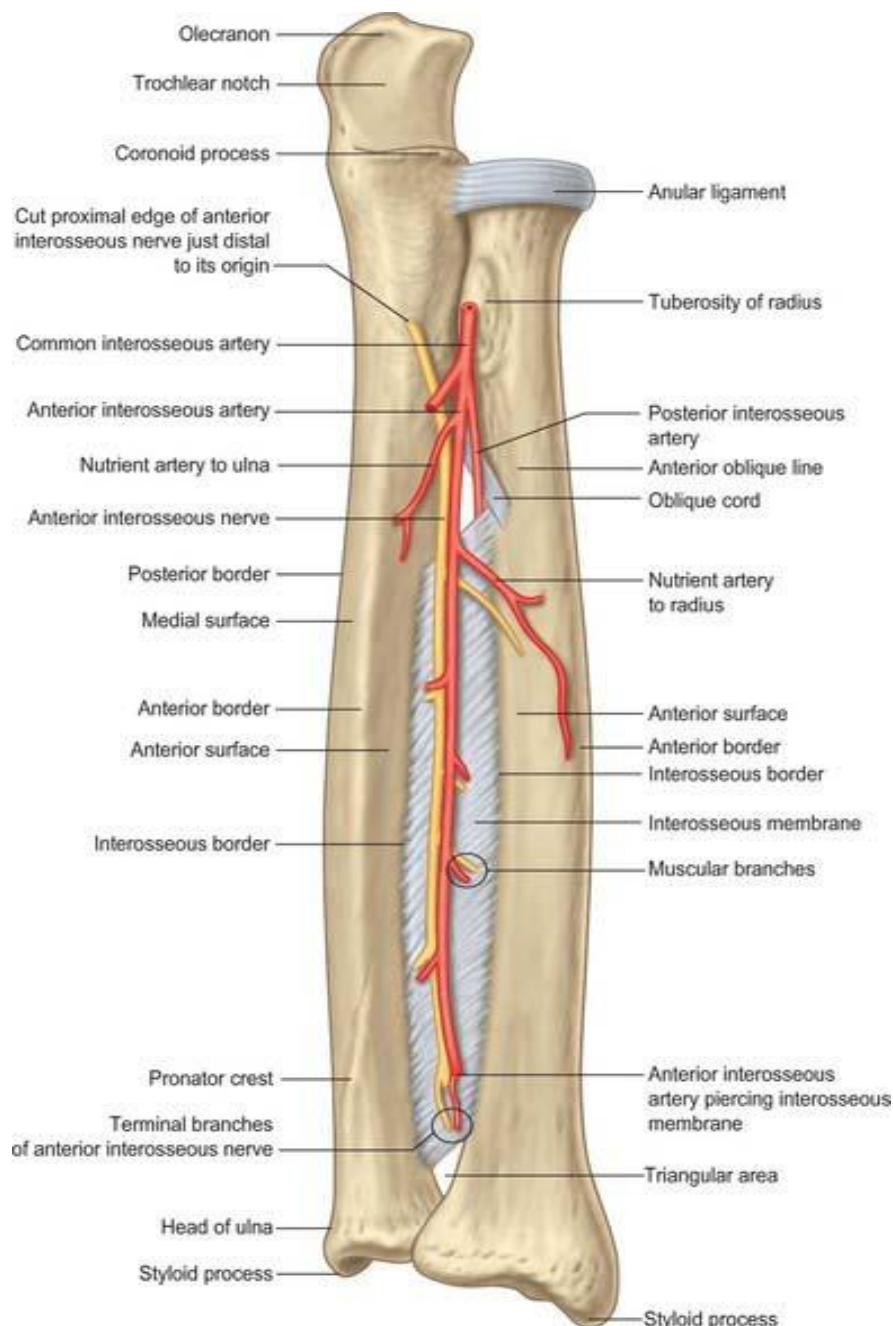
- Muscles which take origin from the posterior surface:

- Abductor pollicis longus
- Extensor pollicis longus
- Extensor pollicis brevis
- Extensor indices

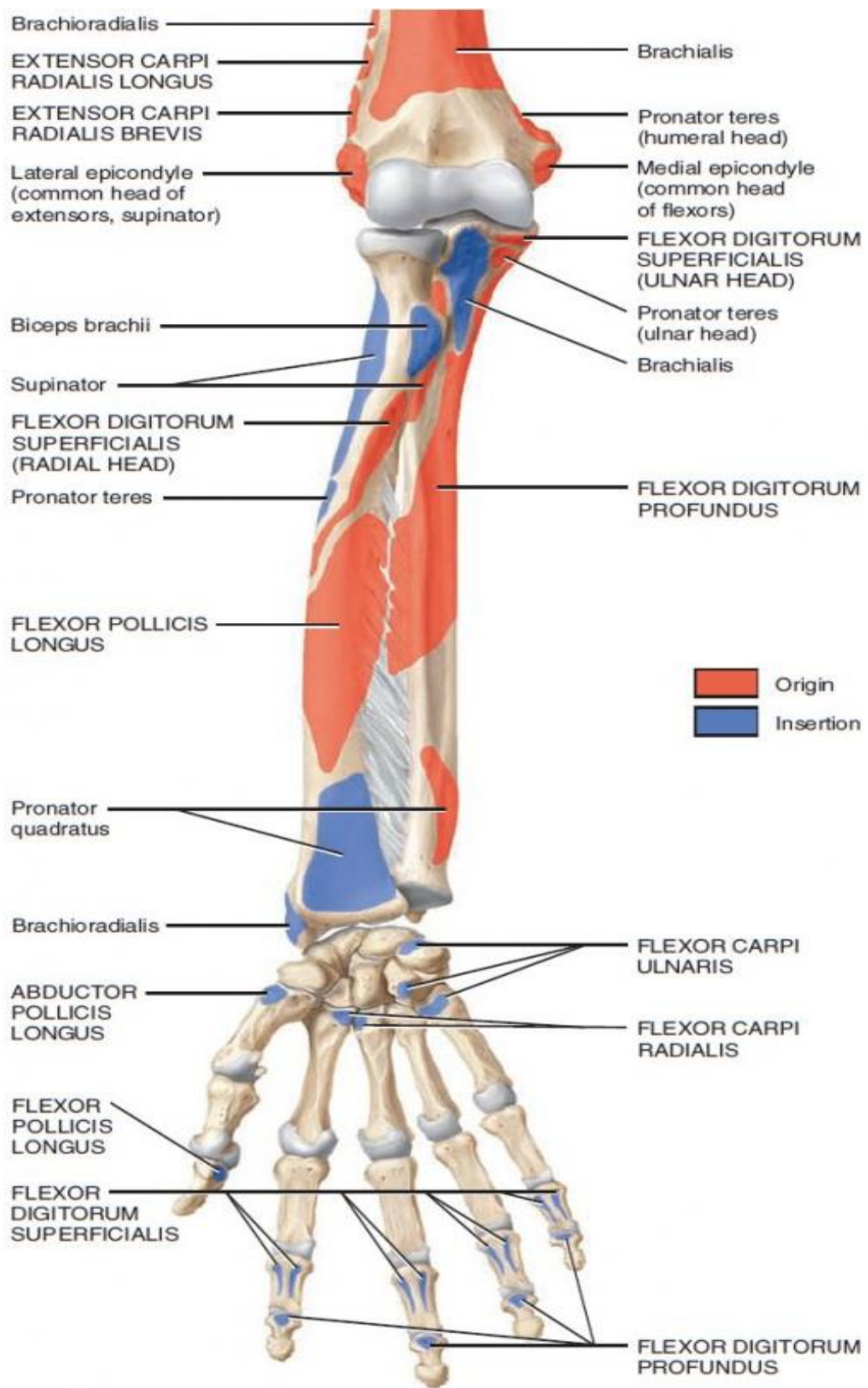
3. The radius receives forces from the hand. The interosseous membrane, due to the direction of its fibers, **transmits forces from radius to ulna** which in turn transmits forces upwards to the humerus.

★ Relations:

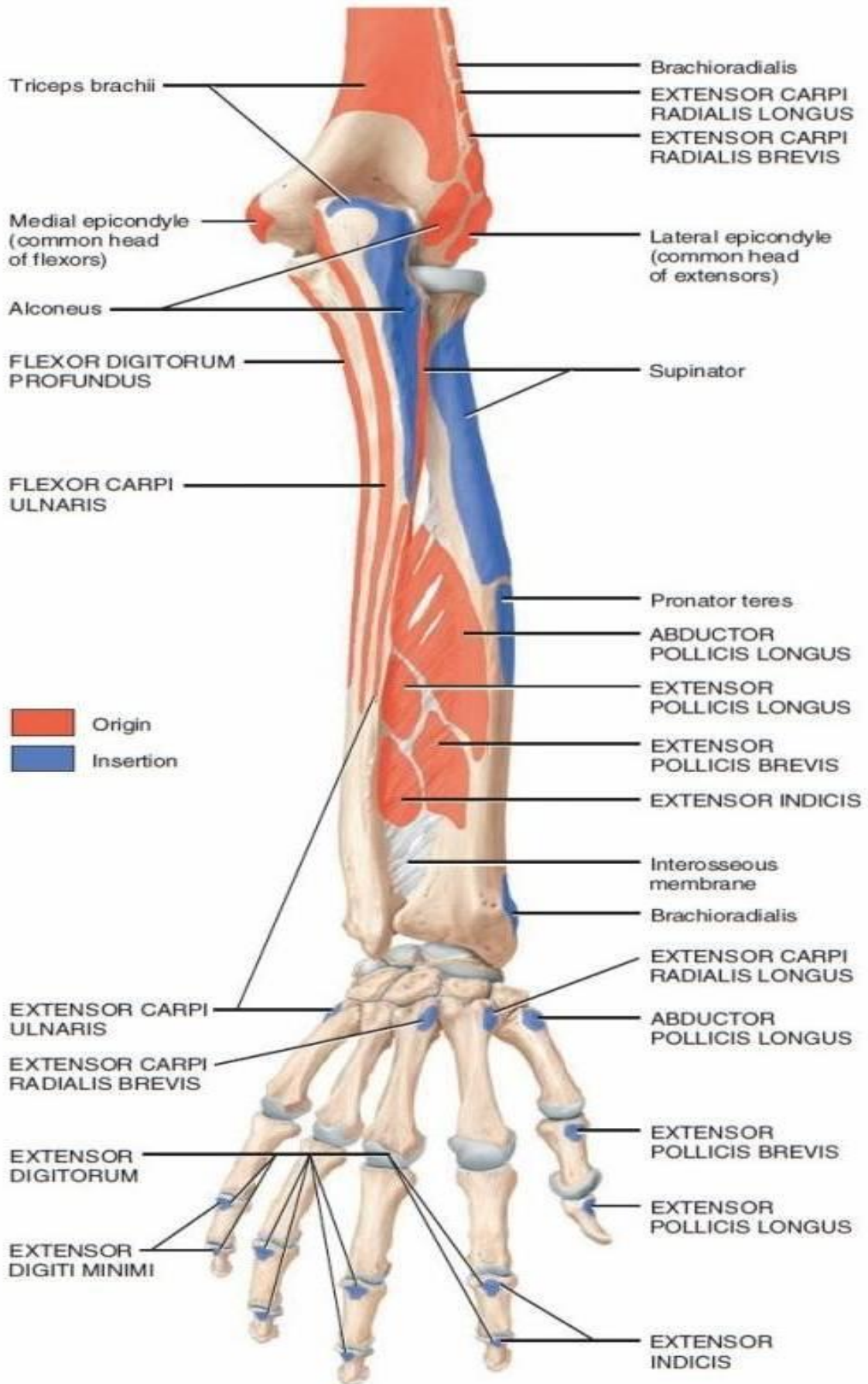
1. The anterior interosseous nerve and vessels lie on its anterior surface.
2. The anterior interosseous artery pierces it above upper border of pronator quadratus.
3. The posterior interosseous vessels pass backwards above its upper border.
4. Pronator quadratus crosses in front of its lower part.
5. Muscles attached to its anterior and posterior surfaces.



Joints of Upper Limb



Joints of Upper Limb



The wrist joint (Radio-carpal joint)

★ **Type:** Synovial, biaxial, *ellipsoid* joint.

★ **Articular surfaces:**

- **Proximal articular surface:** elliptical concave **surface** formed by:
 1. The inferior surface of lower end of *radius* .
 2. Inferior surface of *articular disc* of inferior radio-ulnar joint which lies below the head of ulna .
- **Distal articular surface:** *oval convex* surface formed of three carpal bones:
 1. *Scaphoid and lunate* lie below the radius.
 2. *Triquetral* lies below the articular disc below the head of ulna.

★ **N.B.** *The ulna does not come in direct contact with the carpal bones due the presence of the articular disc of cartilage below the head of ulna. Therefore, the wrist joint is called radio-carpal joint.*

★ **Capsule and ligaments:**

1. The capsule is attached to the *margins* of the articular surfaces.
2. The lateral and medial parts of the capsule are **thickened** to form *radial (lateral)* and *ulnar (medial) collateral* ligaments of the wrist. They descend from the **styloid processes** of both radius and ulna to become attached to the **proximal carpal bones** below.

3. The capsule is strengthened in front and behind by ***anterior and posterior*** (palmar and dorsal) ***radio-carpal ligaments*** which pass obliquely downwards and medially from the **lower end of the radius to the carpal bones**. They are important as they **force the carpus to move with the radius** as one unit during ***pronation and supination***.

★ **Arterial supply:** (anastomosis around the wrist).

★ **Nerve supply:** By anterior and posterior interosseous nerves.

★ **Movements:**

A. Flexion:

1. Flexor carpi radialis is a main flexor
2. Flexor carpi ulnaris is a main flexor
3. Palmaris longus
4. All the long muscles whose tendons cross in front of the wrist help in flexion.

B. Extension:

1. Extensor carpi radialis longus is a main extensor
2. Extensor carpi radialis brevis is a main extensor
3. Extensor carpi ulnaris is a main extensor
4. All the long muscles whose tendons cross behind the wrist help in extension.

● **Adduction:**

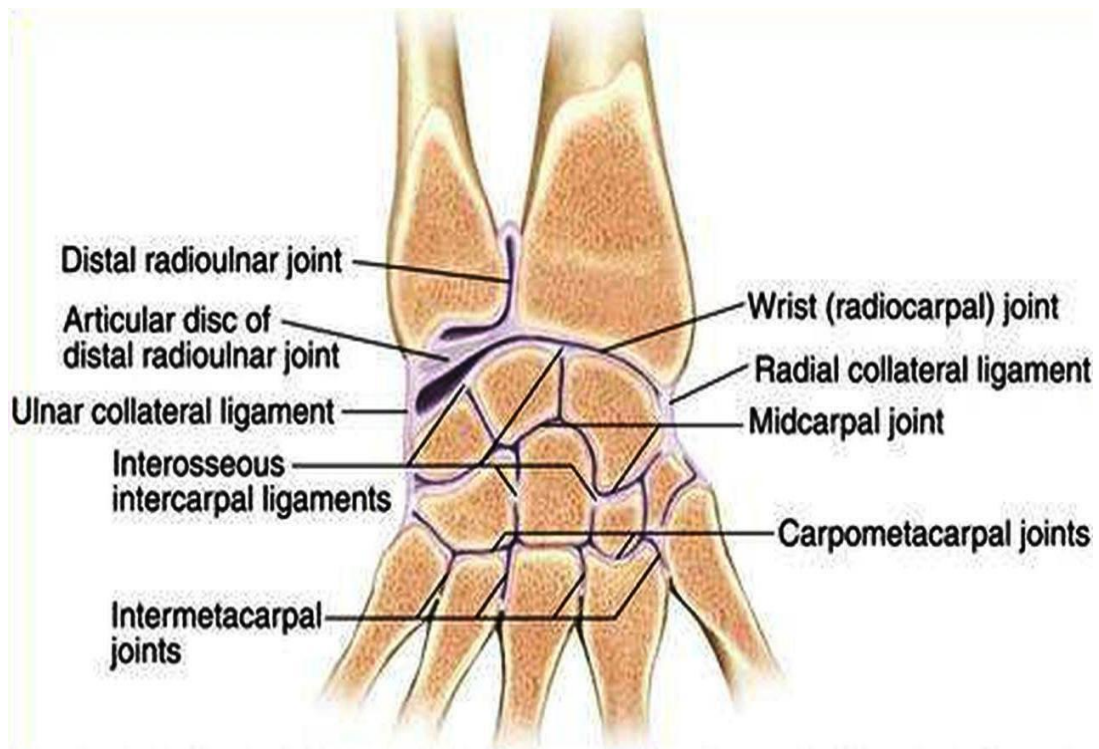
1. Flexor carpi ulnaris
2. Extensor carpi ulnaris

● **Abduction:**

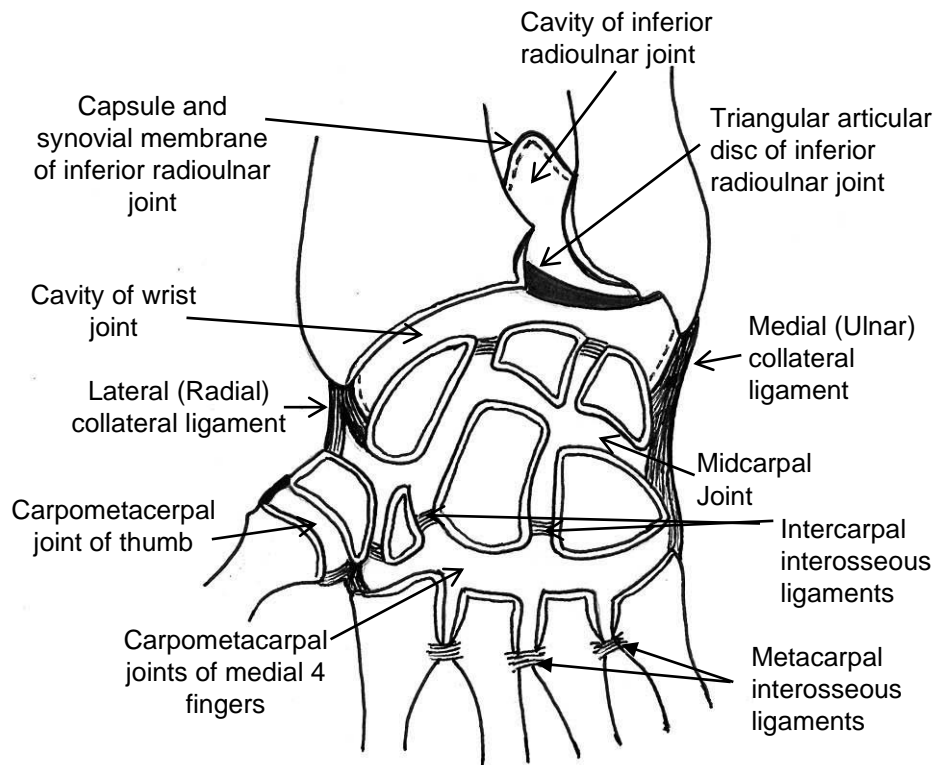
1. Extensor carpi radialis longus

Joints of Upper Limb

2. Extensor carpi radialis brevis
 3. Flexor carpi radialis
 4. Abductor pollicis longus
- **Circumduction:** Combination of the above mentioned four movements.



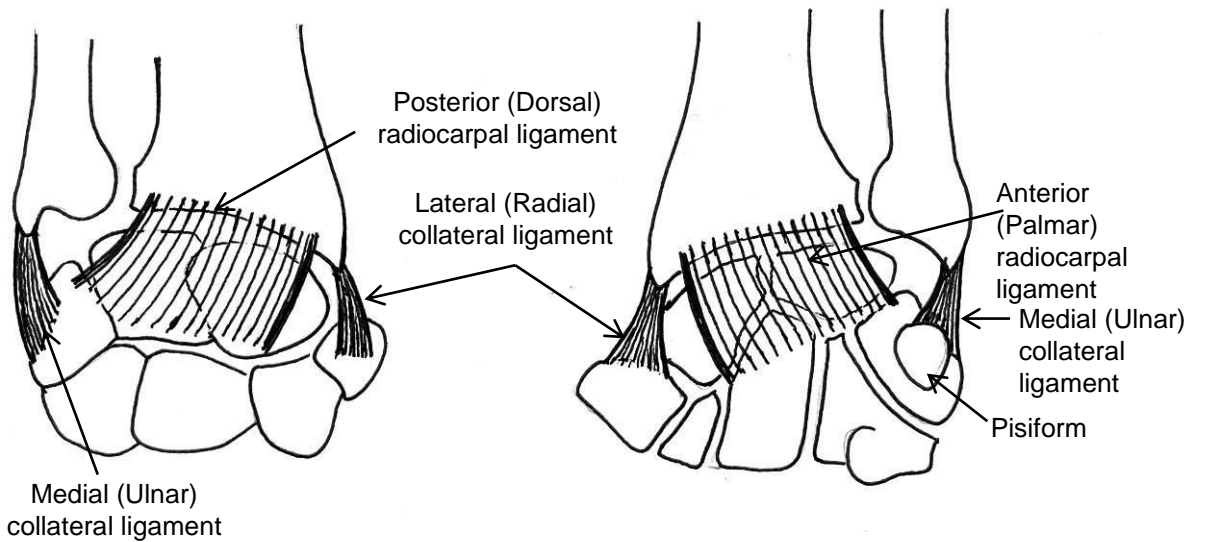
Joints of Upper Limb



**Wrist Joint, Inferior Radioulnar Joint
Midcarpal and Carpometacarpal
Joints**

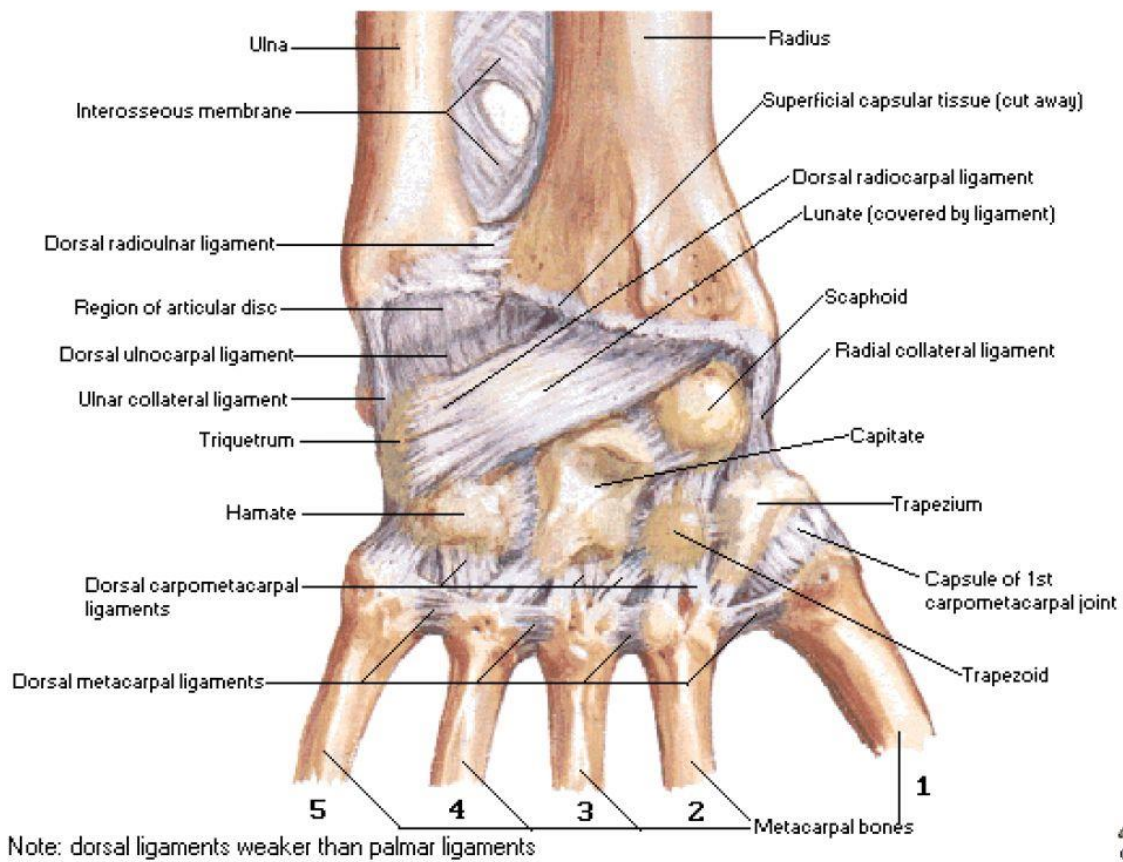
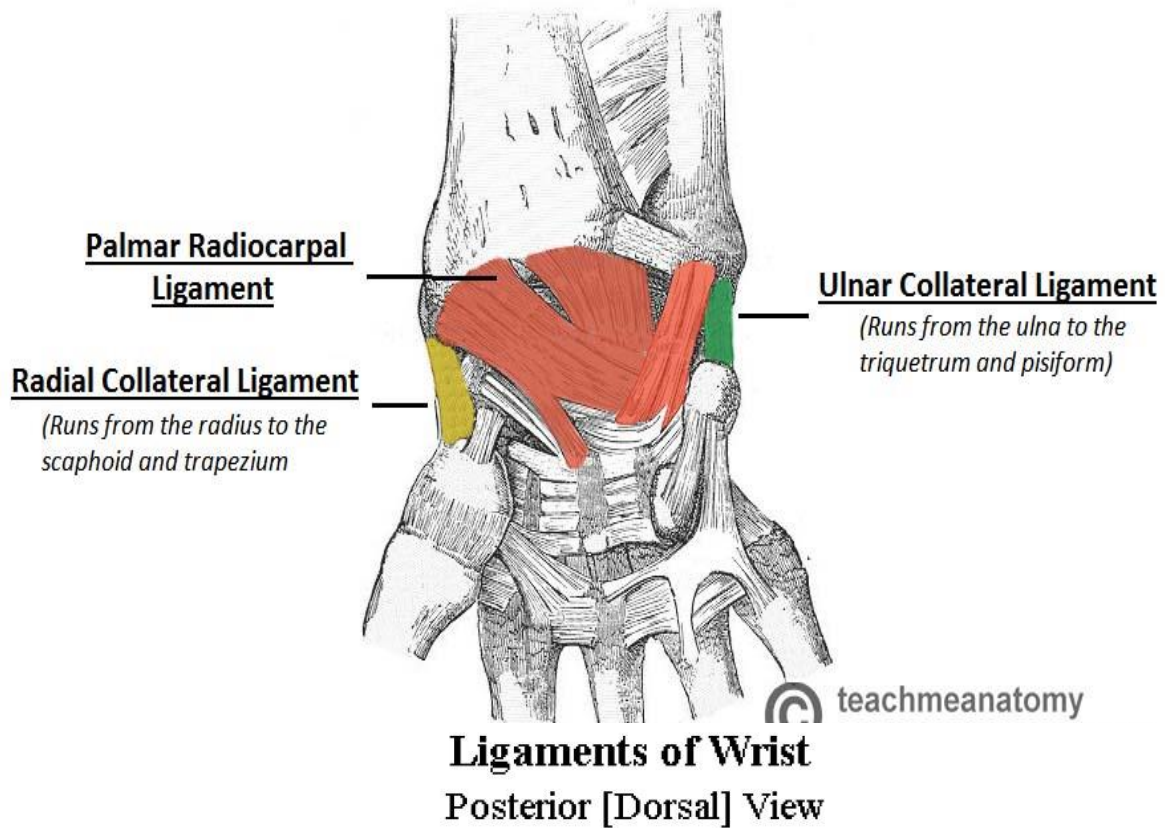
*** Posterior View**

*** Anterior View**



Ligaments of Wrist Joint

Joints of Upper Limb



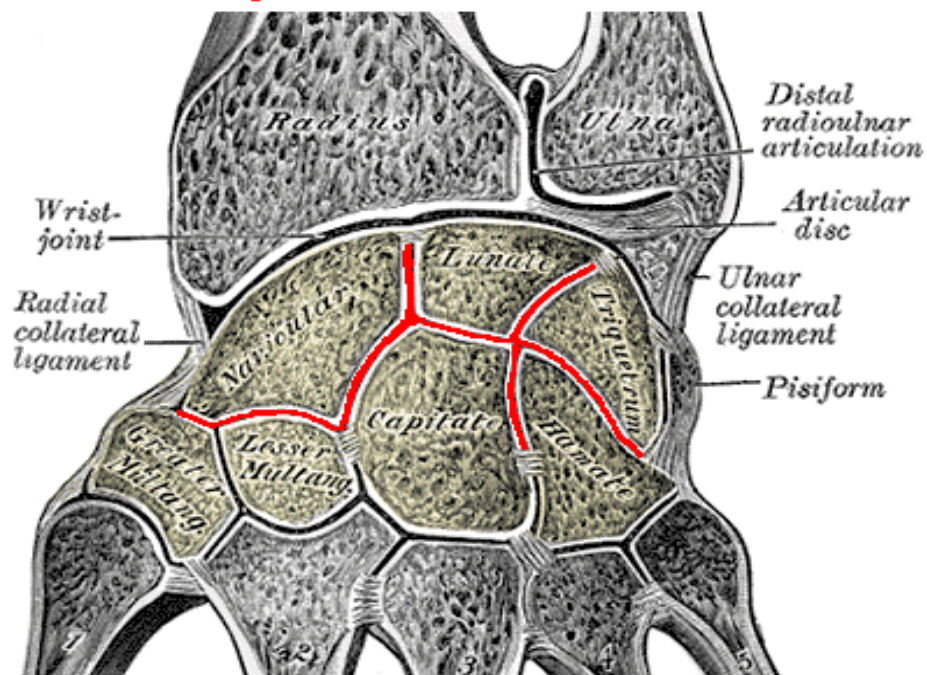
★ Relations :

- **Anterior:** Carpal tunnel and its contents.
- **Posterior:** 6 compartment deep to extensor retinaculum.
- **Lateral :** Radial artery passing backwards to anatomical snuff box.
- **Medial:** Skin & fascia.

The mid-carpal joint

- ★ **Type and Variety:** Synovial; modified ellipsoid joint.
- ★ **Articular surfaces :** It is the joint between:
 1. The proximal row of carpal bones (except pisiform) , as one unit.
 2. The distal row of carpal bones, as the second unit.
- ★ **Capsule:** It has a **common capsule** and a common joint **cavity**.
- ★ **Movements:** Its movements are **complimentary** to those of wrist joint but much more limited. It allows **limited flexion, extension, abduction and adduction** (the same muscles as the wrist are concerned).

Midcarpal Joints



The carpo-metacarpal joints

I) C/M joint of the thumb:

- ★ **Type:** Synovial, biaxial, **saddle** joint.
- ★ **Articular surfaces:**
 - **2 concavo-convex surfaces between the base of 1st metacarpal bone and the trapezium.**
 - All the **metacarpal bones, except** that of the thumb, join the carpus in such a way that their palmar surfaces look forwards.
 - The **metacarpal bone of the thumb** joins the trapezium in such a way that it is **rotated 90 degrees** so that its **palmar surface looks medially.**
 - The **plane of the thumb lies at right angle to that of the other fingers.** This makes the thumb **able to oppose** the other fingers.
- ★ **Movements:** It is the ***next freely moveable*** joint after the ball and socket variety. It produces flexion, extension, adduction, abduction, opposition and circumduction.

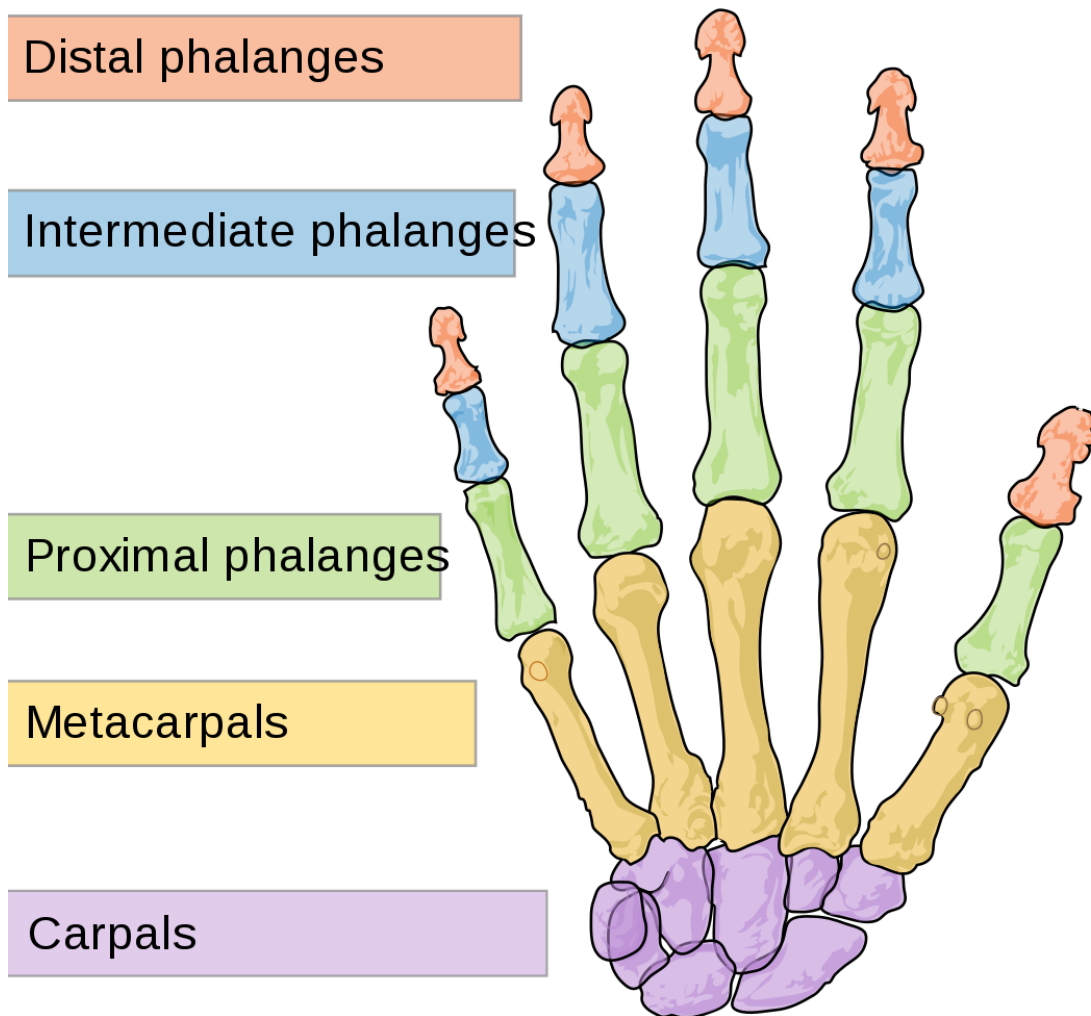
★ **N.B.** *The thumb is the most important finger* because of its ability to oppose the other four fingers, performing fine movements & responsible for grasping function of the hand.

II) C/M joints of medial 4 fingers:

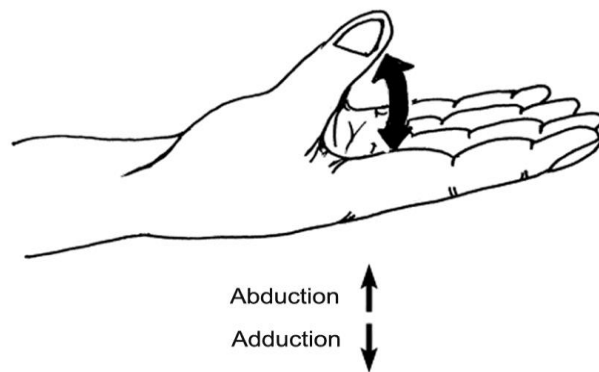
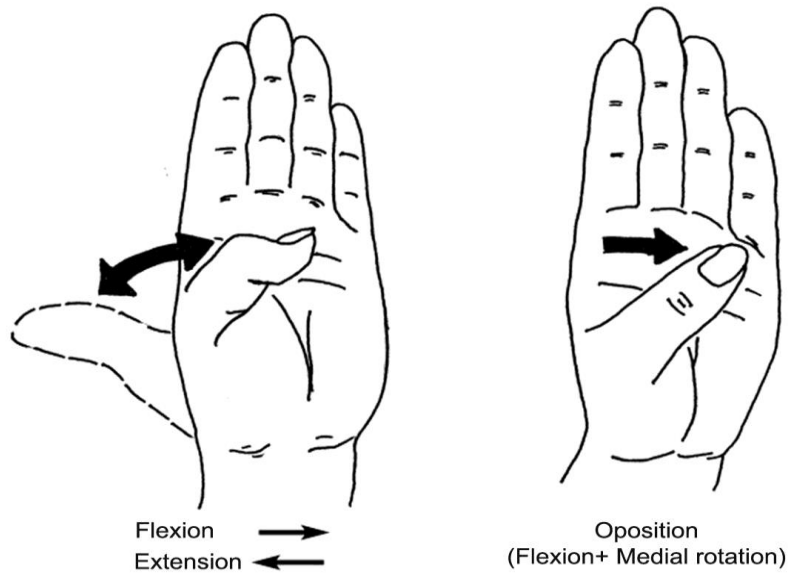
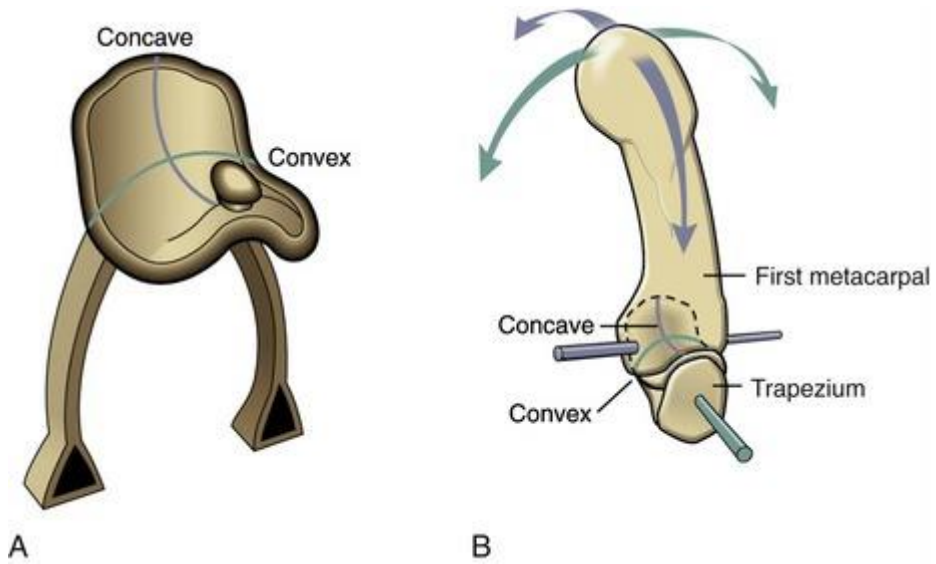
- ★ **Type:** Synovial, plane joint.
- ★ **Articular surfaces:** The distal row of carpal bones articulate with the bases of the medial 4 metacarpal bones.
- ★ **Movements:** minimal gliding movements. The ***little finger*** has an ***opponens*** muscle which can move its metacarpal bone

Joints of Upper Limb

forwards and laterally toward the thumb and helps in ***cupping*** the hand.



Joints of Upper Limb



MOVEMENTS OF THUMB

The metacarpo-phalangeal joints

- ★ **Type:** Synovial joints , *ellipsoid* variety except that of the thumb is hinge (adduction and abduction are restricted)
- ★ **Articular surfaces:**
 - A. Heads of the *metacarpal* bones.
 - B. Bases of the *proximal phalanges*.
- ★ **Ligaments :**
 - 1. **Medial and lateral collateral ligaments** pass distally *from the head* of metacarpal *to the base* of proximal phalanges .
 - 2. **Palmar ligament** form the *palmar aspect* of the joint capsule.
 - 3. The palmar ligaments of medial 4 metacarpo-phalangeal joints are attached together by **deep transverse metacarpal ligaments** that hold the heads of metacarpal bones together .
- ★ **Movements:**
 - A. Metacarpo-phalangeal joints *of the medial four fingers* allow:
 - 1. **Flexion:** By lumbricals, interossei, flexor digitorum superficialis and profundus.
 - 2. **Extension:** By extensor digitorum, extensor indices and digiti minimi.
 - 3. **Adduction:** Palmar interossei.
 - 4. **Abduction:** Dorsal interossei.
 - B. Metacarpo-phalangeal joint of the **thumb:** A hinge joint and allows:
 - 1. **Flexion:** By flexor pollicis longus and brevis.
 - 2. **Extension:** By extensor pollicis longus and brevis.

Interphalangeal joints

- ★ **Type:** Synovial, uniaxial (**hinge**) joints.
- ★ Ligaments : medial & lateral collateral ligaments and palmar ligaments (like metacarpophalangeal joints)
- ★ **Movements:** They allow flexion and extension only.
 - In the ***medial four*** fingers:
 - 1. Flexion:**
 - Flexor digitorum profundus (acting on both proximal and distal interphalangeal joints but it acts mainly on the distal one).
 - Flexor digitorum superficialis (acting only on proximal interphalangeal joint).
 - 2. Extension:**
 - Lumbricals
 - Interossei
 - In the ***thumb***:
 - 1. Flexion:** Flexor pollicis longus
 - 2. Extension:** Extensor pollicis longus

Joints of Upper Limb

