

GENERAL ANATOMY



Assignment on:
(JOINTS OF UPPERLIMB)

Submitted to:
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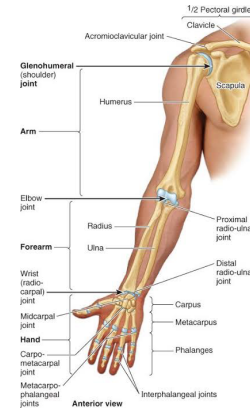
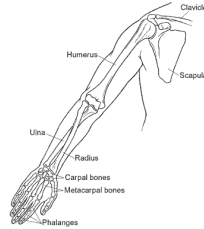
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Anesthesia Semester : 1st

IQRA NATIONAL UNIVERSITY (INU)

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HAYATABAD PHASE 2 , PESHAWAR**

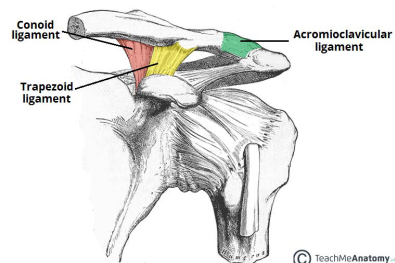
JOINT OF UPPER LIMB

- There are six (06) main joints of upper limb.
- The Acromioclavicular Joint.
- The Sternoclavicular Joint.
- The Shoulder Joint.
- The Elbow Joint.
- The Radioulnar Joints.
- The Wrist Joint.



1. Acromioclavicular:

- The acromioclavicular joint consists of an articulation between the lateral end of the clavicle and the acromion of the scapula. It has two atypical features:
- The articular surfaces of the joint are lined with fibrocartilage (as opposed to hyaline cartilage).
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Joint Capsule:

- The joint capsule consists of a loose fibrous layer which encloses the two articular surfaces. It also gives rise to the articular disc. The posterior aspect of the joint capsule is reinforced by fibres from the trapezius muscle.
- As would be expected of a synovial joint, joint capsule is lined internally by a synovial membrane. This secretes synovial fluid into the cavity of the joint.

Ligament:

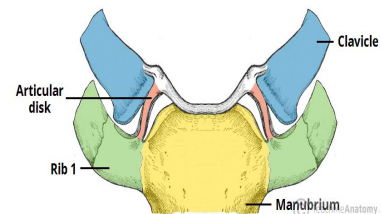
- Acromioclavicular ligament – runs horizontally from the acromion to the lateral clavicle. It covers the joint capsule, reinforcing its superior aspect.
- Extrinsic.
- Intrinsic

► **Movement:**

- The acromioclavicular joint allows a degree of axial rotation and anteroposterior movement.
- As no muscles act directly on the joint, all movement is passive, and is initiated by movement at other joints (such as the scapulothoracic joint).

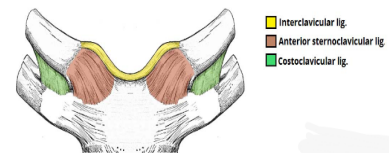
2 **Sternoclavicular joint:**

- The acromioclavicular joint consists of an articulation between the lateral end of the clavicle and the acromion of the scapula. It has two atypical features:
- The articular surfaces of the joint are lined with fibrocartilage (as opposed to hyaline cartilage).
- The joint cavity is partially divided by an articular disc – a wedge of fibrocartilage suspended from the upper part of the capsule.



► **Joint Structure & Articulating Surfaces:**

- The sternoclavicular joint consists of the sternal end of the clavicle, the manubrium of the sternum, and part of the 1st costal cartilage.
- The articular surfaces are covered with fibrocartilage (as opposed to hyaline cartilage, present in the majority of synovial joints). The joint is separated into two compartments by a fibrocartilagenous articular disc.



► **Joint Capsule and Ligament:**

- The joint capsule consists of a fibrous outer layer, and inner synovial membrane. The fibrous layer extends from the epiphysis of the sternal end of the clavicle, to the borders of the articular surfaces and the articular disc.
- A synovial membrane lines the inner surface and produces synovial fluid to reduce friction between the articulating structures.
- The ligaments of the sternoclavicular joint provide much of its stability. There are four major ligaments:
 - i. Sternoclavicular ligaments (anteriorly and posteriorly).
 - ii. Interclavicular ligament.

iii. Costoclavicular ligament .

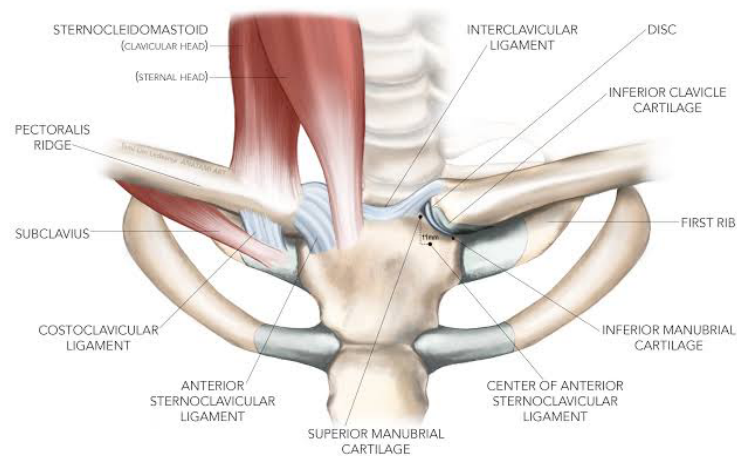
➤ **Movement :**

- The sternoclavicular joint has a large degree of mobility. There are several movements that require joint involvement:
- Elevation of the shoulders.
- Depression of the shoulders.
- Protraction of the shoulders.
- Retraction of the shoulders.
- Rotation.

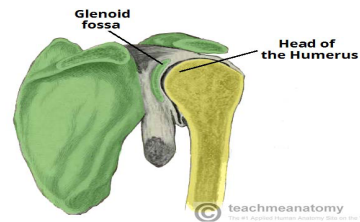
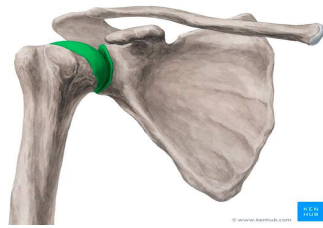
➤ **Mobility and Stability:**

- The sternoclavicular joint is required to accommodate the movements of the upper limb, and thus has a high degree of mobility. However, it also requires much stability, as it is the only connection between the upper limb and the axial skeleton.
- Here we will consider the factors which contribute to both its mobility and its stability.

• Mobility	• Stability
• Type of joint – being a saddle joint it can move in two axes.	• Strong joint capsule.
• Articular disc – this allows the clavicle and the manubrium to slide over each other more freely, allowing for the rotation and movement in a third axis.	• Strong ligaments – particularly the costoclavicular ligament, which transfers stress from the clavicle to the manubrium (via the costal cartilage).



3 Shoulder Joint:



- The shoulder joint is formed by the articulation of the head of the humerus with the glenoid cavity (or fossa) of the scapula. This gives rise to the alternate name for the shoulder joint. The glenohumeral joint.
- Like most synovial joints, the articulating surfaces are covered with hyaline cartilage. The head of the humerus is much larger than the glenoid fossa, giving the joint a wide range of movement at the cost of inherent instability.
- To reduce the disproportion in surfaces, the glenoid fossa is deepened by a fibrocartilage rim, called the glenoid labrum.

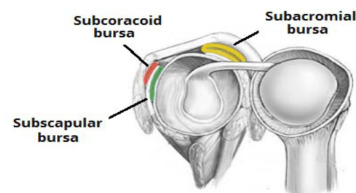
➤ Joint Capsule and Bursae:

- The joint capsule is a fibrous sheath which encloses the structures of the joint.
- It extends from the anatomical neck of the humerus to the border or 'rim' of the glenoid fossa. The joint capsule is lax, permitting greater mobility (particularly abduction).
- The synovial membrane lines the inner surface of the joint capsule, and produces synovial fluid to reduce friction between the articular surfaces.



- The bursae that are important clinically are:

- i. Subacromial
- ii. Subscapular

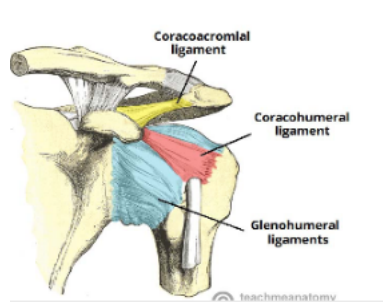


- There are other minor bursae present between the tendons of the muscles around the joint, but this is beyond the scope of this article.

➤ Ligaments:

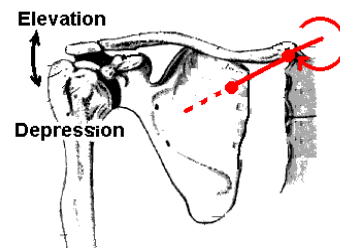
- In the shoulder joint, the ligaments play a key role in stabilising the bony structures.

- i. Glenohumeral ligaments.
- ii. Coracohumeral ligament.
- iii. Transverse humeral ligament.
- iv. Coraco-clavicular ligament.



Movements :

- As a ball and socket synovial joint, there is a wide range of movement permitted:
- Extension (upper limb backwards in sagittal plane)
- Flexion (upper limb forwards in sagittal plane)
- Abduction (upper limb away from midline in coronal plane)
- Adduction (upper limb towards midline in coronal plane)
- Internal rotation (rotation towards the midline, so that the thumb is pointing medially)
- External rotation (rotation away from the midline, so that the thumb is pointing laterally)



Mobility and Stability :

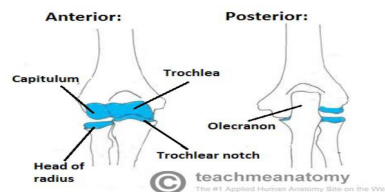
- The shoulder joint is one of the most mobile in the body, at the expense of stability. Here, we shall consider the factors that permit movement, and those that contribute towards joint structure.

Factors that contribute to mobility;	Factors that contribute to stability:
Type of joint – ball and socket joint.	Rotator cuff muscles – surround the shoulder joint, attaching to the tuberosities of the humerus, whilst also fusing with the joint capsule.
Bony surfaces – shallow glenoid cavity and large humeral head – there is a 1:4 disproportion in surfaces. A commonly used analogy is the golf ball and tee.	Glenoid labrum – a fibrocartilaginous ridge surrounding the glenoid cavity.
Inherent laxity of the joint capsule.	Ligaments – act to reinforce the joint capsule, and form the coraco-acromial arch.
-----	Biceps tendon – it acts as a minor humeral head depressor, thereby contributing to stability.

4. Elbow Joint ;

➤ It consists of two separate articulations:

1) Trochlear notch of the ulna and the trochlea of the humerus.



2) Head of the radius and the capitulum of the humerus.

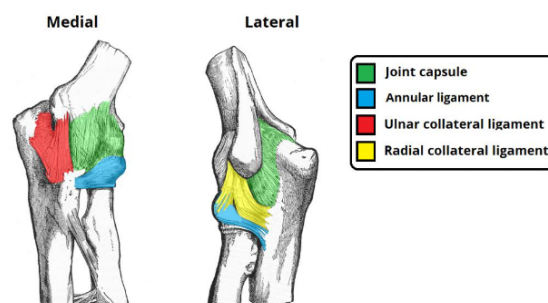
➤ **Note:** The proximal radioulnar joint is found within same joint capsule of the elbow, but most resources consider it as a separate articulation.

➤ Joint Capsule and 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.

➤ Ligament ;

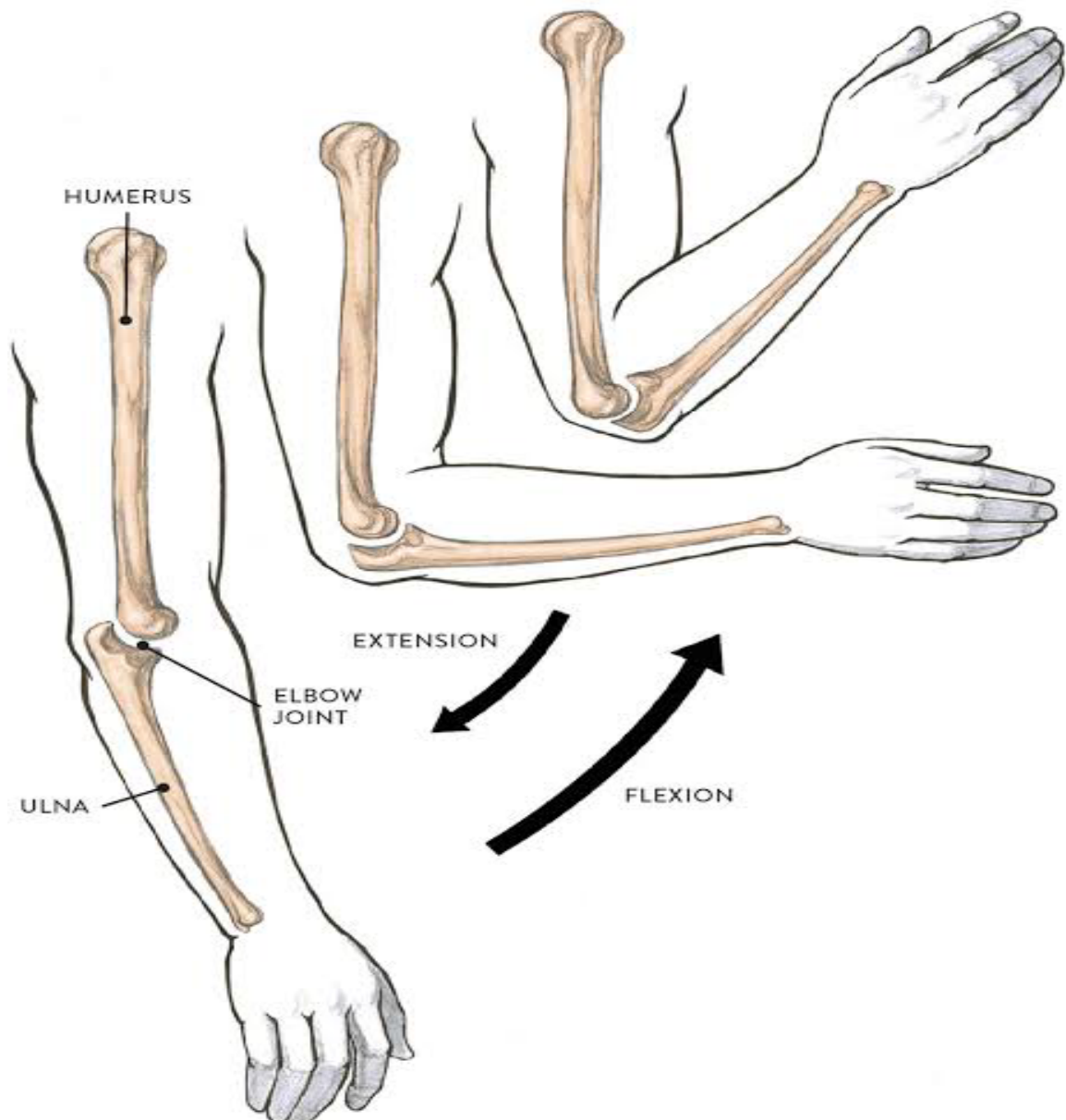
- The joint capsule of the elbow is strengthened by ligaments medially and laterally.
- The radial collateral ligament is found on the lateral side of the joint, extending from the lateral epicondyle, and blending with the annular ligament of the radius (a ligament from the proximal radioulnar joint).
- The ulnar collateral ligament originates from the medial epicondyle, and attaches to the coronoid process and olecranon of the ulna.



► Movement of Joint :

- The orientation of the bones forming the elbow joint produces a hinge type synovial joint, which allows for extension and flexion of the forearm:
 - 1) Extension: triceps brachii and anconeus.
 - 2) Flexion: brachialis, biceps brachii, brachioradialis.

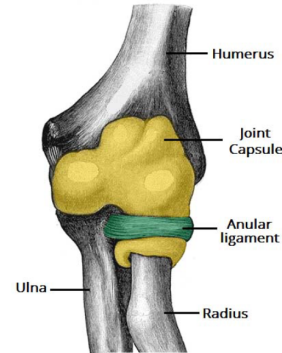
=> Note : pronation and supination do not occur at the elbow – they are produced at the nearby radioulnar joints.



5. Radioulnar joint ;

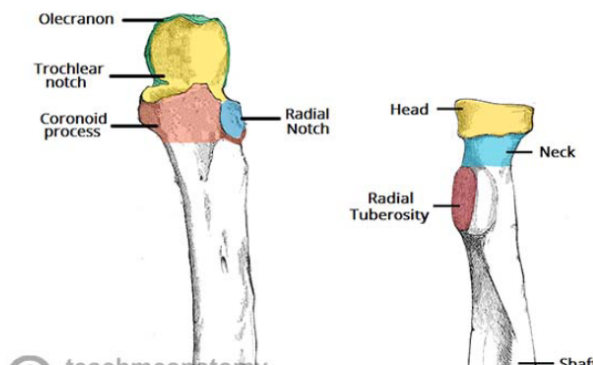
➤ The radioulnar joints are two locations in which the radius and ulna articulate in the forearm:

1. Proximal radioulnar joint.
2. Distal radioulnar joint.



➤ Proximal Radioulnar Joint ,

- The proximal radioulnar joint is located immediately distal to the elbow joint, and is enclosed within the same articular capsule. It is formed by an articulation between the head of the radius and the radial notch of the ulna.
- The radial head is held in place by the annular radial ligament, which forms a 'collar' around the joint. The annular radial ligament is lined with a synovial membrane, reducing friction during movement.
- Movement is produced by the head of the radius rotating within the annular ligament. There are two movements possible at this joint; pronation and supination.
 - i. **Pronation:** Produced by the pronator quadratus and pronator teres.
 - ii. **Supination:** Produced by the supinator and biceps brachii.



➤ Distal Radioulnar Joint ,

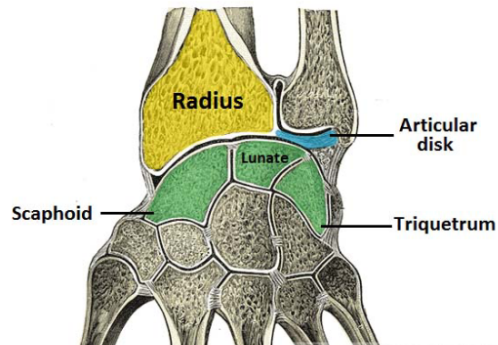
- This distal radioulnar joint is located just proximally to the wrist joint. It is an articulation between the ulnar notch of the radius, and the ulnar head.
- In addition to anterior and posterior ligaments strengthening the joint, there is also a fibrocartilaginous ligament present, called the articular disk. It serves two functions;

a) Binds the radius and ulna together, and holds them together during movement at the joint.

b) Separates the distal radioulnar joint from the wrist joint.

1. **Pronation:** Produced by the pronator quadratus and pronator teres.

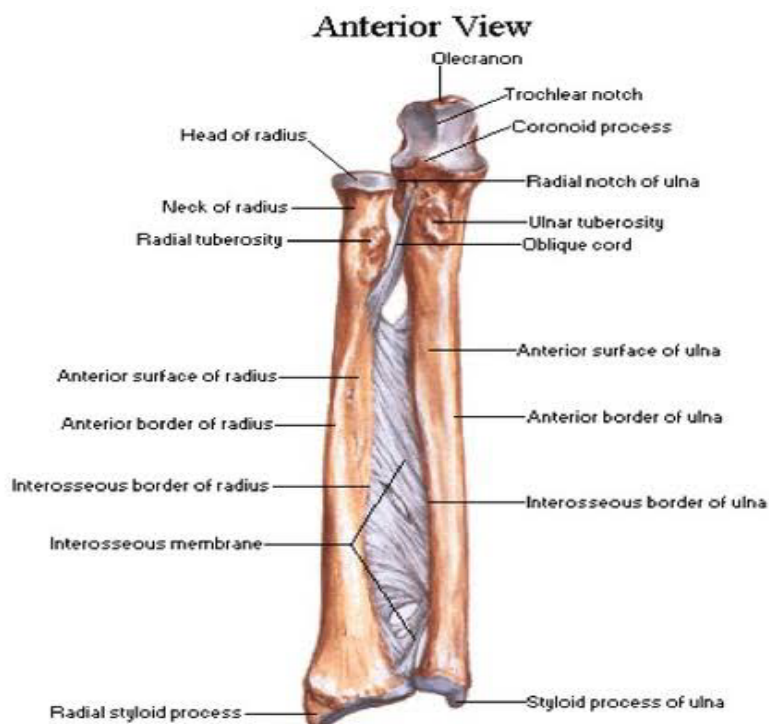
2. **Supination:** Produced by the supinator and biceps brachii.

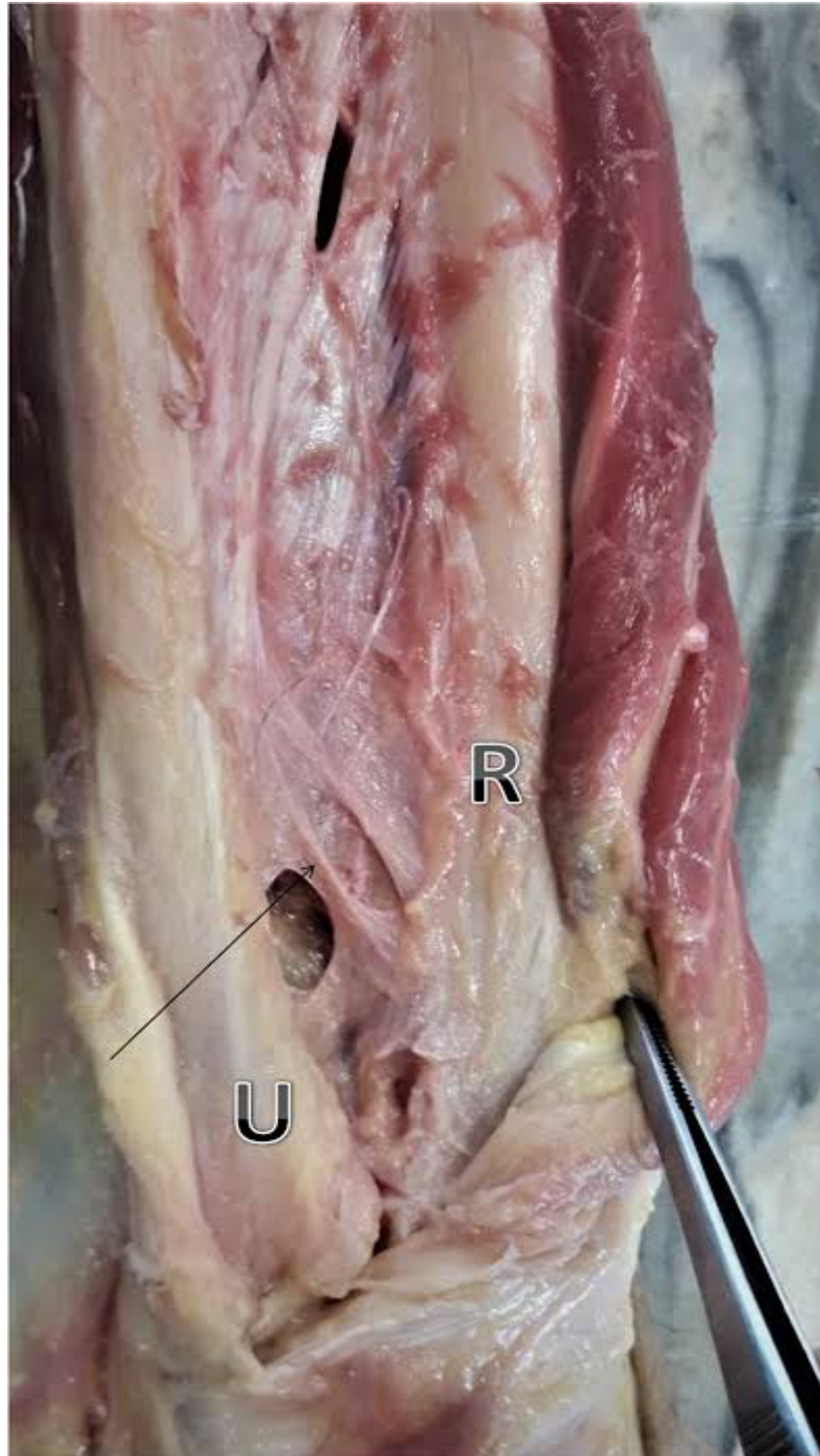


Produced by
and biceps

► Interosseous Membrane ;

- The interosseous membrane is a sheet of connective tissue that joins the radius and ulna together between the radioulnar joints.
- It spans the distance between the medial radial border, and the lateral ulnar border. There are small holes in the sheet, as a conduit for the forearm vasculature.
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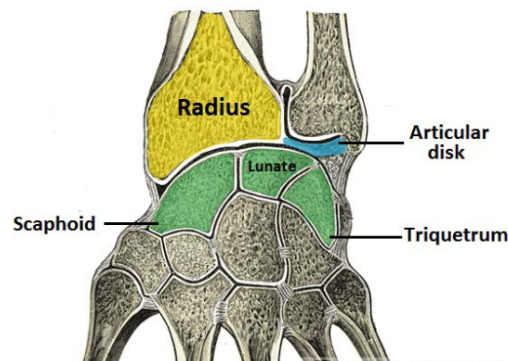


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Wrist Joint ;

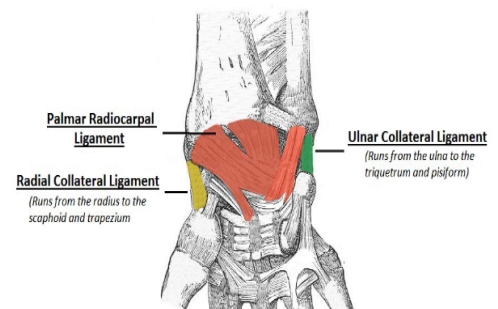
► The wrist joint is formed by:

1. Distally : The proximal row of the carpal bones (except the pisiform).
 2. Proximally – The distal end of the radius, and the articular disk (see below).
- The ulna is not part of the wrist joint – it articulates with the radius, just proximal to the wrist joint, at the distal radioulnar joint. It is prevented from articulating with the carpal bones by a fibrocartilaginous ligament, called the articular disk, which lies over the superior surface of the ulna.
 - Together, the carpal bones form a convex surface, which articulates with the concave surface of the radius and articular disk.



► Joint Capsule :

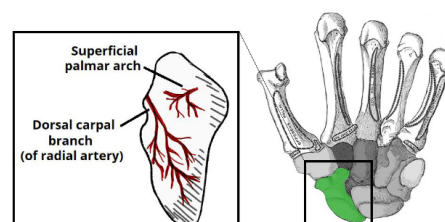
- Like any synovial joint, the capsule is dual layered. The fibrous outer layer attaches to the radius, ulna and the proximal row of the carpal bones.
- The internal layer is comprised of a synovial membrane, secreting synovial fluid which lubricates the joint.



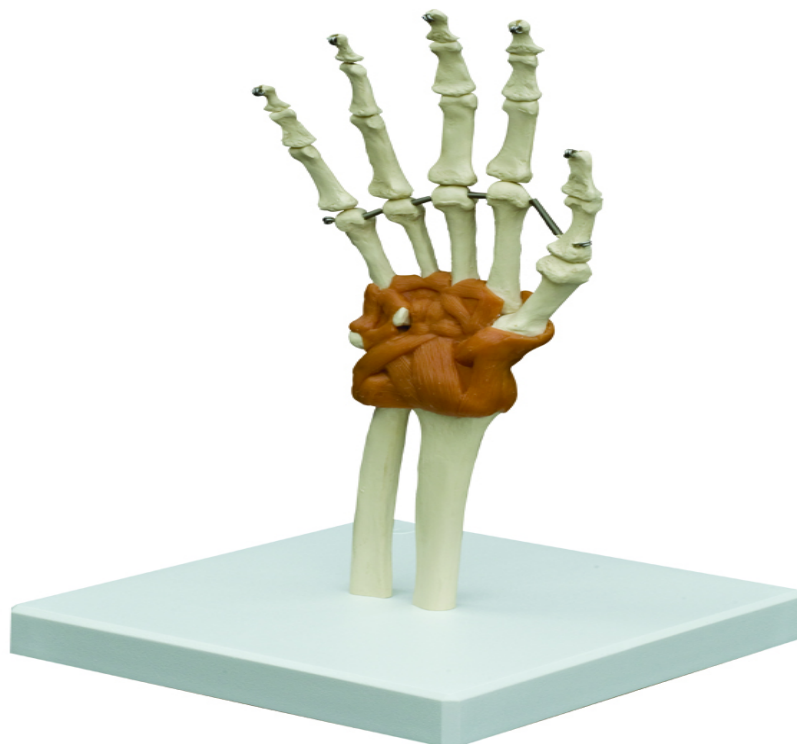
► Ligament :

- There are four ligaments of note in the wrist joint, one for each side of the joint

1. **Palmar radiocarpal** : It is found on the palmar (anterior) side of the hand. It passes from the radius to both rows of carpal bones. Its function, apart from increasing stability, is to ensure that the hand follows the forearm during supination.



2. **Dorsal radiocarpal** : It is found on the dorsum (posterior) side of the hand. It passes from the radius to both rows of carpal bones. It contributes to the stability of the wrist, but also ensures that the hand follows the forearm during pronation.
3. Ulnar collateral – Runs from the ulnar styloid process to the triquetrum and pisiform. Works in union with the other collateral ligament to prevent excessive lateral joint displacement.
4. Radial collateral – Runs from the radial styloid process to the scaphoid and trapezium. Works in union with the other collateral ligament to prevent excessive lateral joint displacement.

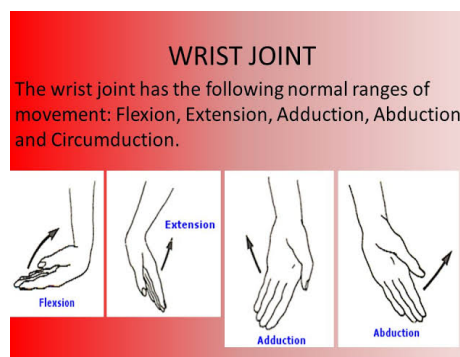


▶ **Neurovascular Supply :**

- a. Median nerve.
- b. Radial nerve.
- c. Ulnar nerve.

▶ **Movements of the Wrist Joint :**

- The wrist is an ellipsoidal (condyloid) type synovial joint, allowing for movement along two axes.
- This means that flexion, extension, adduction and abduction can all occur at the wrist joint.



- All the movements of the wrist are performed by the muscles of the forearm.

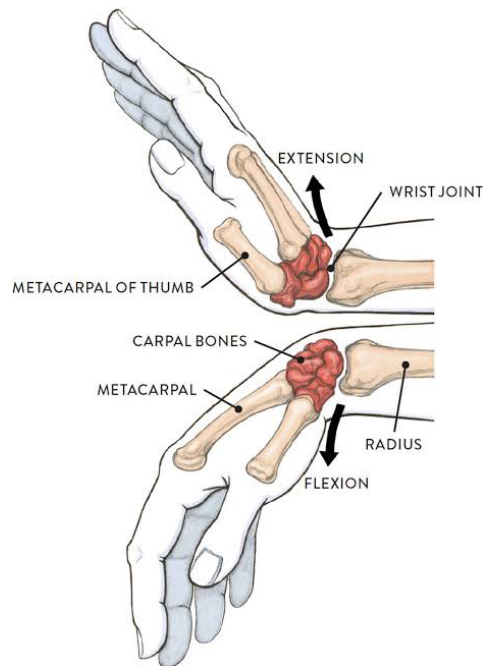
- Flexion.
- Extension.
- Adduction.
- Abduction.

1) **Flexion**: Produced mainly by the flexor carpi ulnaris, flexor carpi radialis, with assistance from the flexor digitorum superficialis.

2) **Extension** : Produced mainly by the extensor carpi radialis longus and brevis, and extensor carpi ulnaris, with assistance from the extensor digitorum.

3) **Abduction** :Produced by the extensor carpi ulnaris and flexor carpi ulnaris

4) **Addiction** : Produced by the abductor pollicis longus, flexor carpi radialis, extensor carpi radialis longus and brevis.



THANK YOU