LAB ASSIGNMENT

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TOPIC : joint of the upper Lamb

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Class : bs- Anesthesia

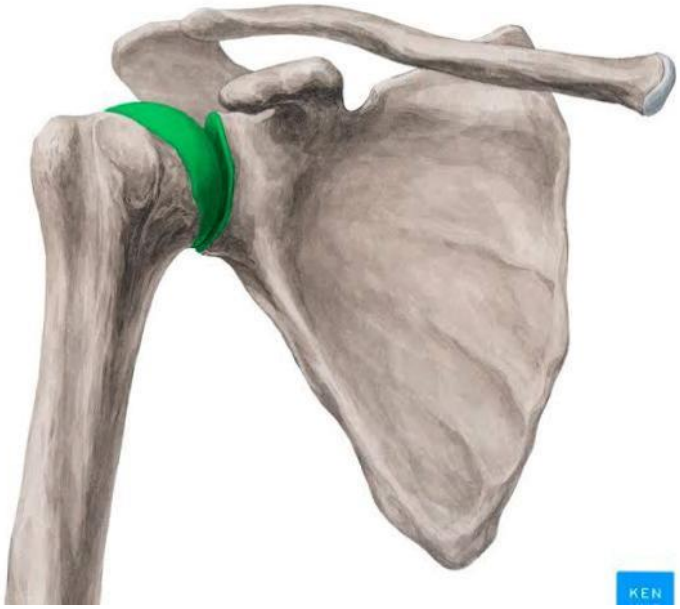
Section : (A)

Joint of the upper lamb

1. Shoulder Joint

The shoulder joint (glenohumeral joint) is a ball and socket joint between the **scapula** and the **humerus**. It is the major joint connecting the upper limb to the trunk.

It is one of the most mobile joints in the human body, at the cost of joint stability. In this article, we shall look at the anatomy of the shoulder joint and its important clinical correlations.

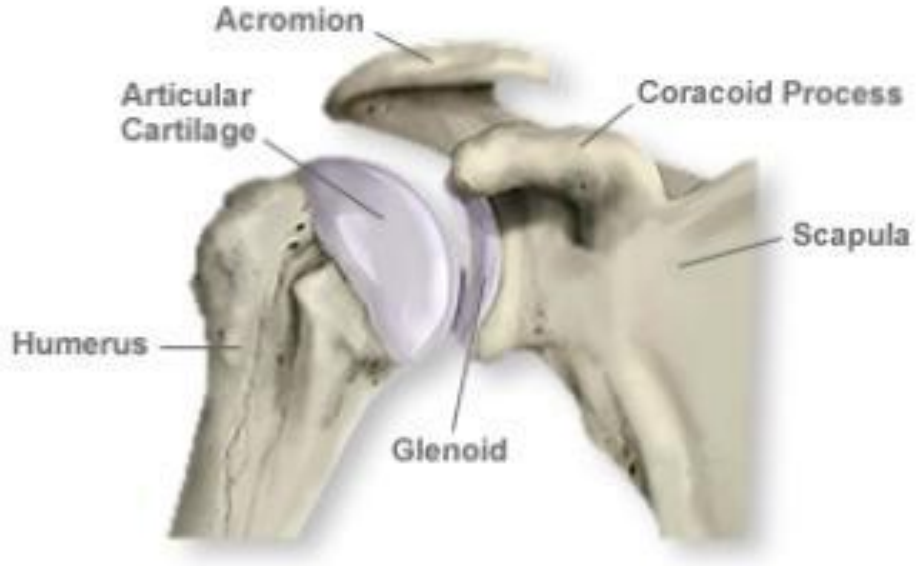


Structure of the shoulder joint

Articulating surface

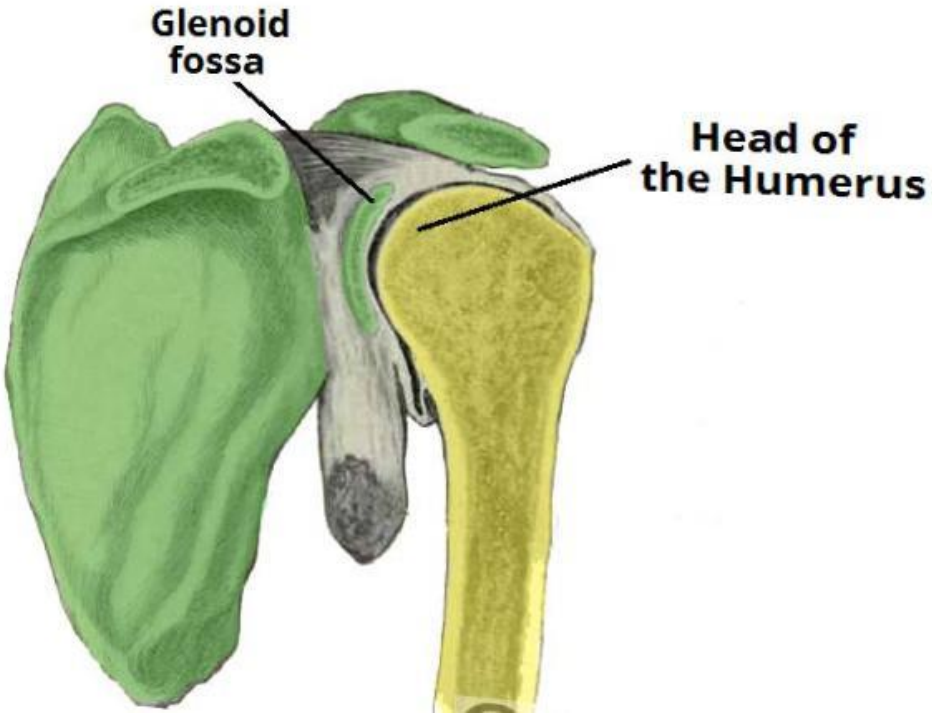
The shoulder joint is formed by the articulation of the head of the humerus with the glenoid cavity (or fossa) of the scapula. This gives rise to the alternate name for the shoulder joint – the glenohumeral joint.

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.



The major bursae of the shoulder 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).

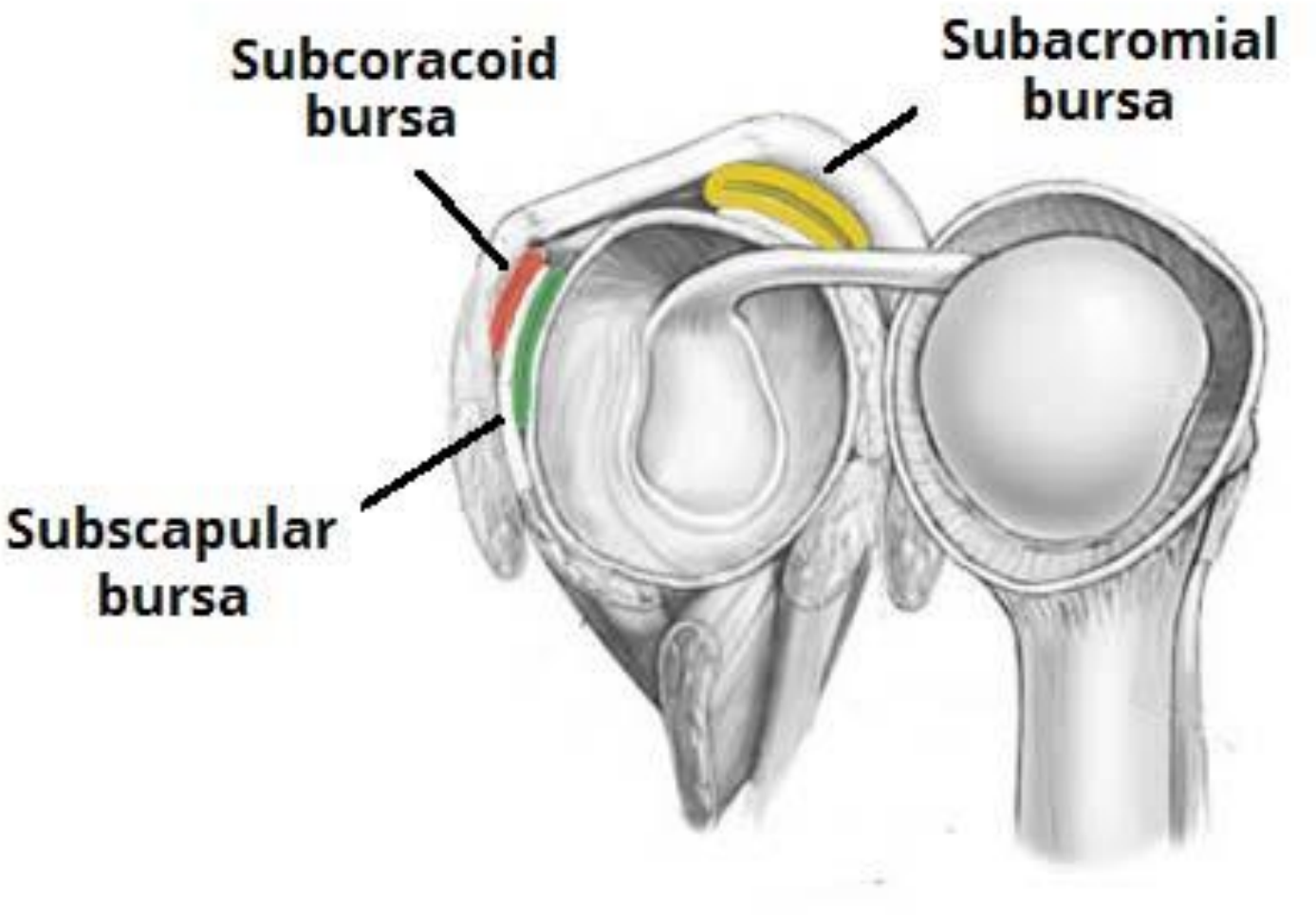
The **synovial membrane** lines the inner surface of the joint capsule, and produces synovial fluid to reduce friction between the articular surfaces.

To reduce friction in the shoulder joint, several **synovial bursae** are present. A bursa is a synovial fluid filled sac, which acts as a cushion between tendons and other joint structures.

The bursae that are important clinically are:

- **Subacromial** – located deep to the deltoid and acromion, and superficial to the supraspinatus tendon and joint capsule. The subacromial bursa reduces friction beneath the deltoid, promoting free motion of the rotator cuff tendons. Subacromial bursitis (i.e. inflammation of the bursa) can be a cause of shoulder pain.
- **Subscapular** – located between the subscapularis tendon and the scapula. It reduces wear and tear on the tendon during movement at the shoulder joint.

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

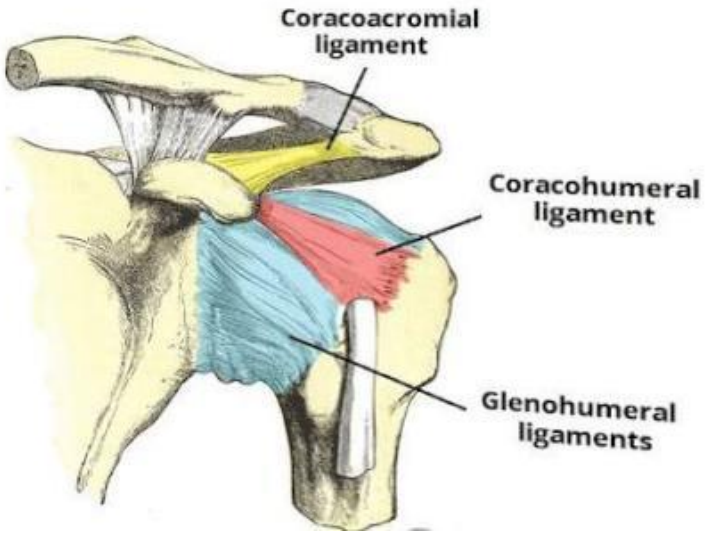


The major bursae of the shoulder joint.

Ligaments

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

- **Glenohumeral ligaments** (superior, middle and inferior) – the joint capsule is formed by this group of ligaments connecting the humerus to the glenoid fossa. They are the main source of stability for the shoulder, holding it in place and preventing it from dislocating anteriorly. They act to stabilise the anterior aspect of the joint.



The ligaments of the shoulder joint

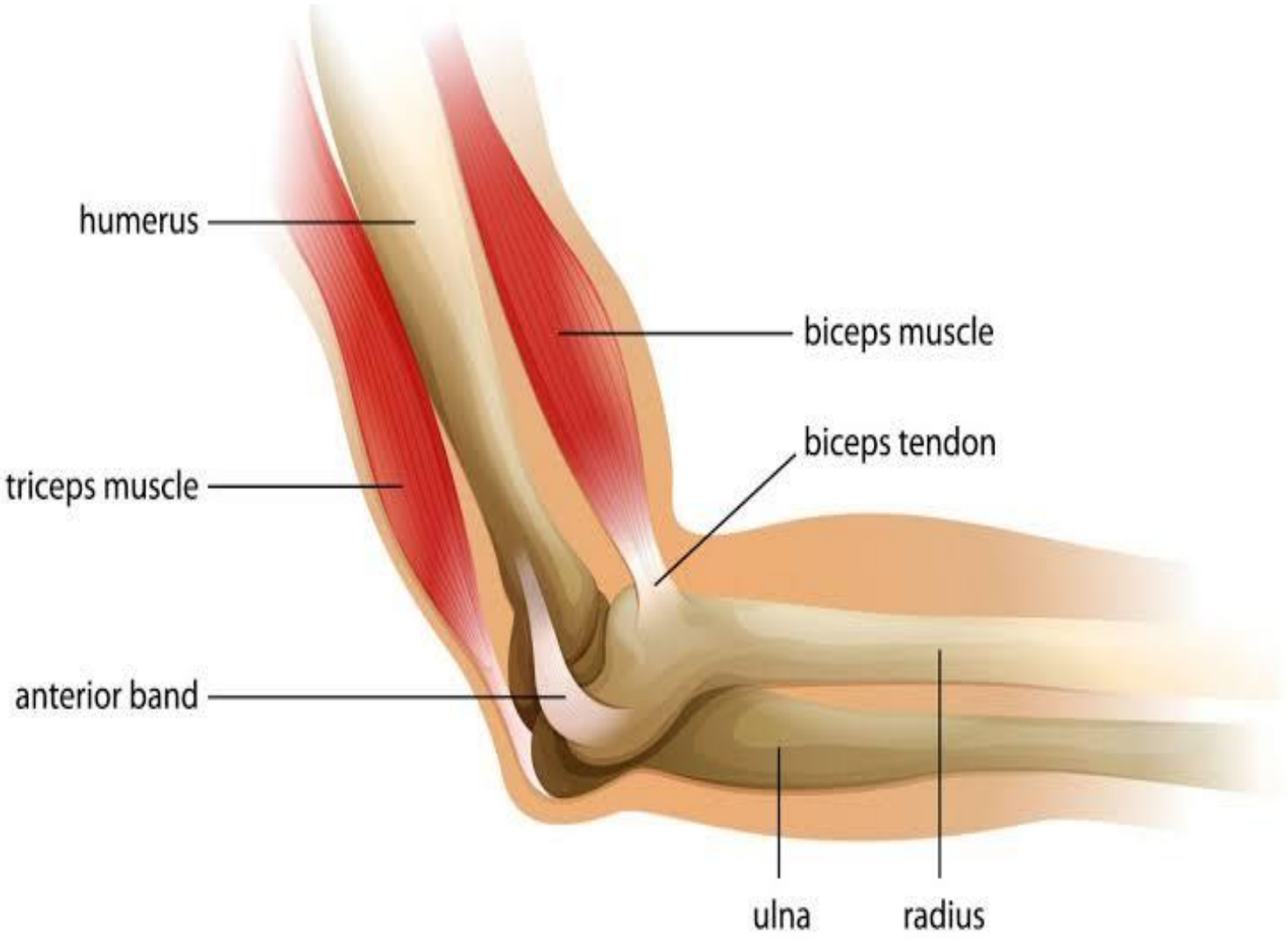
- ***Coracohumeral ligament*** – attaches the base of the coracoid process to the greater tubercle of the humerus. It supports the superior part of the joint capsule.
- ***Transverse humeral ligament*** – spans the distance between the two tubercles of the humerus. It holds the tendon of the long head of the biceps in the intertubercular groove.]
- ***Coraco–clavicular ligament*** – composed of the trapezoid and conoid ligaments and runs from the clavicle to the coracoid process of the scapula. They work alongside the acromioclavicular ligament to maintain the alignment of the clavicle in relation to the scapula. They have significant strength but large forces (e.g. after a high energy fall) can rupture these ligaments as part of an acromio-clavicular joint (ACJ) injury. In severe ACJ injury, the coraco-clavicular ligaments may require surgical repair.

The other major ligament is the **coracoacromial ligament.** Running between the acromion and coracoid process of the scapula it forms the **coraco-acromial** arch. This structure overlies the shoulder joint, preventing superior displacement of the humeral head.

2. ELBOW JOINT

The **elbow** is the joint connecting the upper arm to the forearm. It is classed as a hinge-type synovial joint.

In this article, we shall look at the anatomy of the elbow joint; its articulating surfaces, movements, stability, and the clinical relevance.



Structures of the Elbow Joint

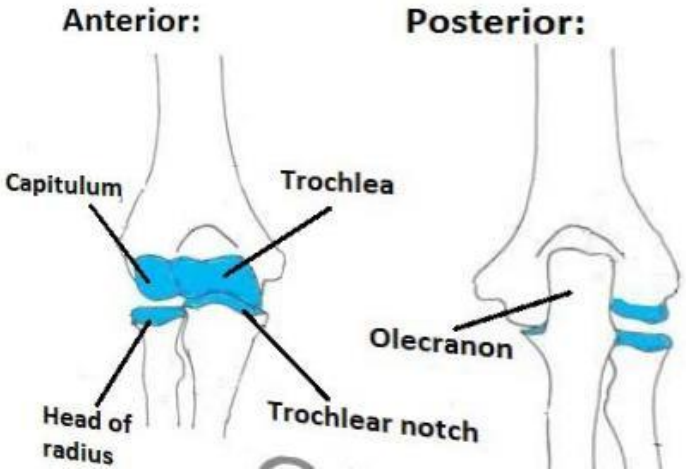
Articulating surface

It consists of two separate articulations:

- Trochlear notch of the **ulna** and the trochlea of the **humerus**

- 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.



Anterior and posterior views of the articulations of the elbow joint

Joint Capsule and Bursae

Like all synovial joints, the elbow joint has a capsule enclosing the joint. This in itself is strong and fibrous, strengthening the joint. The joint capsule is thickened medially and laterally to form collateral ligaments, which stabilise the flexing and extending motion of the arm.

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:

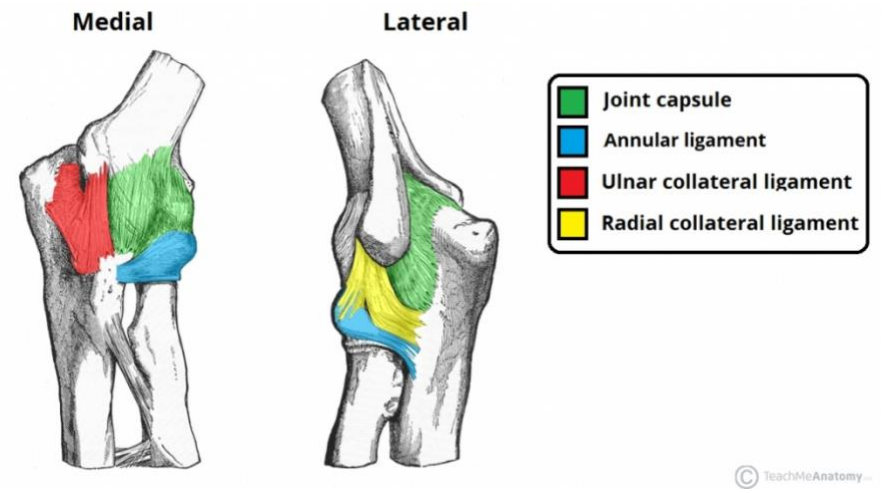
- ***Intratendinous*** – located within the tendon of the triceps brachii.
- ***Subtendinous*** – between the olecranon and the tendon of the triceps brachii, reducing friction between the two structures during extension and flexion of the arm.
- ***Subcutaneous*** (olecranon) bursa – between the olecranon and the overlying connective tissue (implicated in olecranon bursitis).

Ligaments

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 l**igament originates from the **medial epicondyle**, and attaches to the coronoid process and olecranon of the ulna.



Ligaments of the elbow joint.

Movements of the Joint

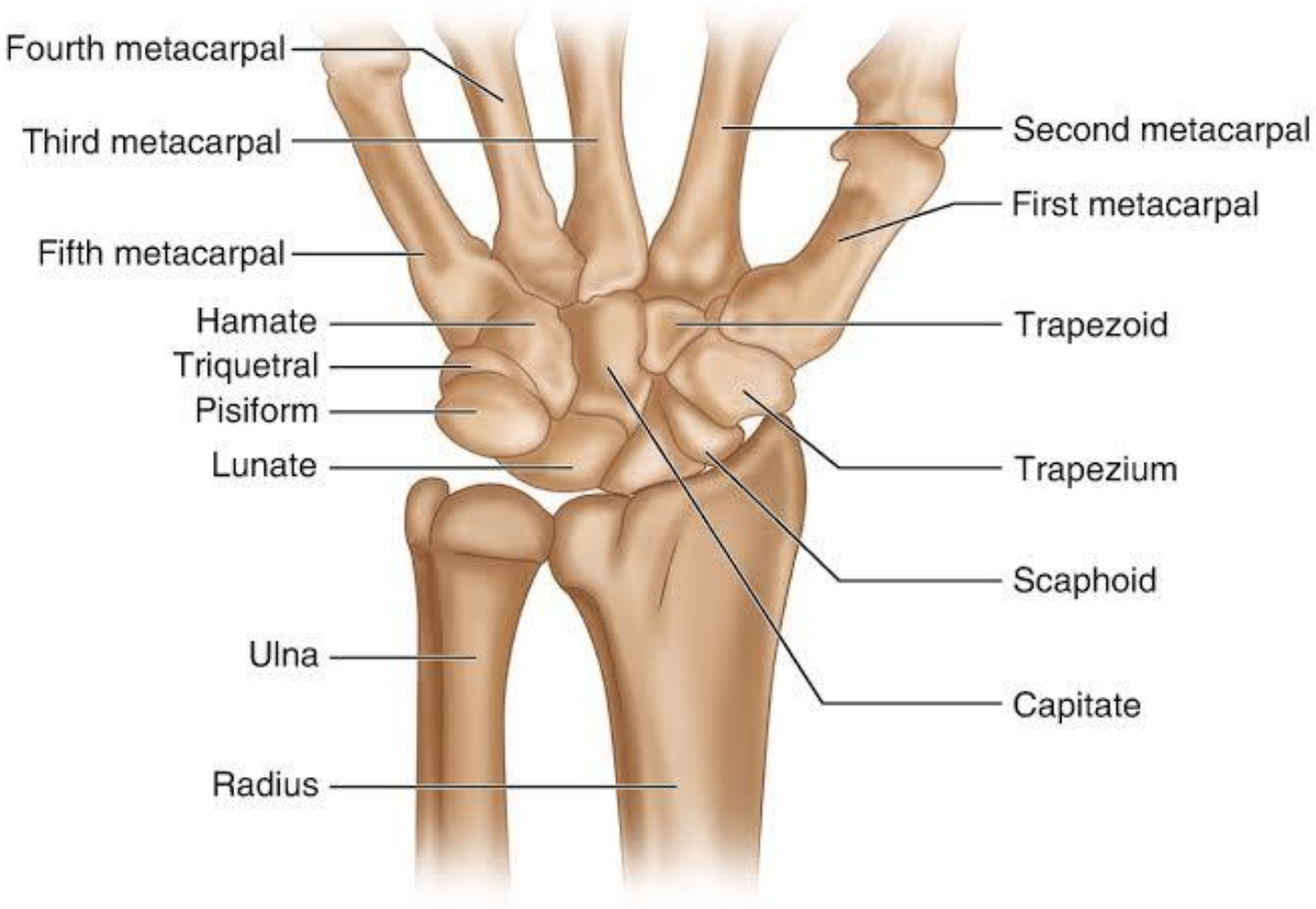
The orientation of the bones forming the elbow joint produces a hinge type synovial joint, which allows for extension and flexion of the forearm:

- **Extension** – triceps brachii and anconeus
- **Flexion** – brachialis, biceps brachii, brachioradialis

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

3. WRIST JOINT

The wrist joint (also known as the radiocarpal joint) is a synovial joint in the upper limb, marking the area of transition between the forearm and the hand.



Structures of the Wrist Joint

Articulating surface

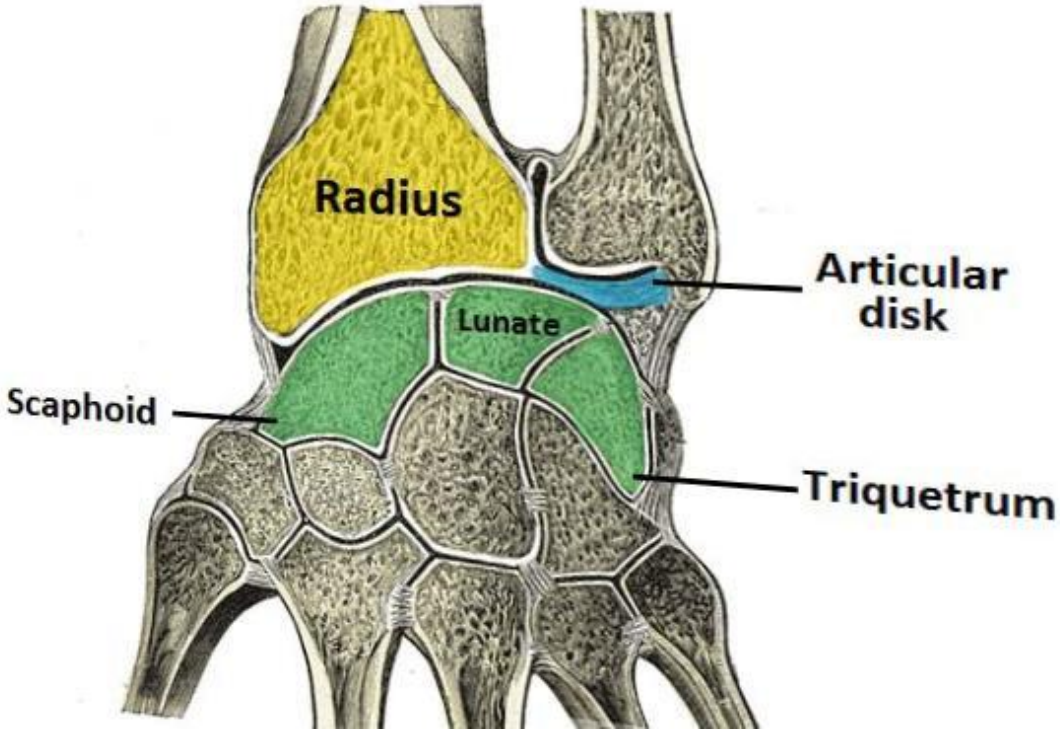
The wrist joint is formed by:

Distally – The proximal row of the carpal bones (except the pisiform).

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.



Articular surfaces of the wrist joint.

Joint Capsule

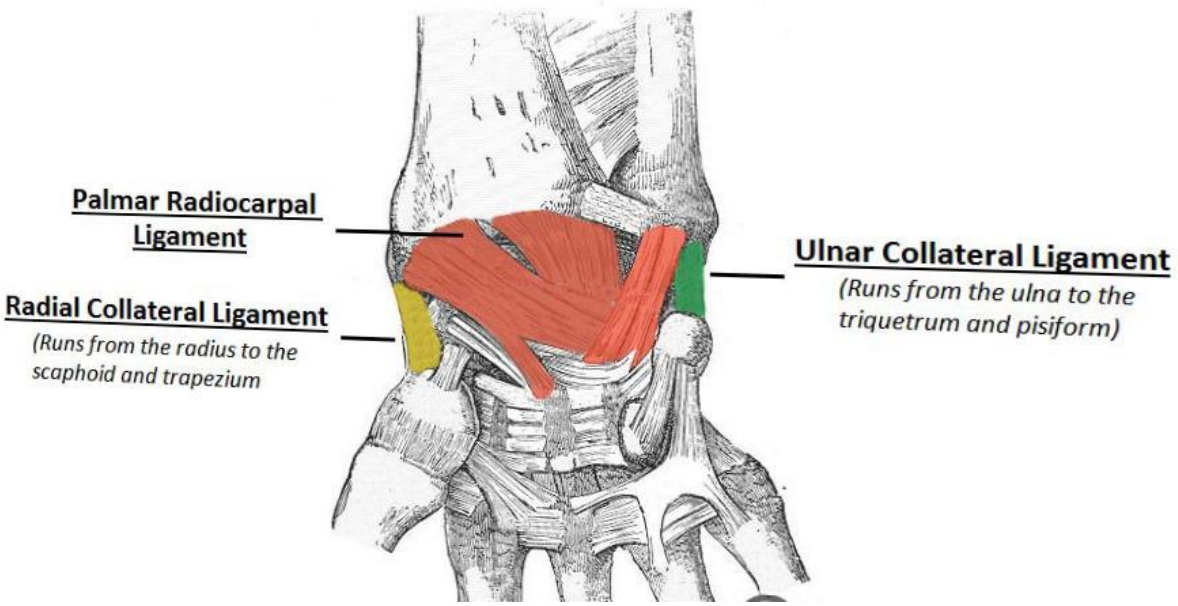
Like any synovial joint, the capsule is dual layered. The fibrous outer layer attaches to the radius, ulna and the proximal row of the carpal bones. The internal layer is comprised of a synovial membrane, secreting synovial fluid which lubricates the joint.

Ligaments

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

- **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.
- **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.

- **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.
- **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.



Palmar view of the ligaments of the wrist joint