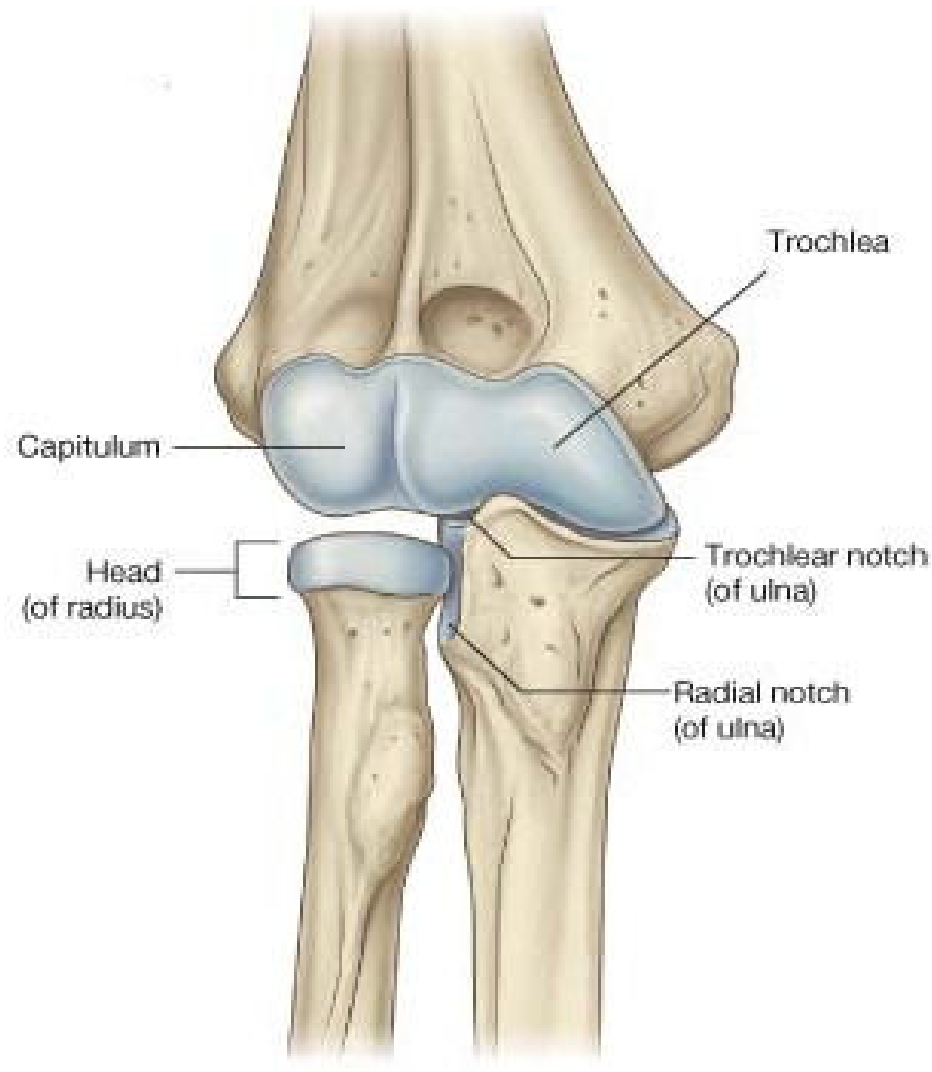
Learning Objectives

- Normal Anatomy Of joint- Elbow, raioulnar,wrist and first carpometacarpal joint.
- Important relations of joints
- Muscles producing different movements of joints
- Applied anatomy

ELBOW JOINT



Type

Synovial / Hinge

compound as it has two articulations

i)humero – ulnar &

ii)humero – radial

Articular surfaces

1. Humerus –by trochlea & capitulum
2. Ulna – trochlear notch
3. Radius – head

Ligaments:

Fibrous capsule

Ulnar collateral ligament

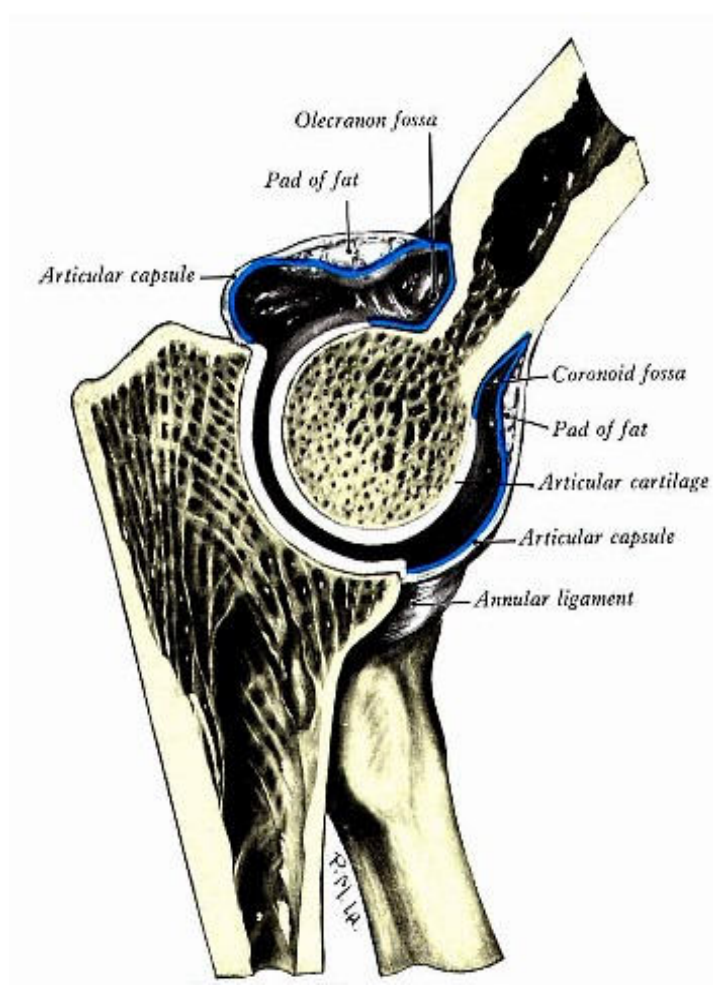
a. Anterior band

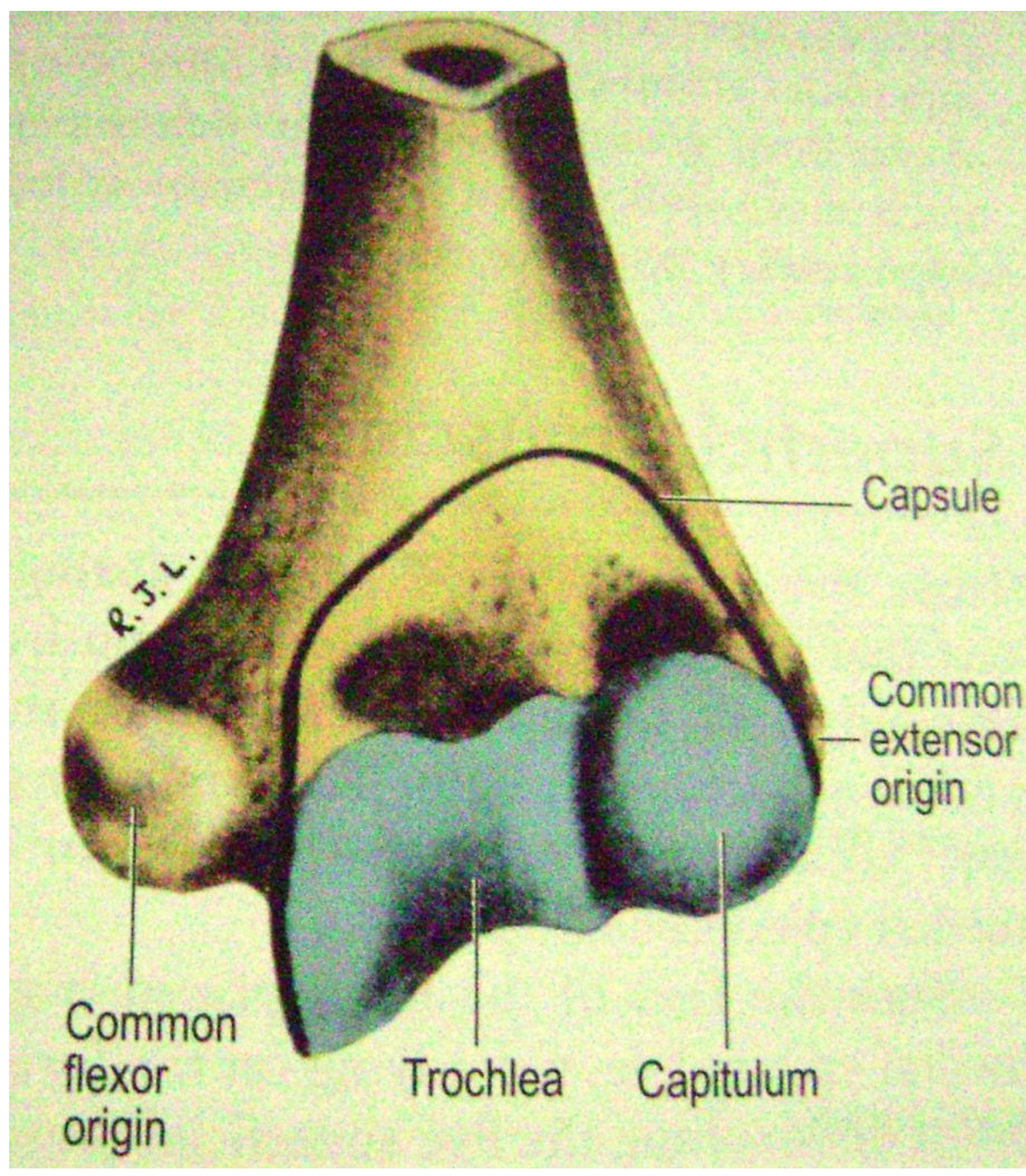
b. Posterior band

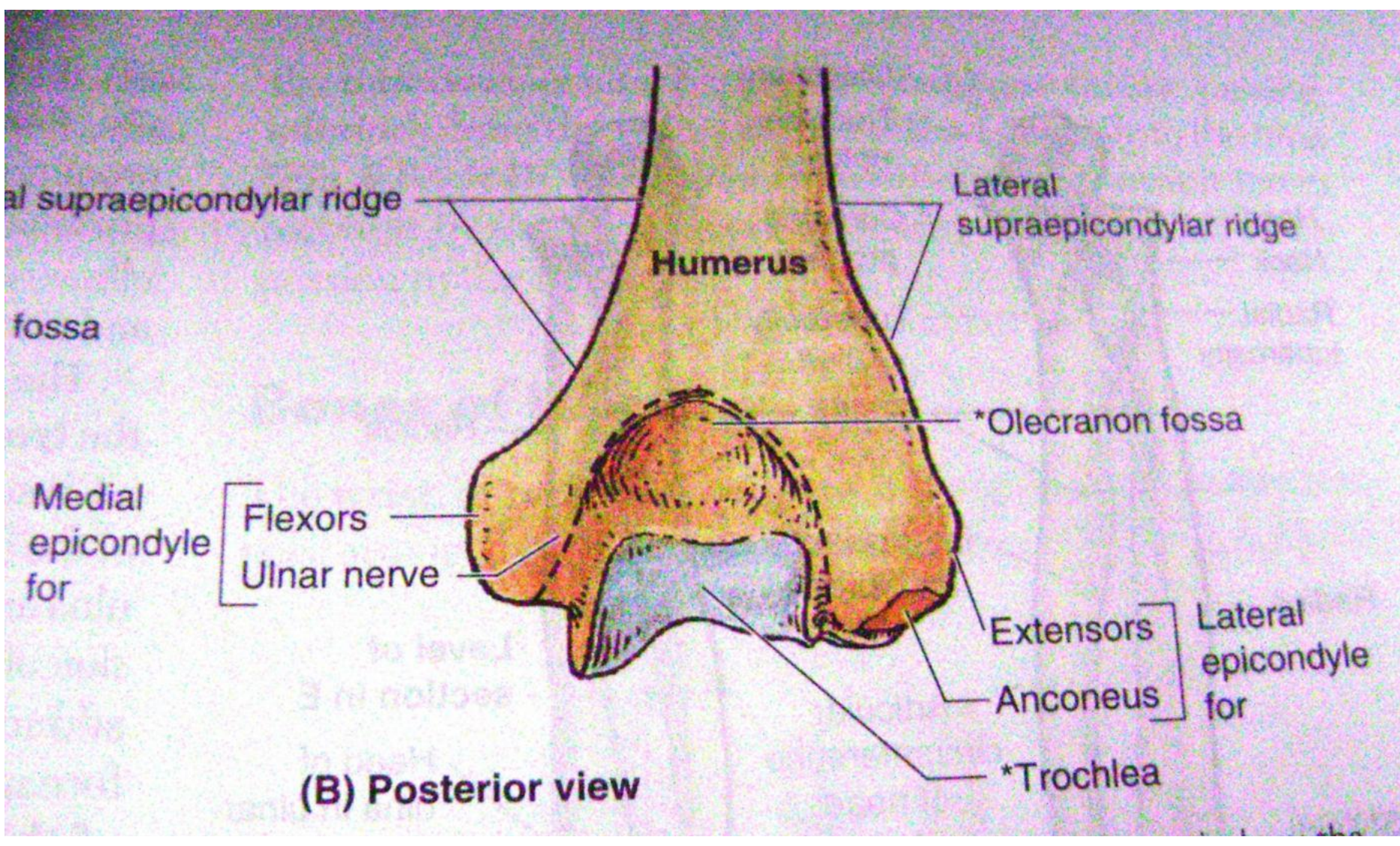
c. Oblique band

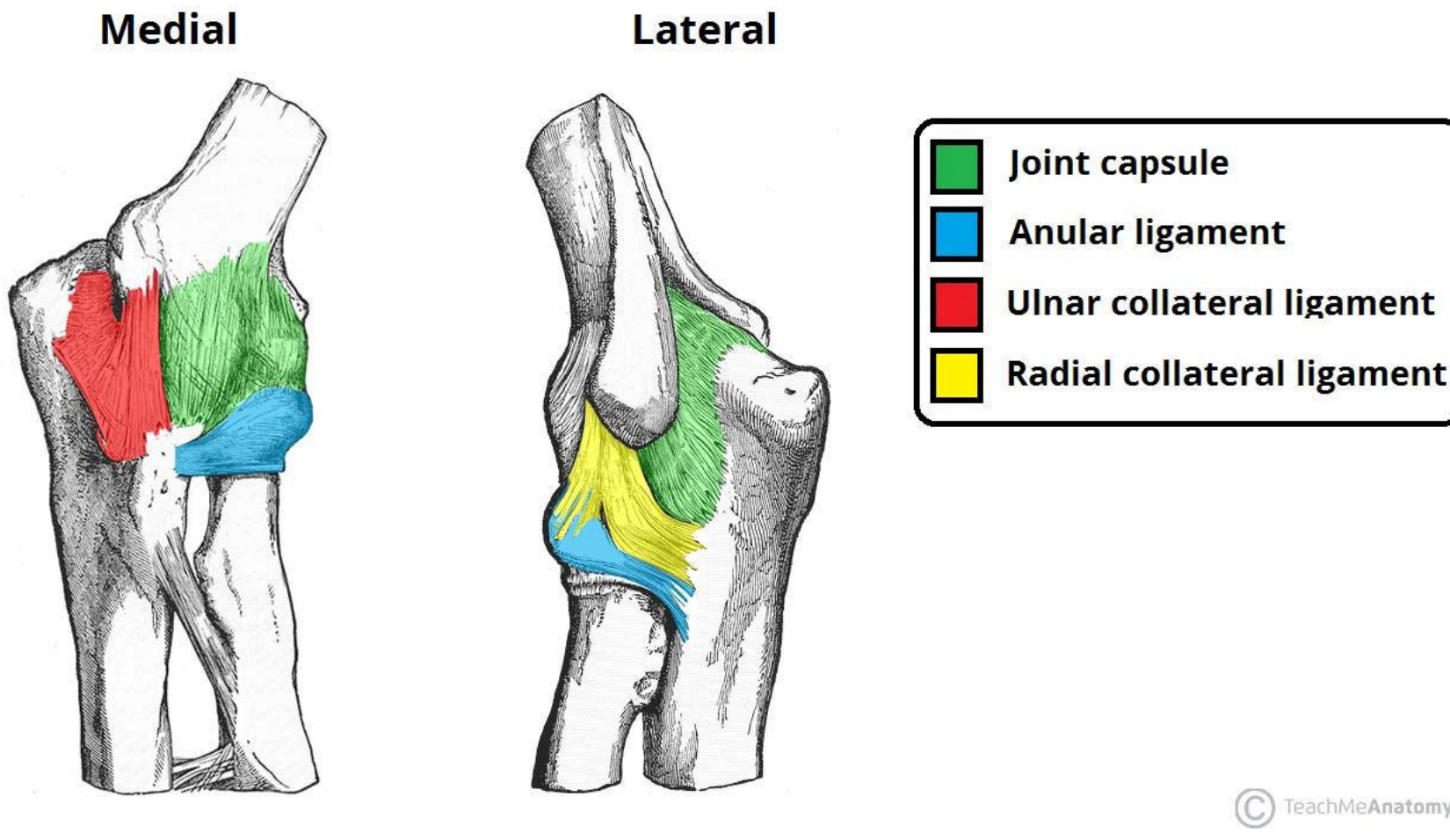
Radial collateral ligament

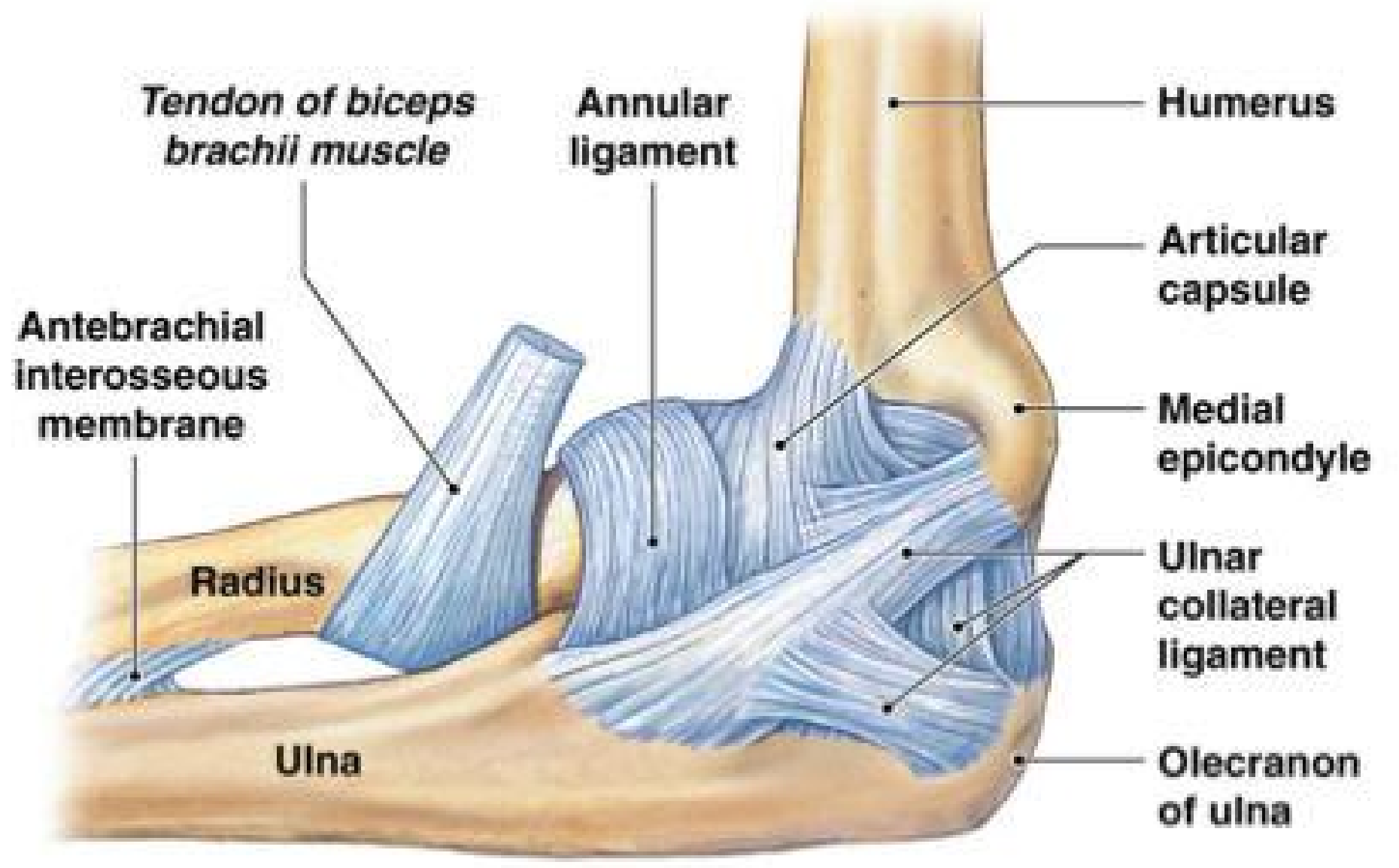
Synovial membrane



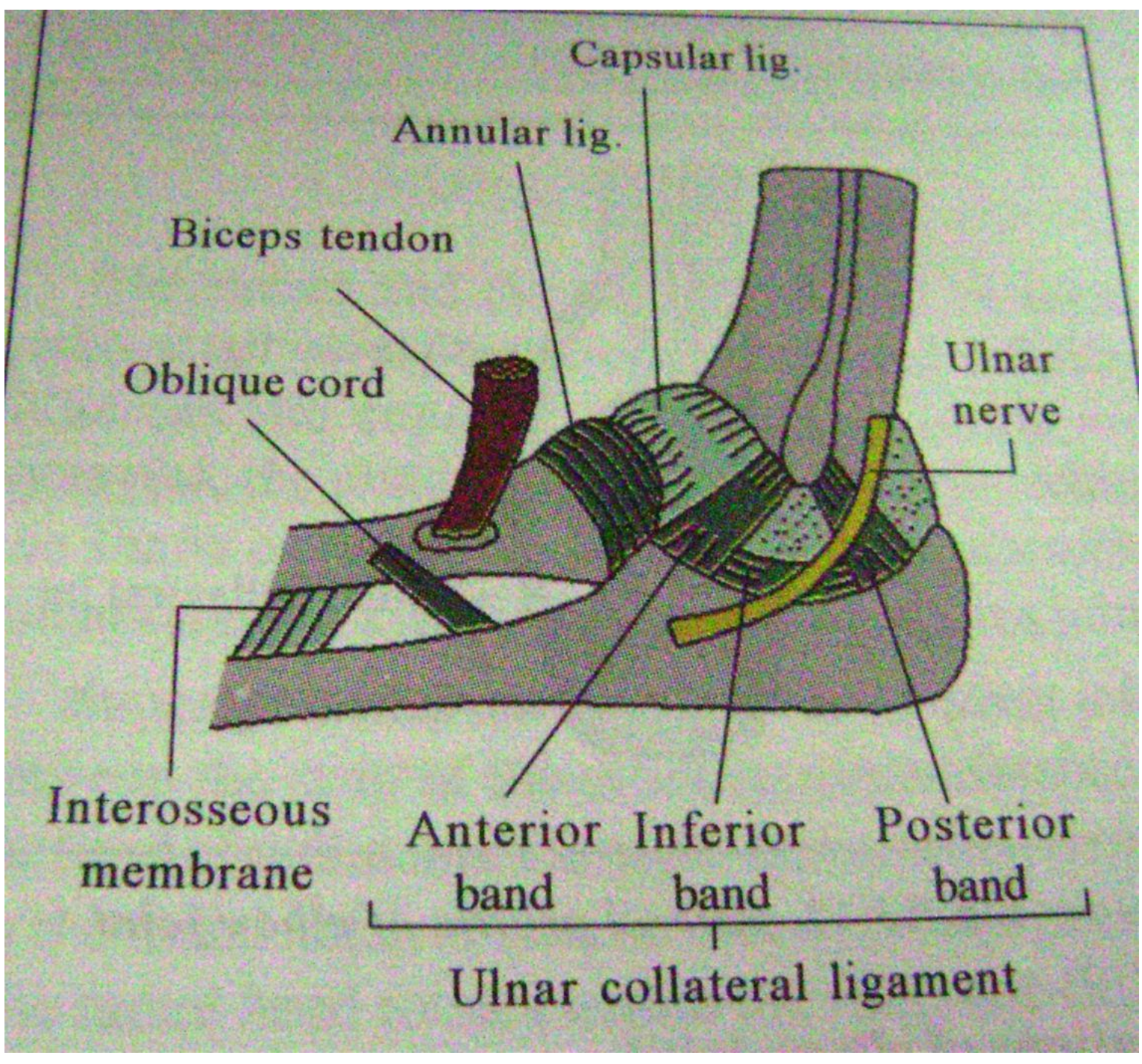


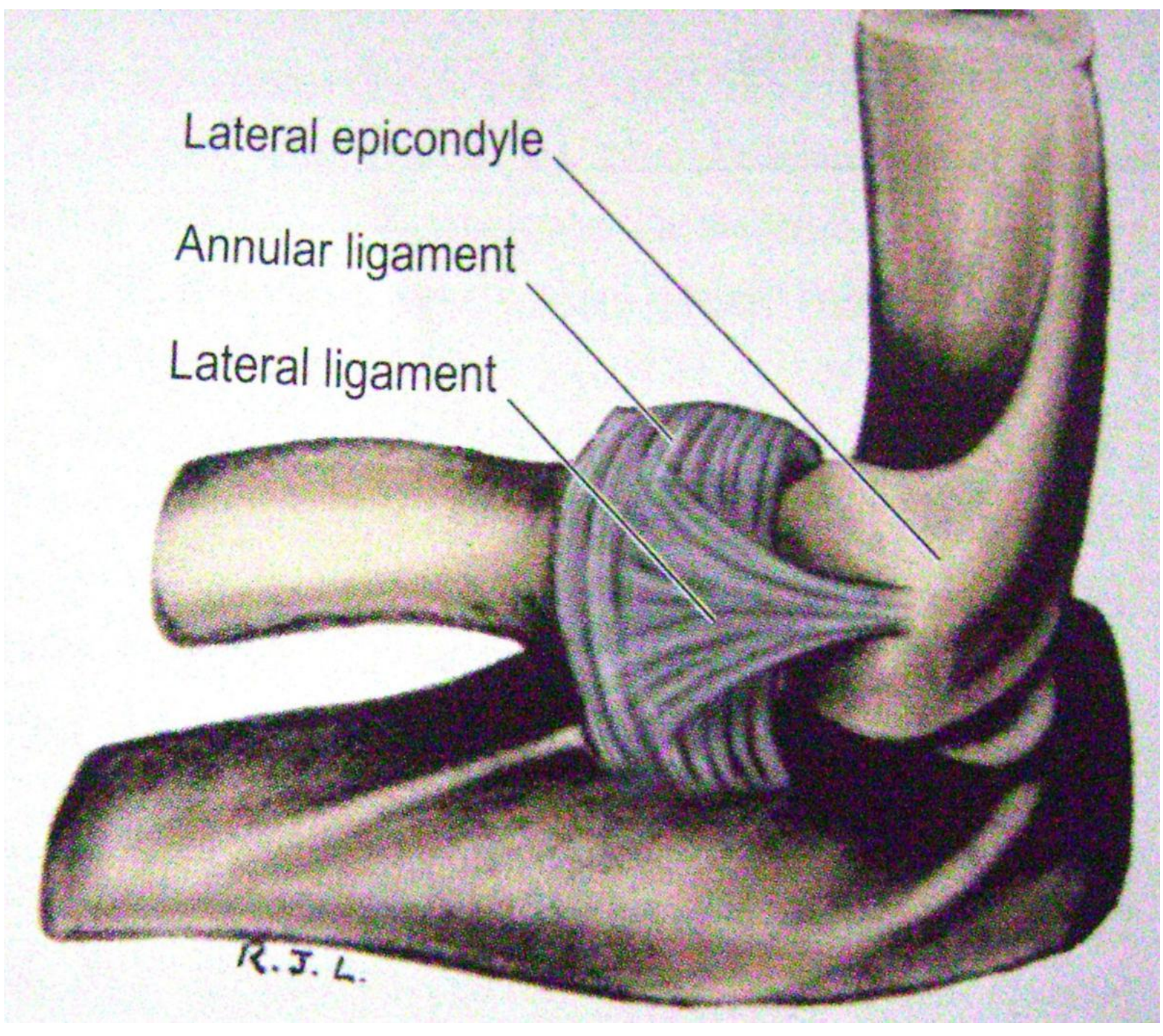


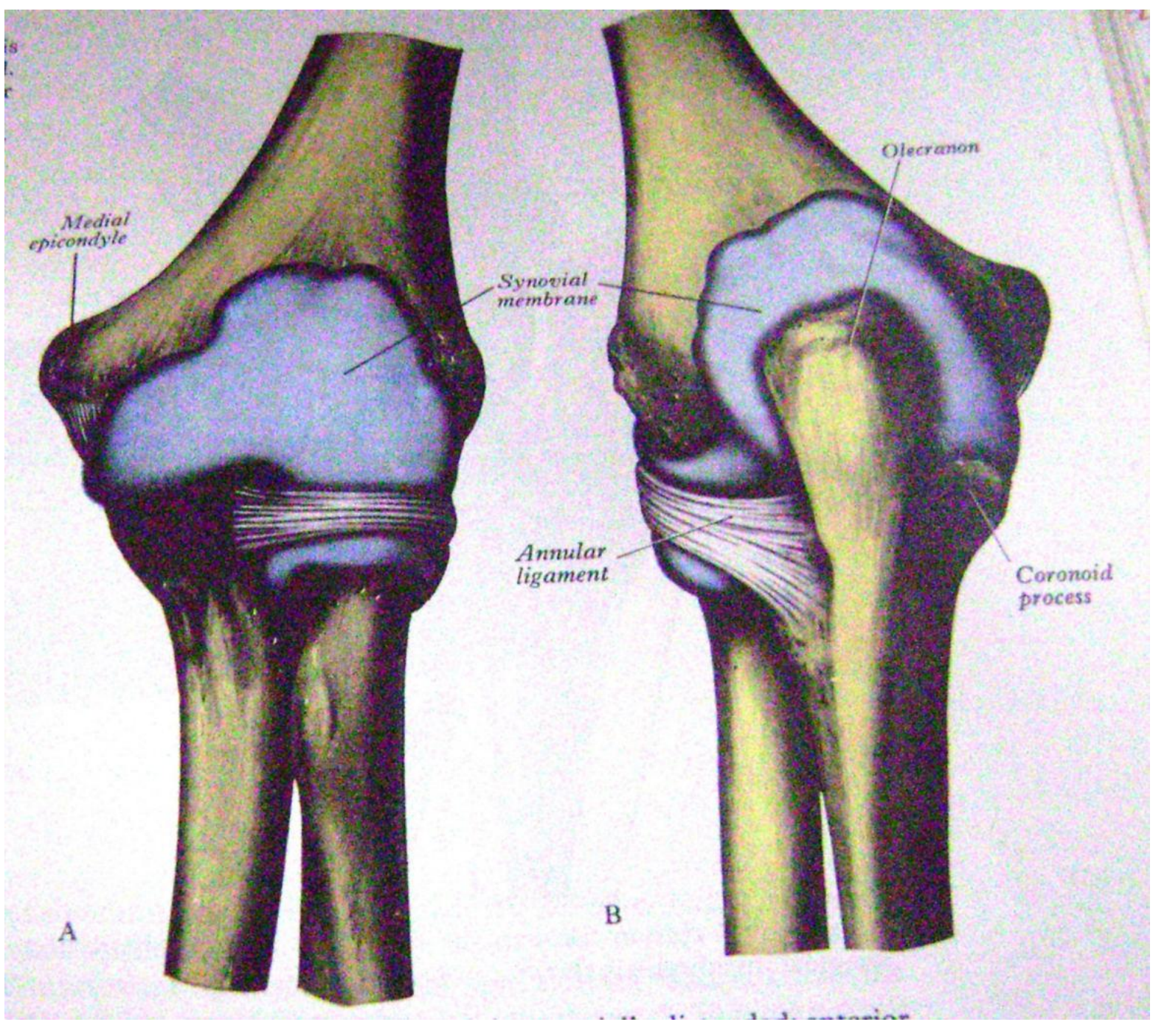


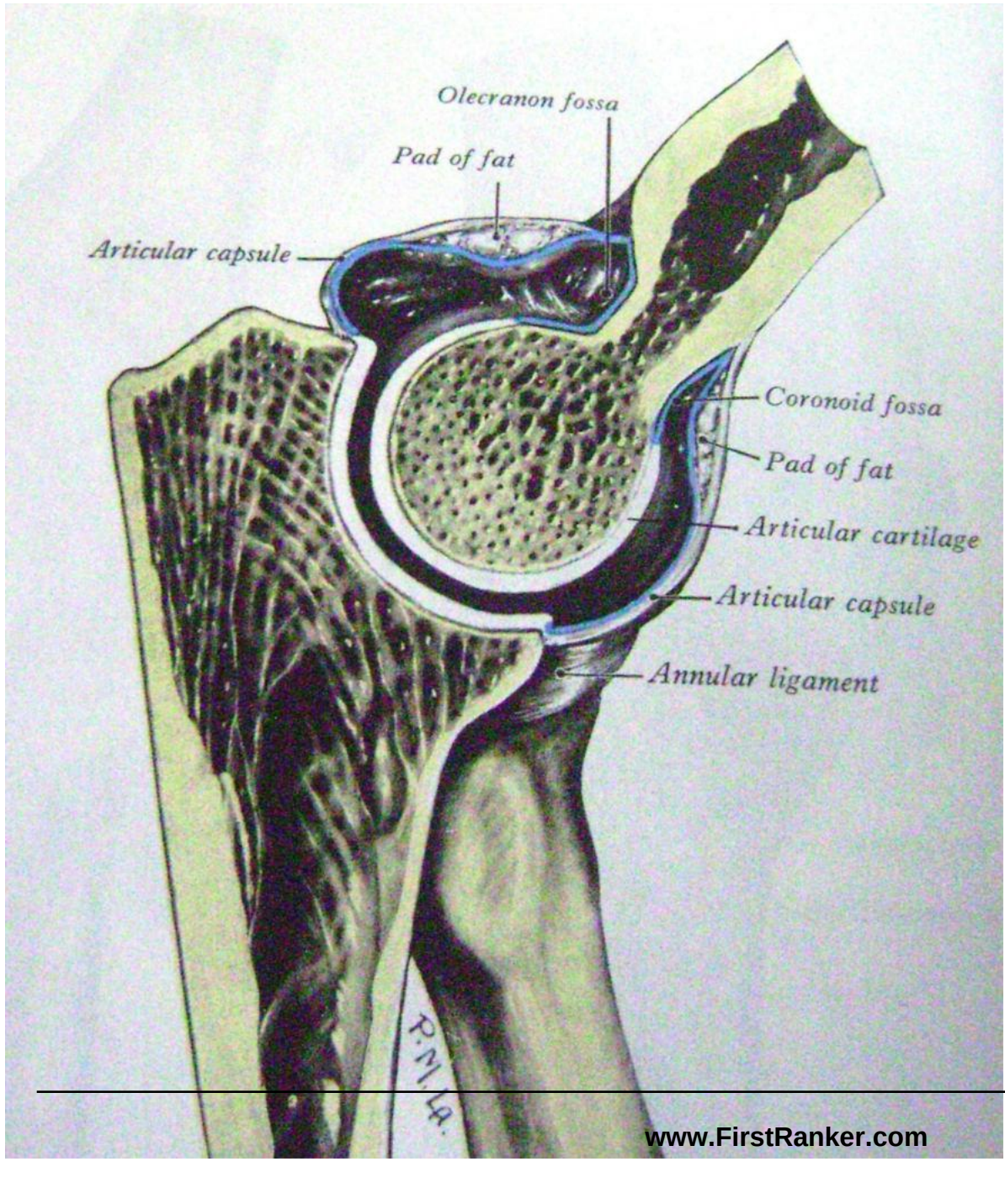


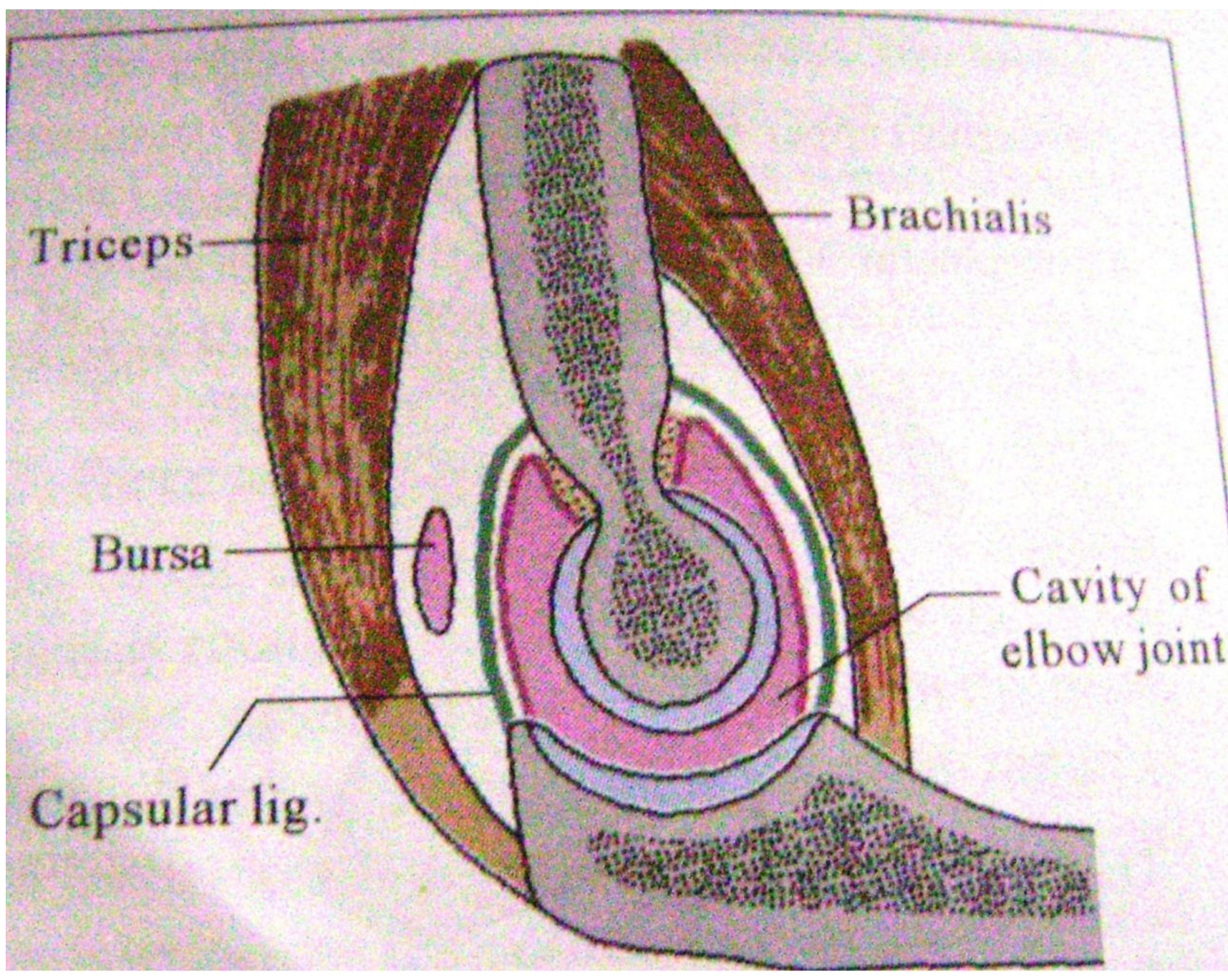
Articular Capsule of Elbow Joint











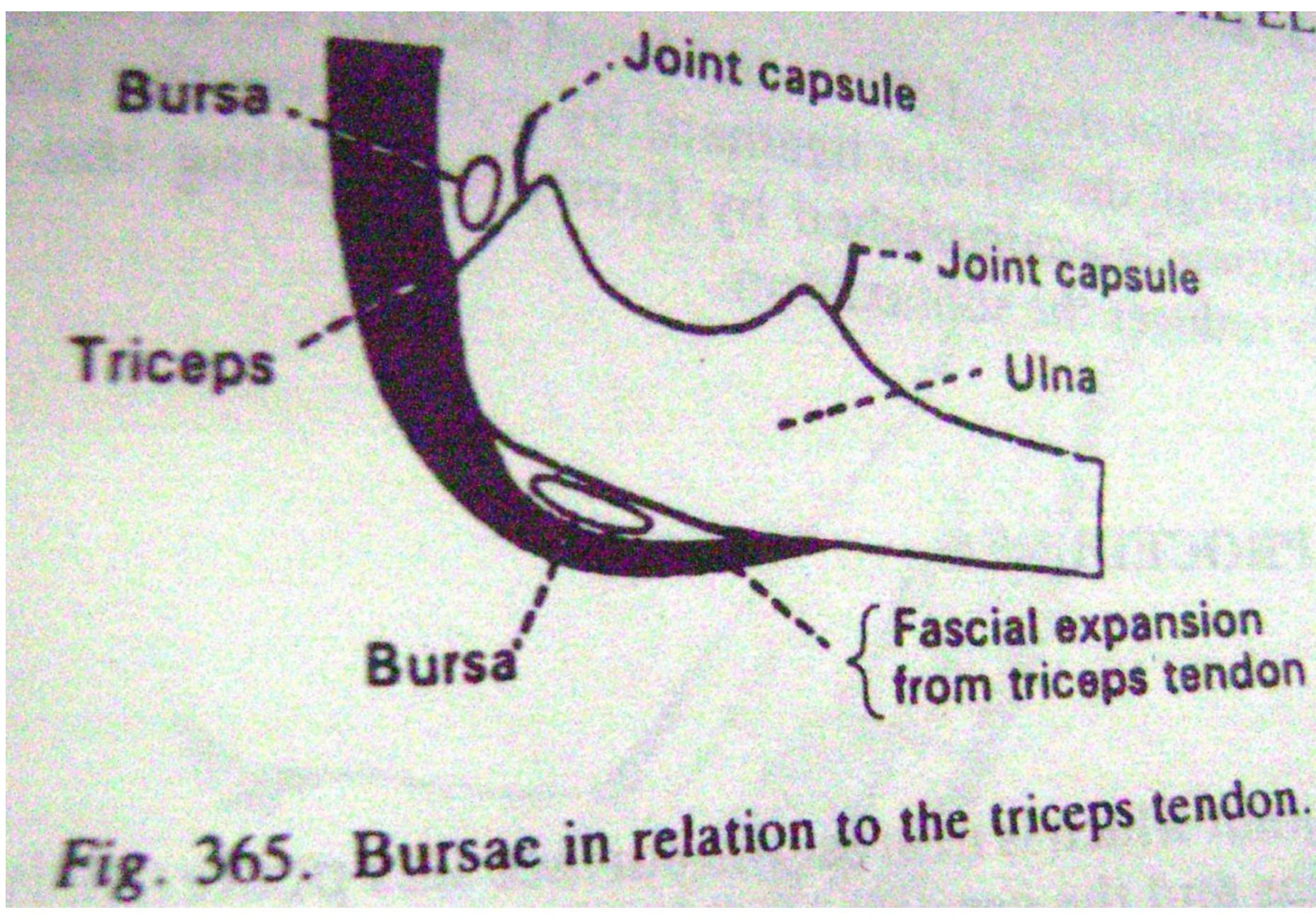
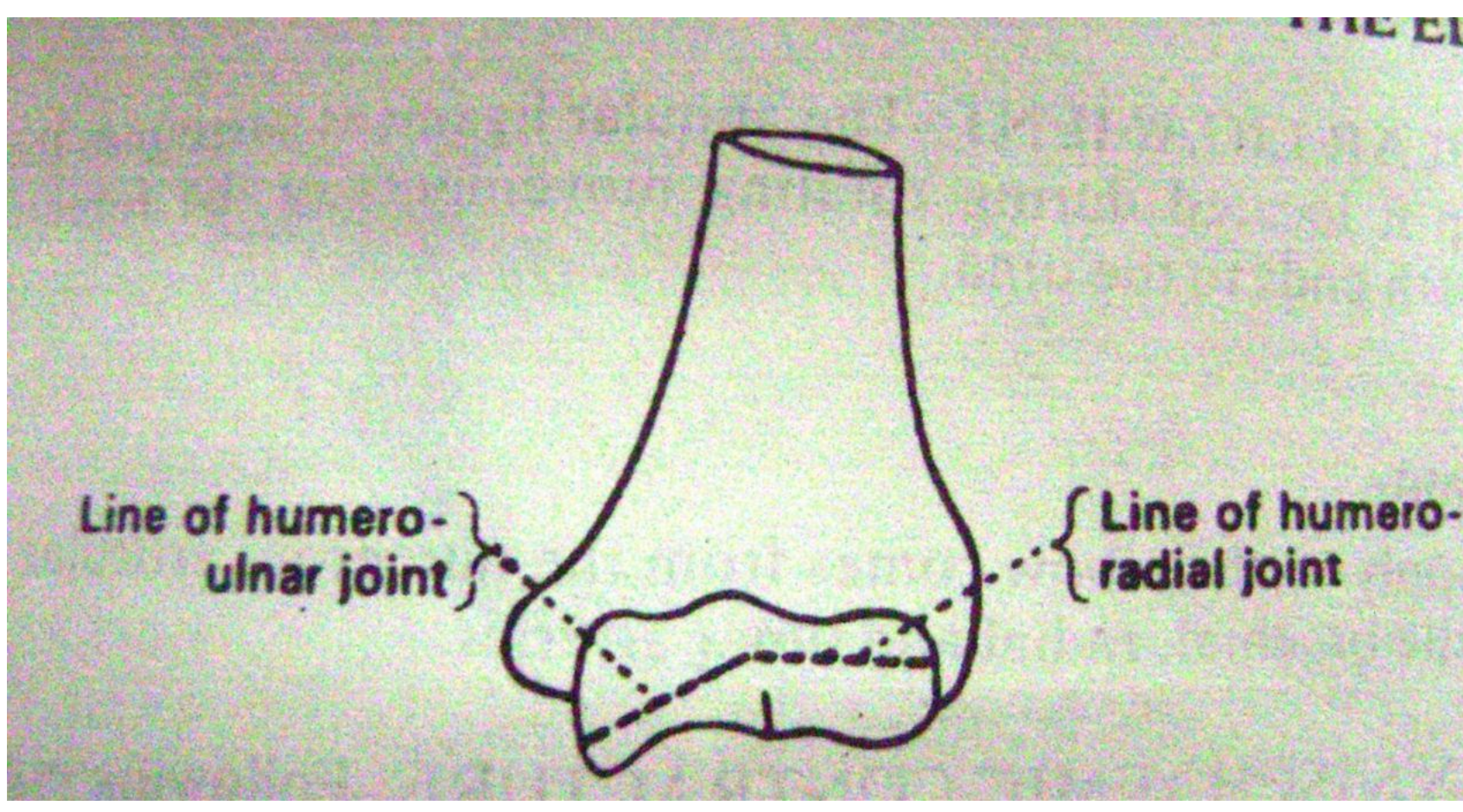
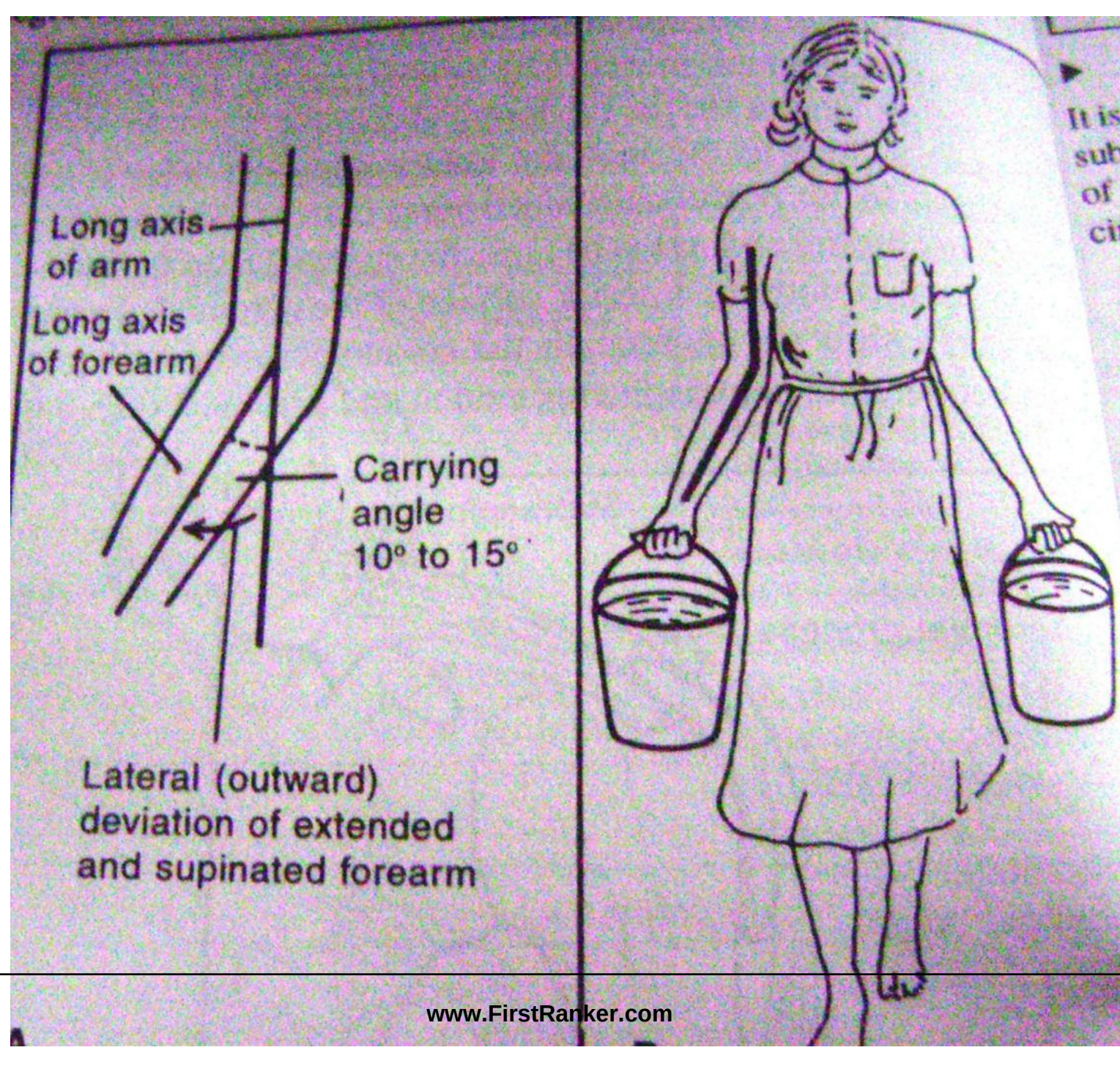
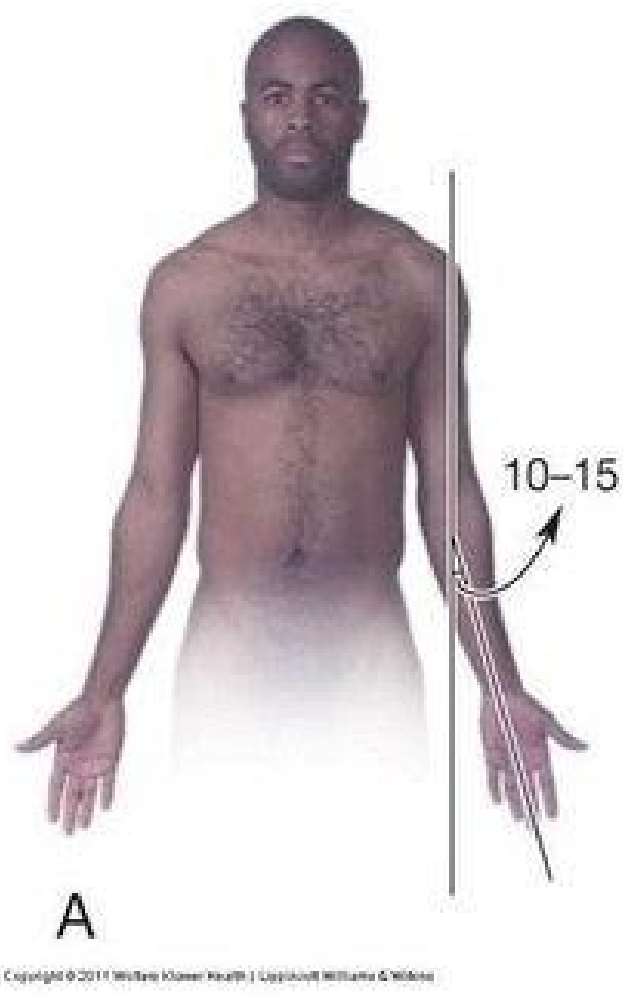


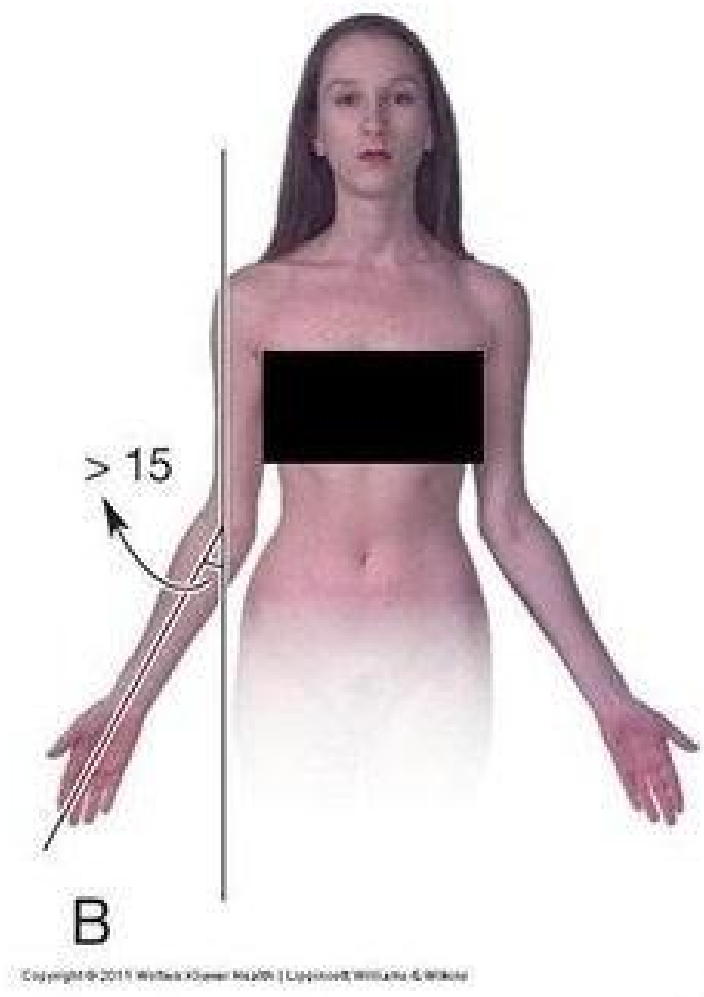
Fig. 365. Bursae in relation to the triceps tendon.

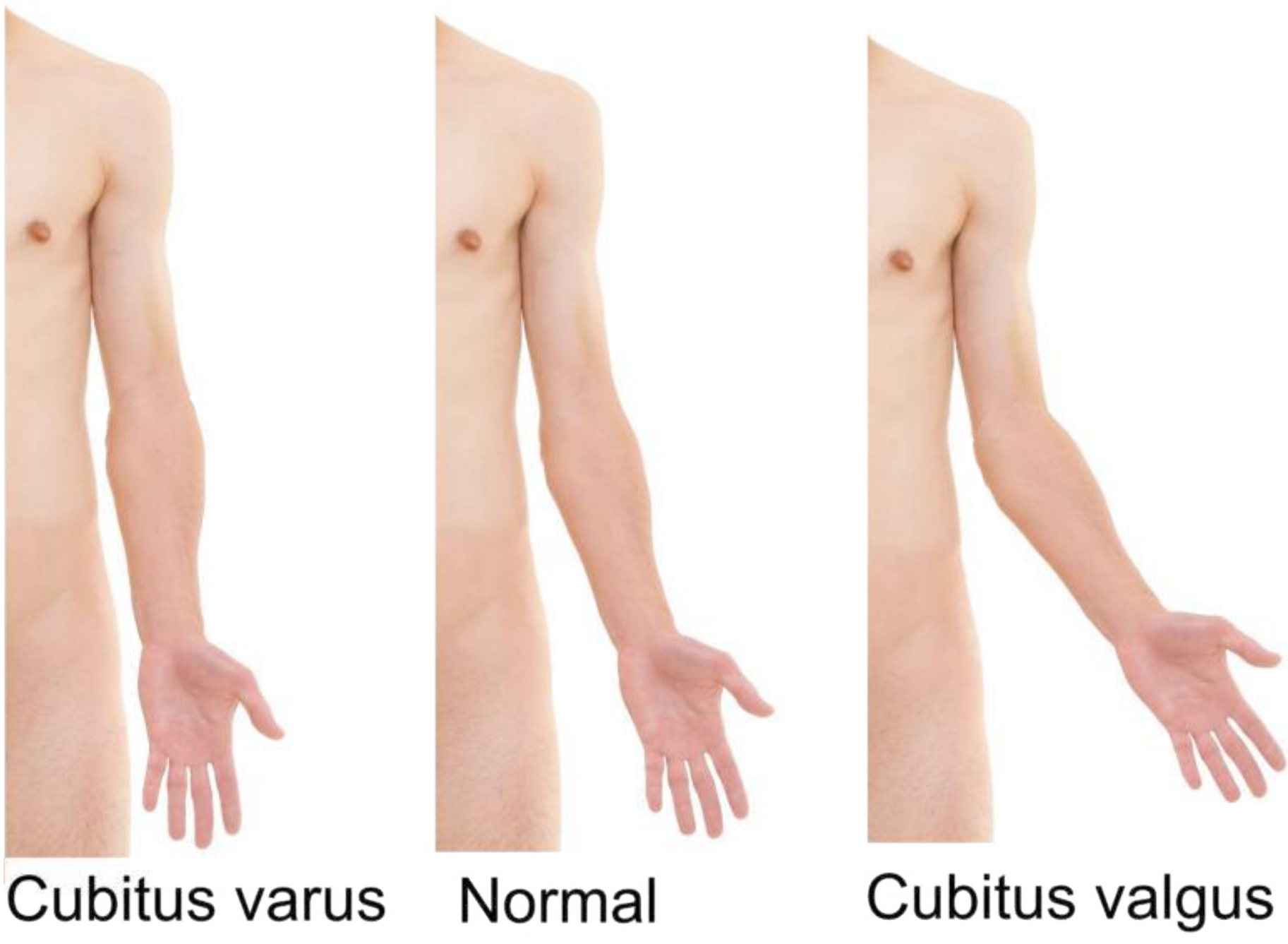




Carrying Angle: Male vs Female

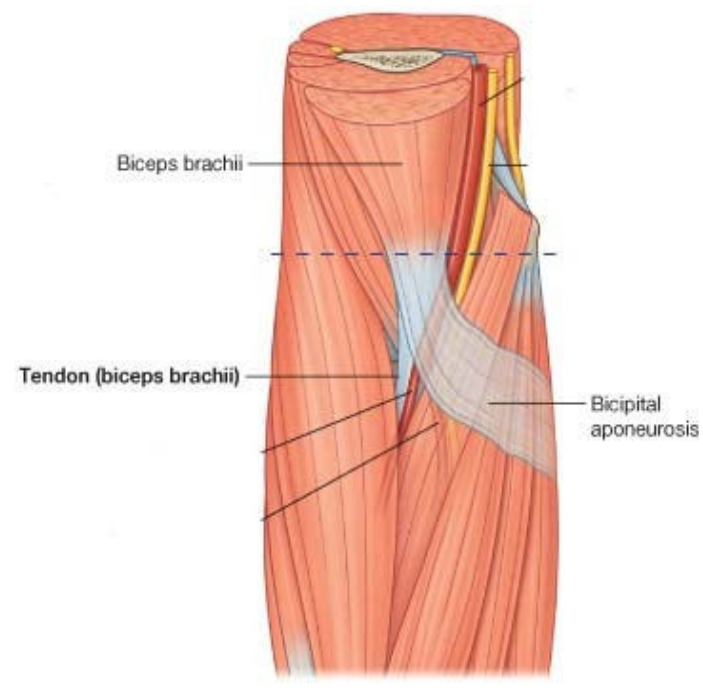




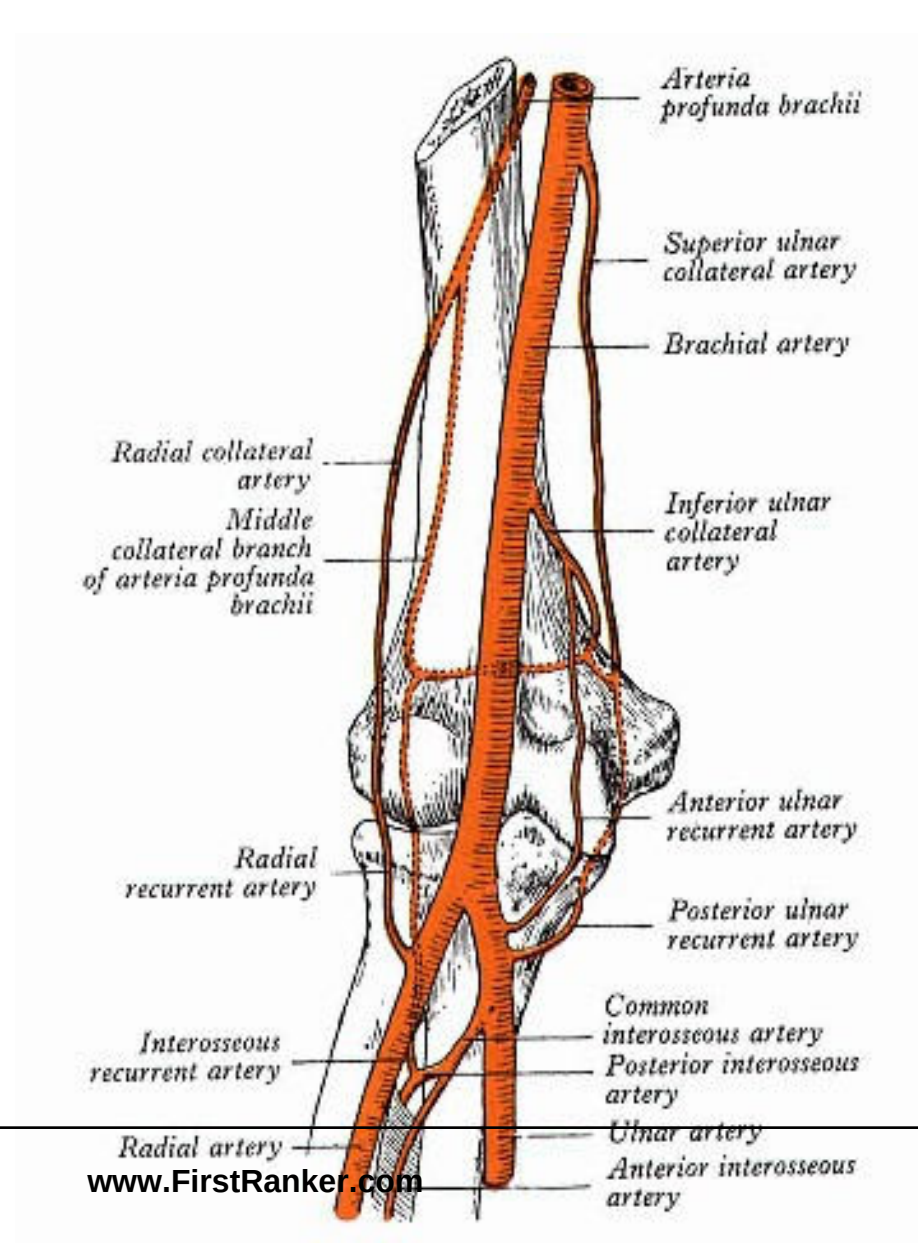


Relations

- Muscles related
  - Anterior – brachialis
  - Posterior– triceps, anconeus
  - Lateral –common extensor tendon, supinator
  - Medial – flexor carpi ulnaris, common flexor tendon
- Arterial supply
  - From anastomosis around elbow joint
- Nerves
  - Musculo-cutaneous and radial (with contributions from ulnar and median nerves)



Anastomosis around Elbow Joint



Movements

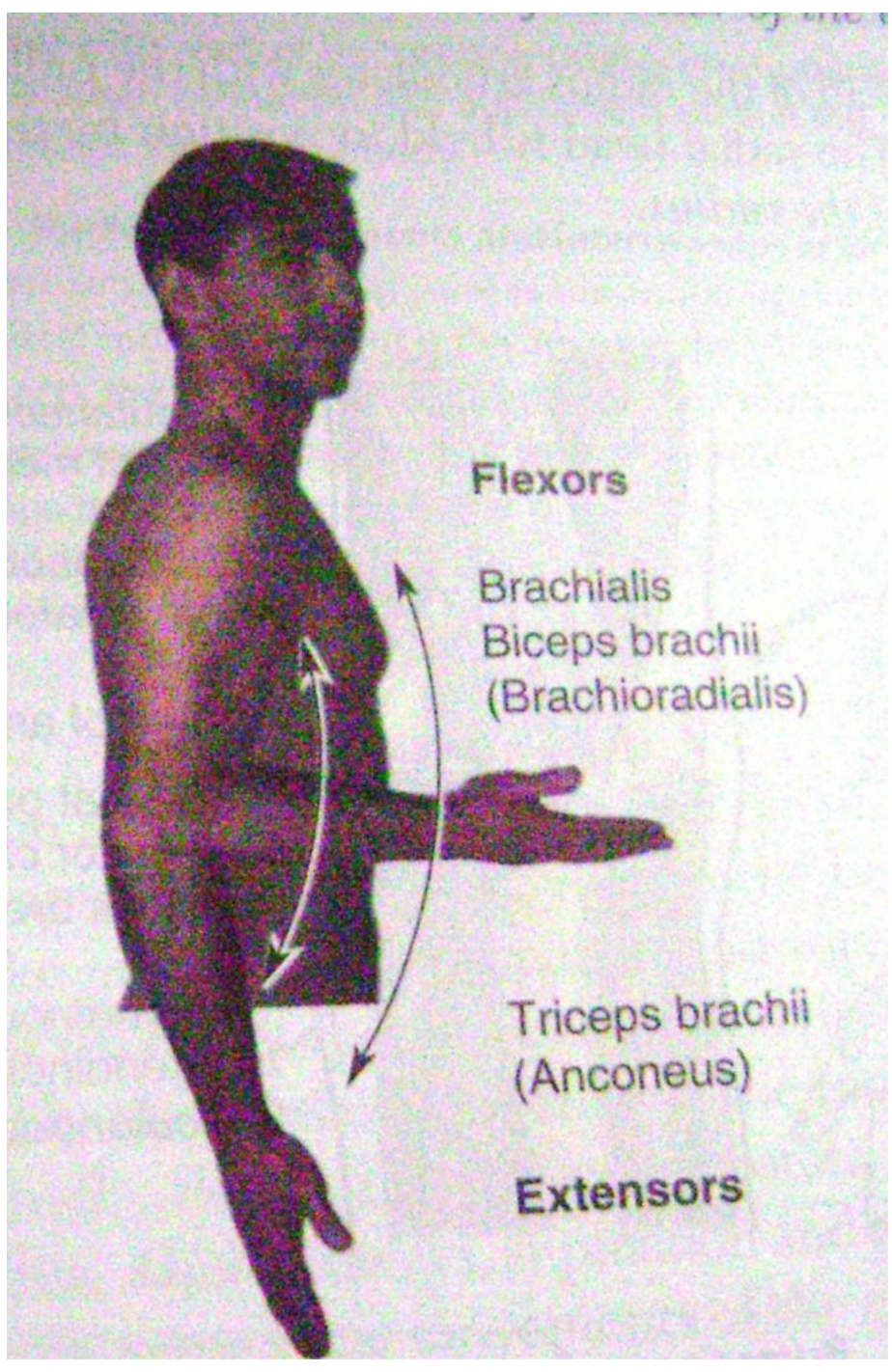
-Flexion
-Extension
-Carrying angle disappears in flexion
-Muscles producing movements:

Flexion

-Brachialis
-Biceps
-Brachioradialis

Extension

-Triceps
-Anconeus



APPLIED ANATOMY

Bursitis of olecranon bursa

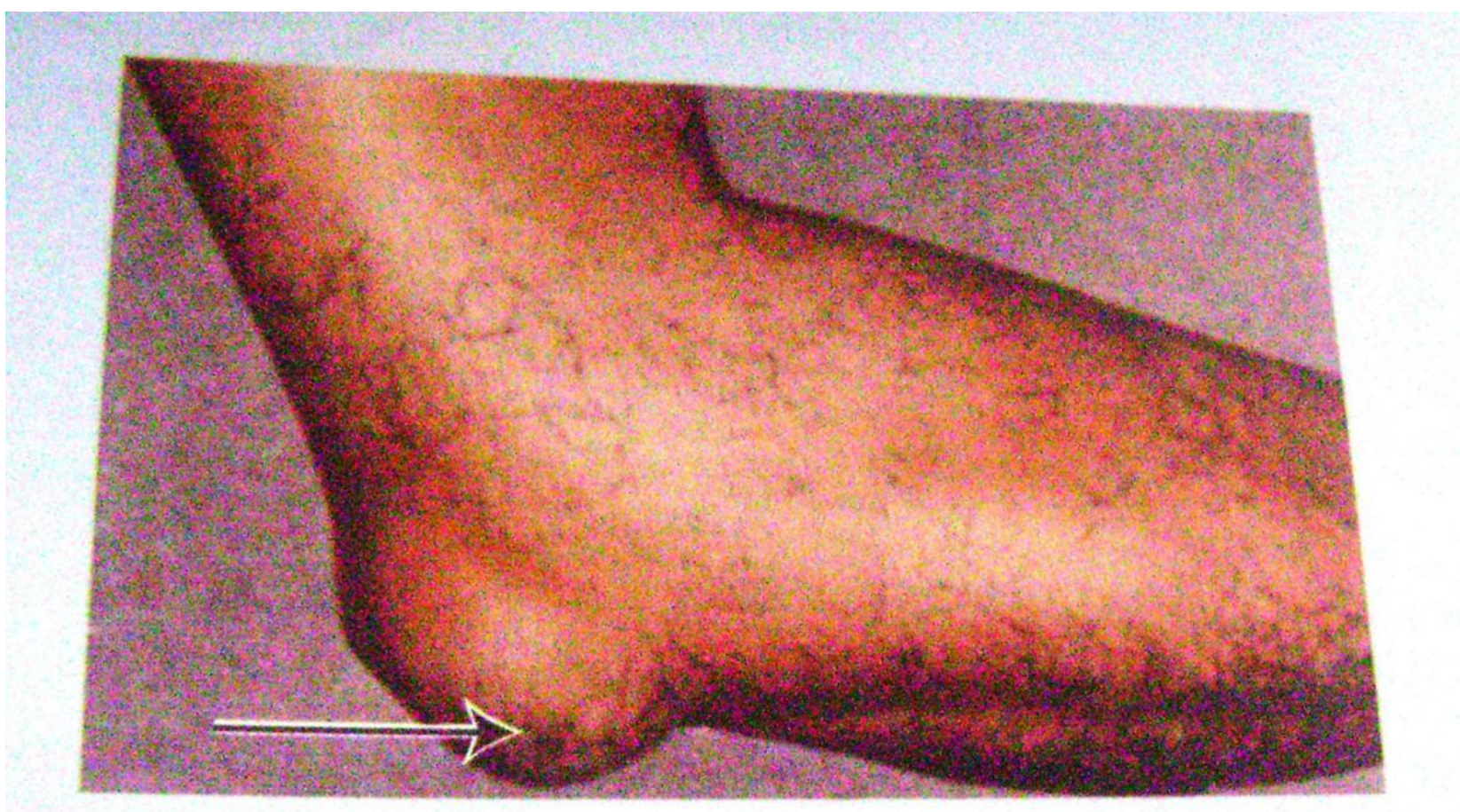
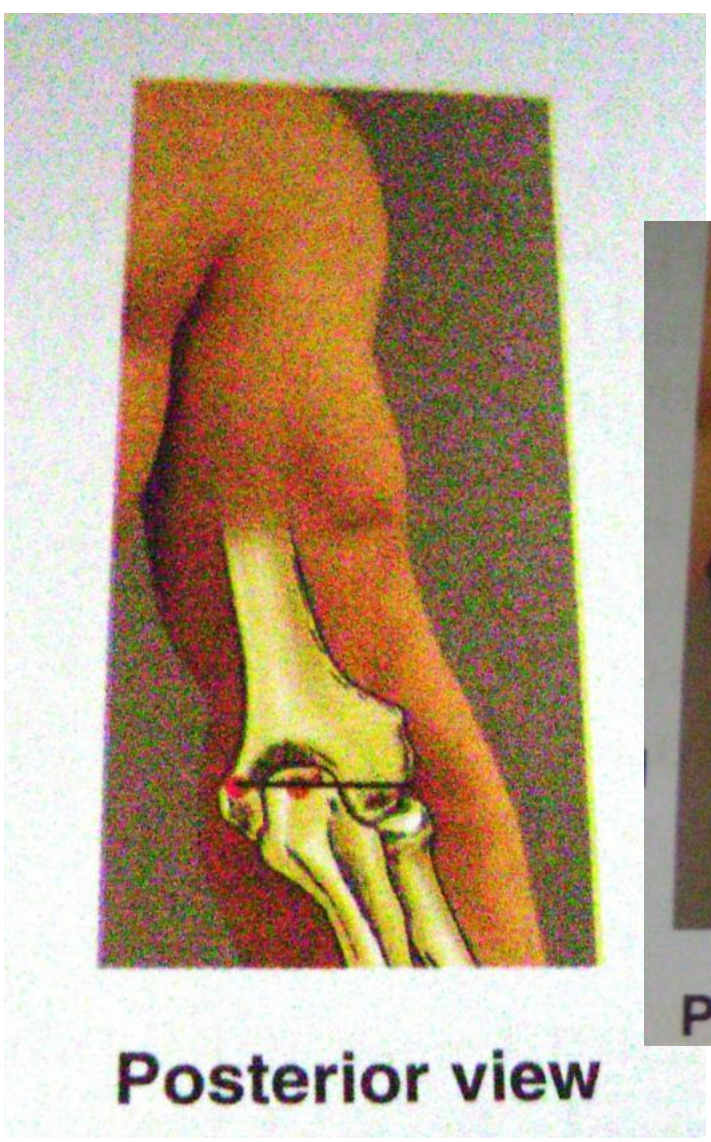


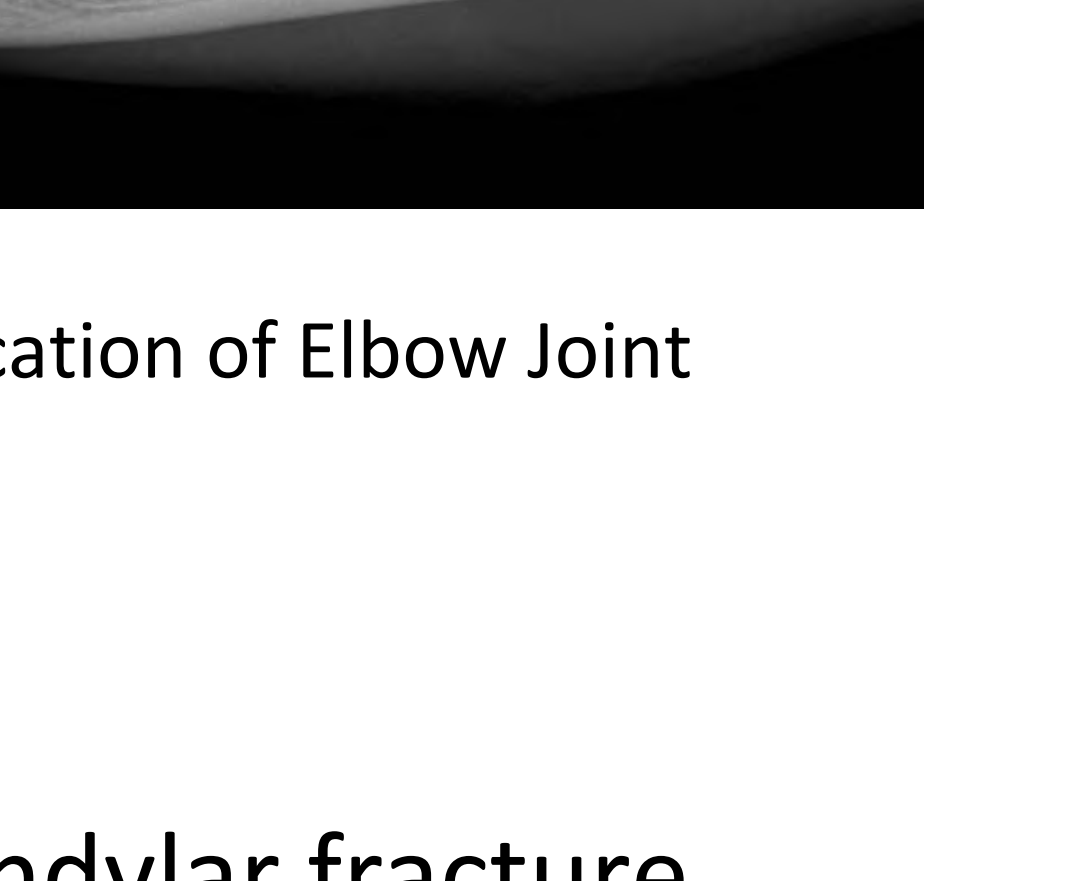
FIGURE B6.35.



Dislocation of Elbow Joint

Supracondylar fracture

- May injure brachial artery leading to vasospasm- lead to ischaemia of deep flexor muscles- volkman's ischaemic conracture



- Tennis elbow- sprain or partial tear of radial collateral ligament due to abrupt pronation- pain and tenderness at lateral epicondyle

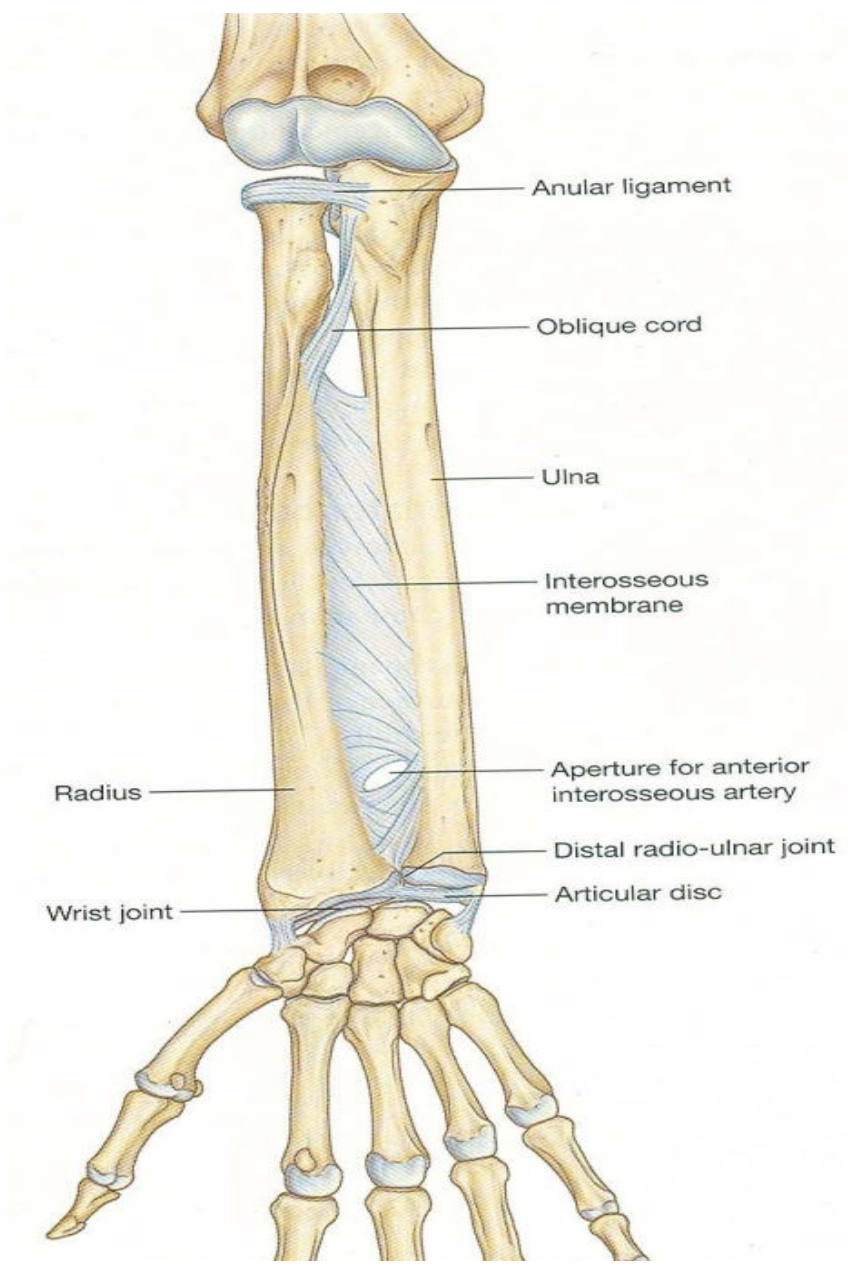
- Golfer's elbow- inflammation of commom flexor tendons

RADIOULNAR JOINTS

The radius and ulna articulate by –

- Synovial
  1. Superior radioulnar joint
  2. Inferior radioulnar joint

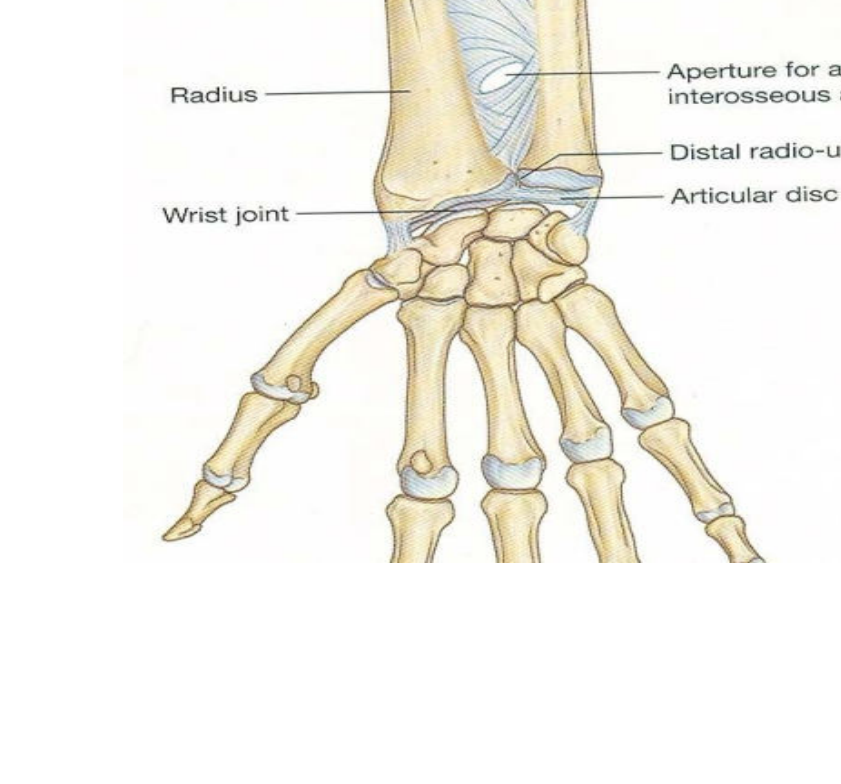
- Non synovial
  Middle radioulnar union



Superior Radioulnar Joint

This articulation is a trochoid or pivot-joint between

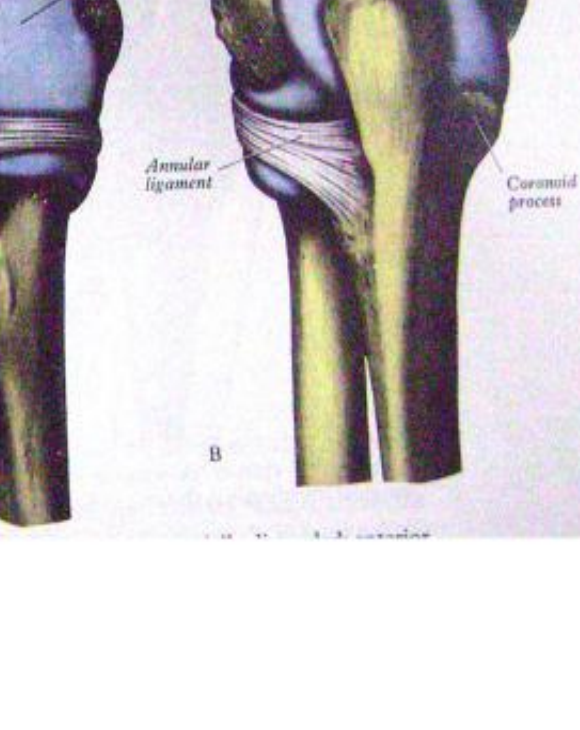
- the circumference of the head of the radius
- ring formed by the radial notch of the ulna and the *annular ligament.*



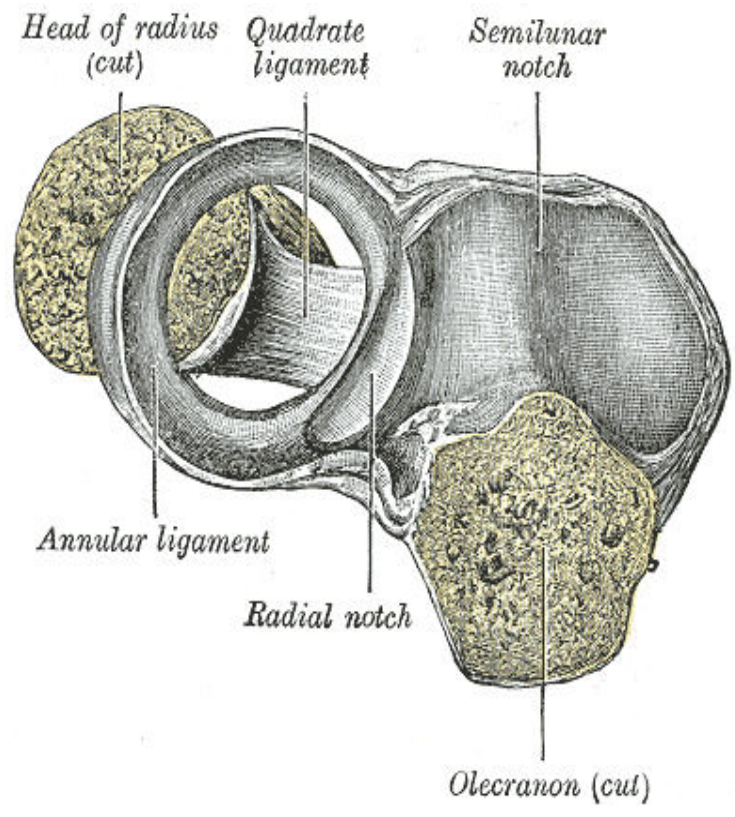
The Annular Ligament (*orbicular ligament)*

It forms about four-fifths of the osseo- fibrous ring, and is attached to the anterior and posterior margins of the radial notch

Its upper border blends with the capsule of elbow joint while from its lower border a thin loose synovial membrane passes to be attached to the neck of the radius



Its *deep surface* is smooth, and lined by synovial membrane, which is continuous with that of the elbow-joint.



Quadrate ligament

A thickened band which extends from the inferior border of the annular ligament below the radial notch to the neck of the radius is known as the **quadrate ligament.**

Middle Radioulnar Union

The shafts of the radius and ulna are connected by

Oblique Cord and Interosseous Membrane

The Oblique Cord (*oblique ligament*)

Extend downward and laterally,

from the

lateral side of the ulnar tuberosity

to the radius a little below the radial tuberosity.

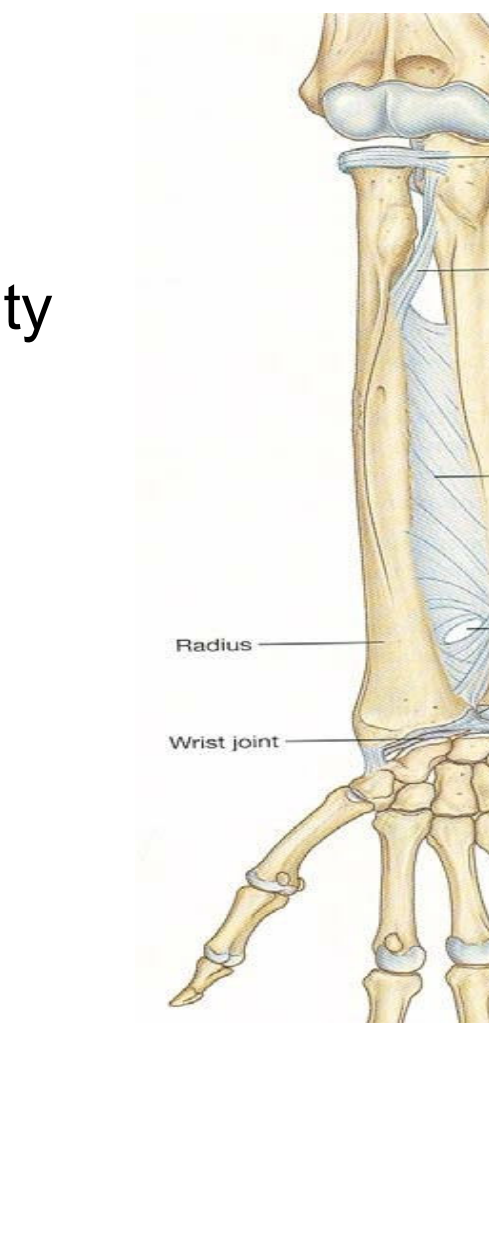
Its fibers run in the opposite direction to those of the interosseous membrane.

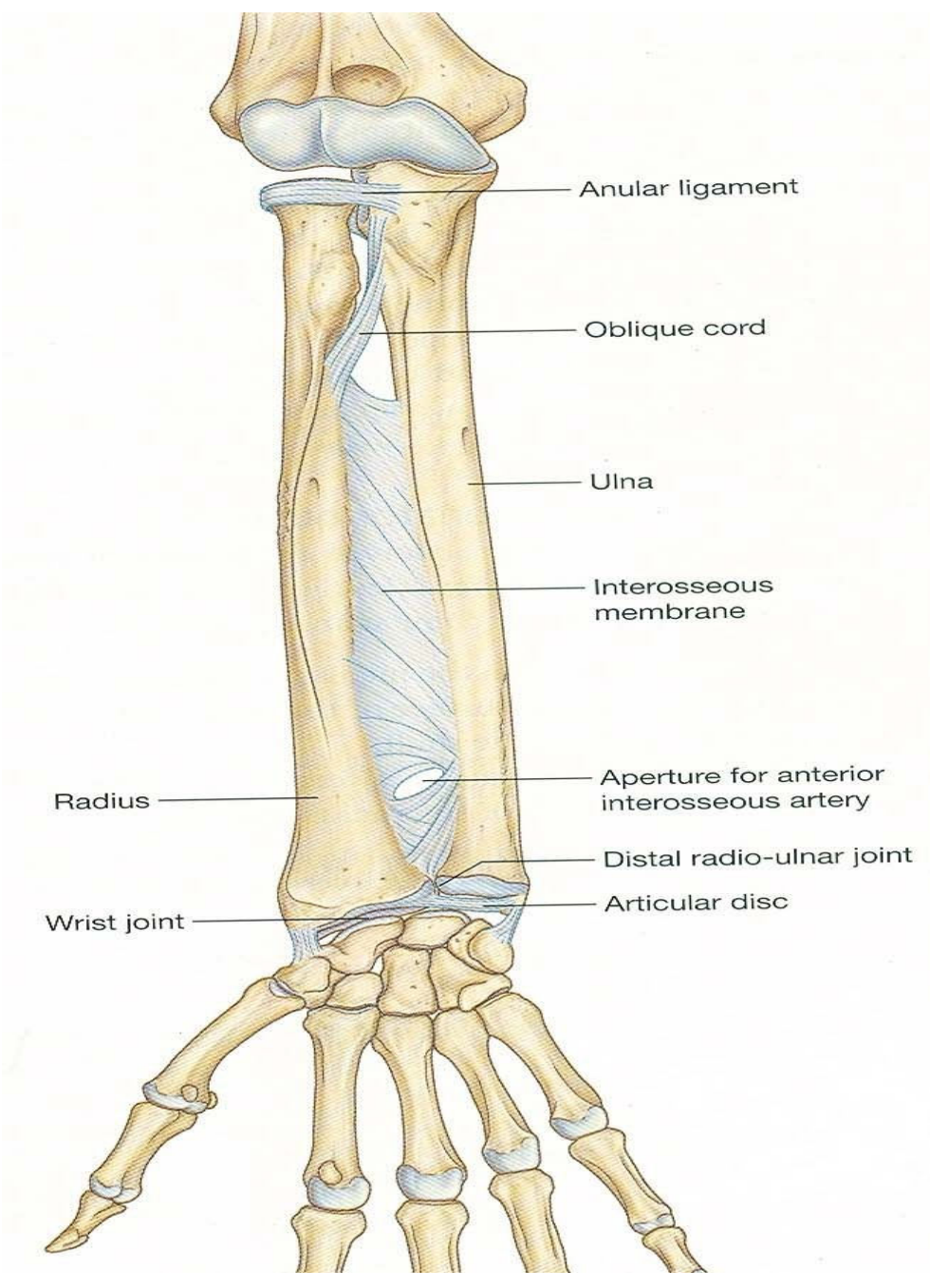
The Interosseous Membrane

Descend obliquely downward and medially

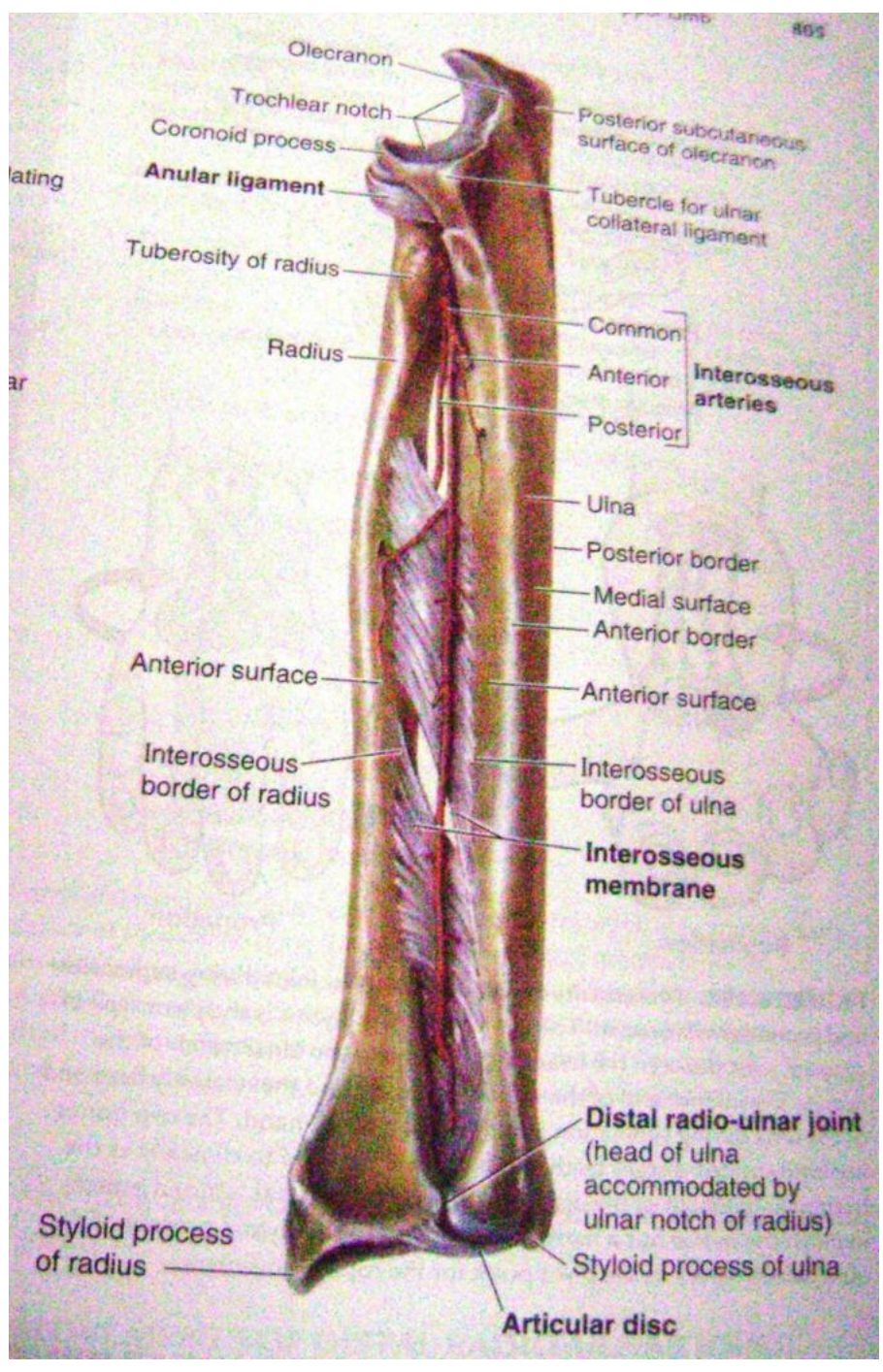
It extends from the interosseous crest of the radius to that of the ulna.

It is deficient above, commencing about 2.5 cm. beneath the tuberosity of the radius.



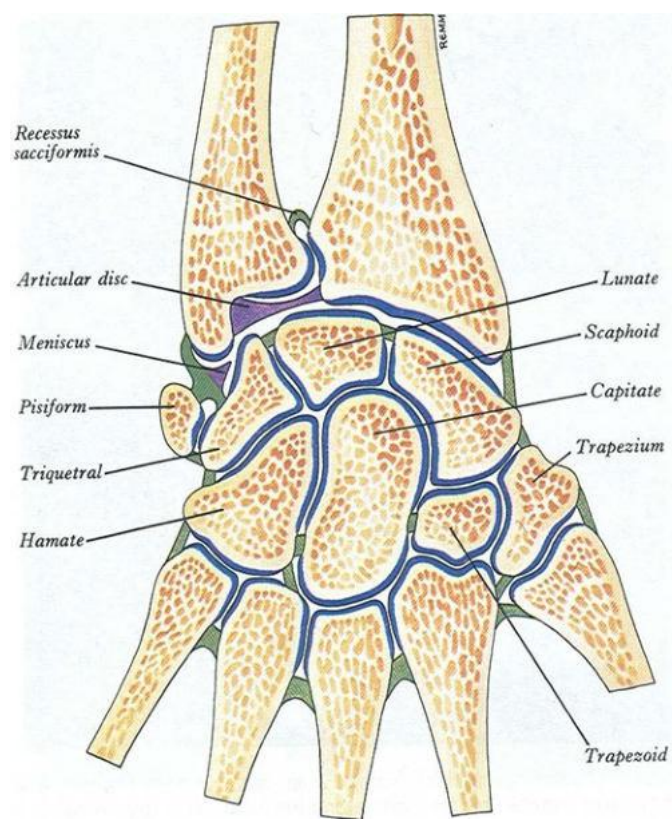


It helps to transmit forces to ulna and humerus acting proximally from hand to radius



Inferior Radioulnar Joint

Uniaxial pivot-joint between head of the ulna and the ulnar notch on the lower end of the radius.

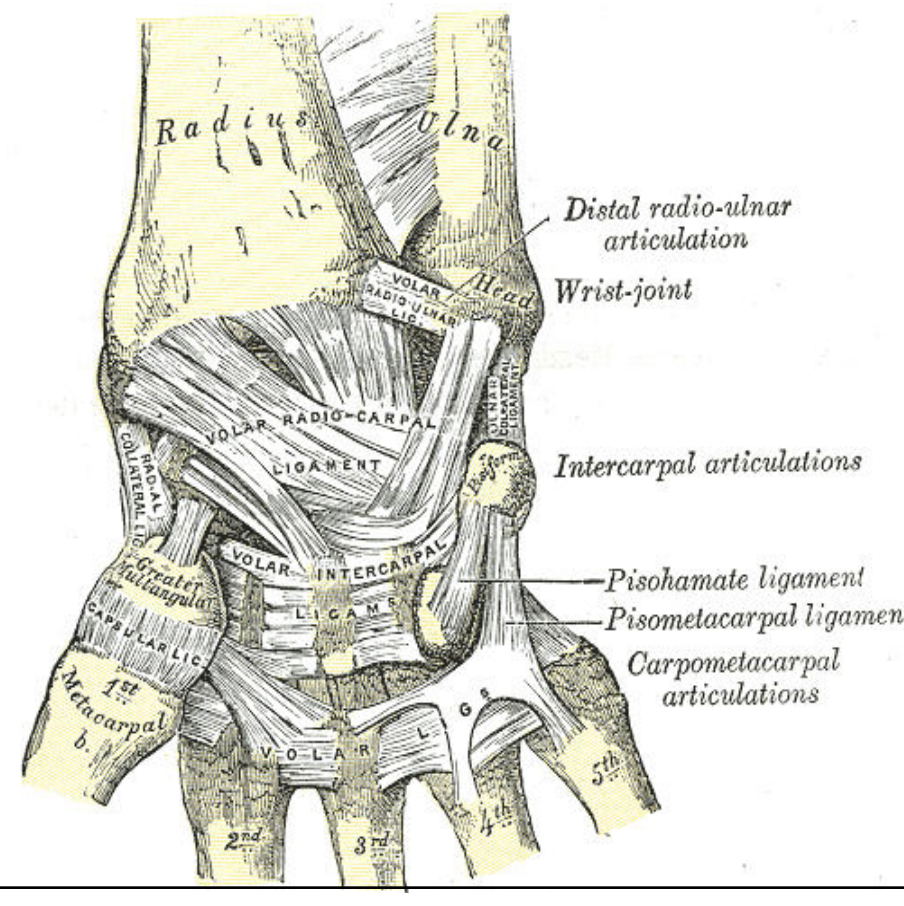


The articular surfaces are enclosed by capsule and connected together by –

- Articular ligaments
  1.Anterior radioulnar ligament
  2. Posterior radioulnar ligament
- Articular disc

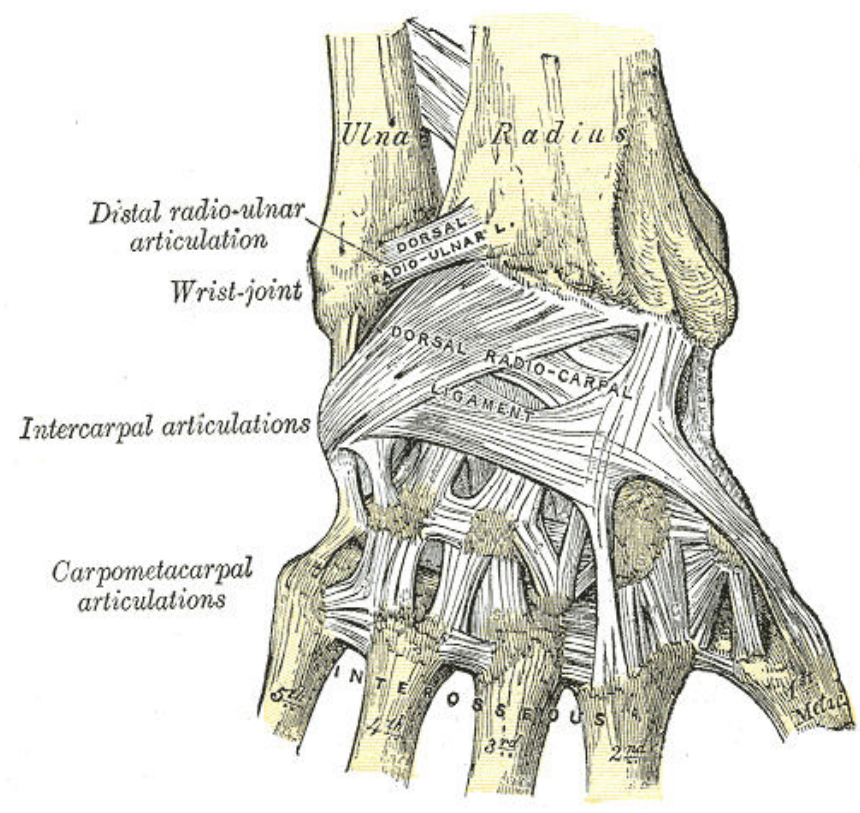
Anterior Radioulnar ligament

This ligament is a narrow band of fibers extending from the anterior margin of the ulnar notch of the radius to the front of the head of the ulna.



Posterior (Dorsal)Radioulnar ligament

This ligament extends between corresponding surfaces on the dorsal aspect of the articulation.



The Articular Disc

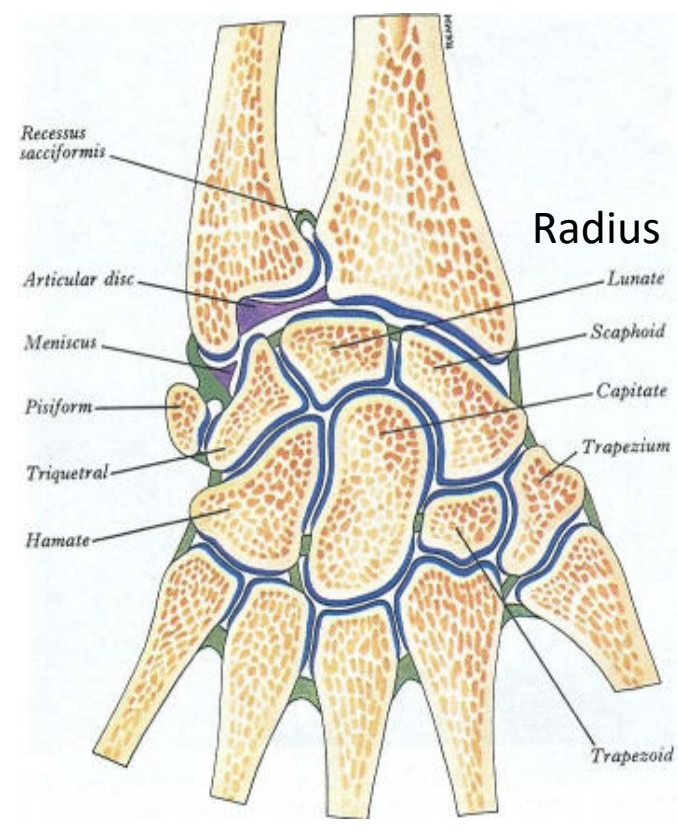
The articular disc is triangular in shape placed transversely beneath the head of the ulna

Its periphery is thicker than its center, which is occasionally perforated.

Attachment –

apex to a depression between the **styloid process and the head of the ulna**;

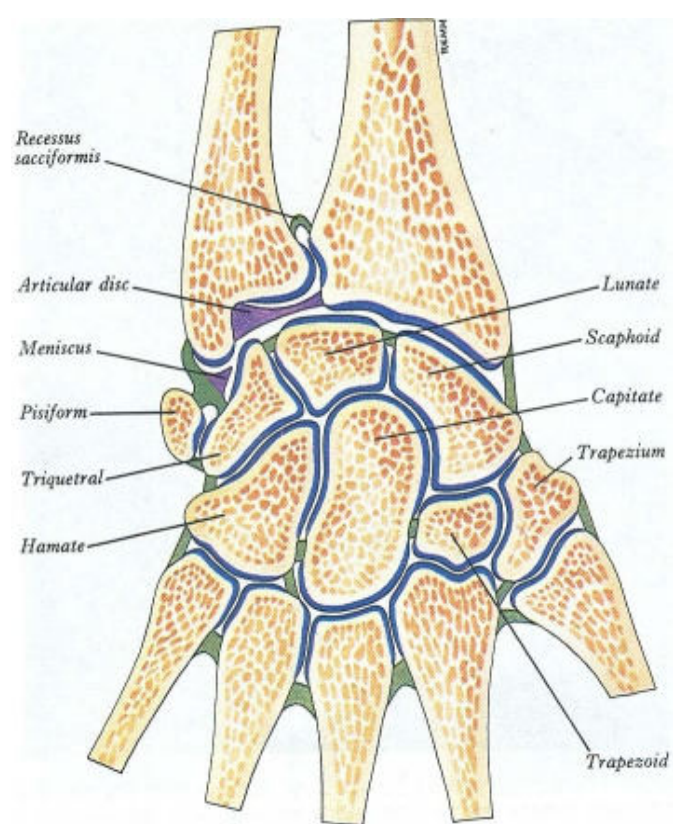
base, which is thin, to the prominent edge between the ulnar notch and carpal articular surface of the radius.



Synovial Membrane

The synovial membrane of this articulation is extremely loose,

It extends upward as a recess (*recessus sacciformis*) between the radius and the ulna.



Movements

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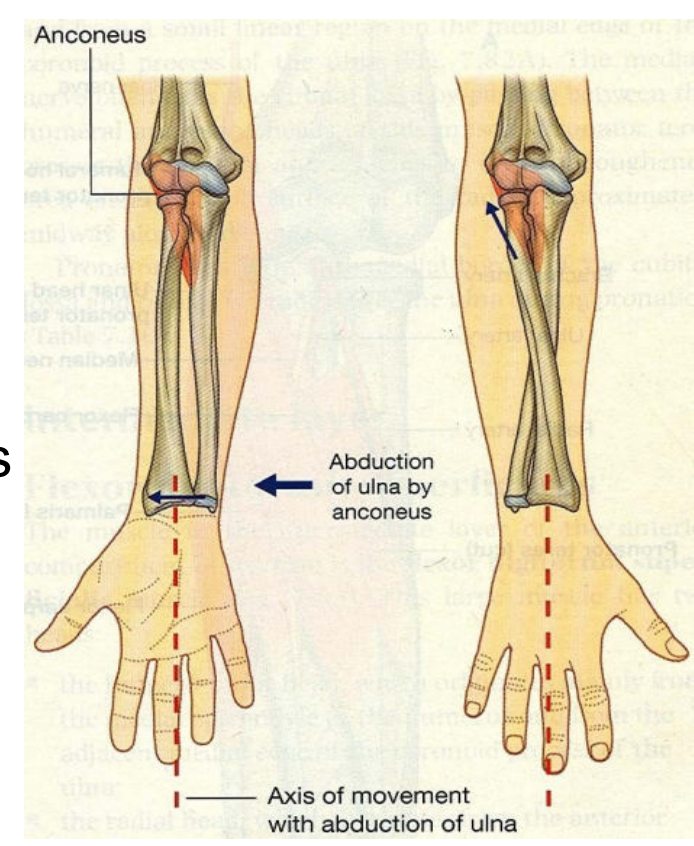
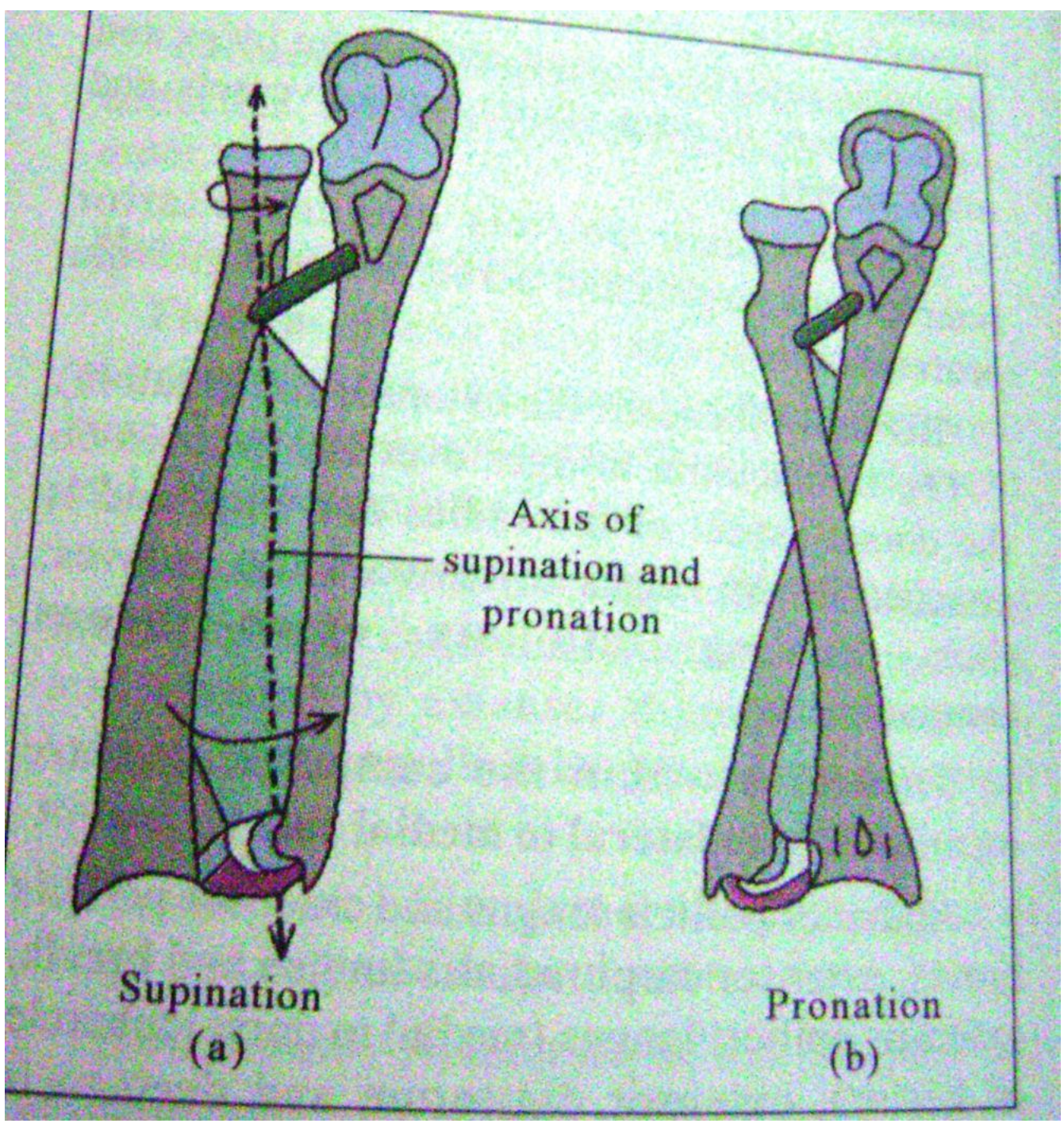
P*ronation* – Radius turns anteromedially and obliquely across the ulna, its proximal end remaining lateral and distal end becoming medial. During this action, interosseous membrane becomes spiralled.

Supination – *R*adius returns to a position lateral and parallel to ulna and interosseous membrane becomes unspiralled.

Hand can thus be turned through 140º – 150º and with elbow extended this can be increased to 360º by humeral rotation and scapular movement.





Axis of supination and pronation extends from the center of the head of the radius to the ulnar attachment of articular disc. This is axis of movement of radius relative to ulna and it does not remain stationery.

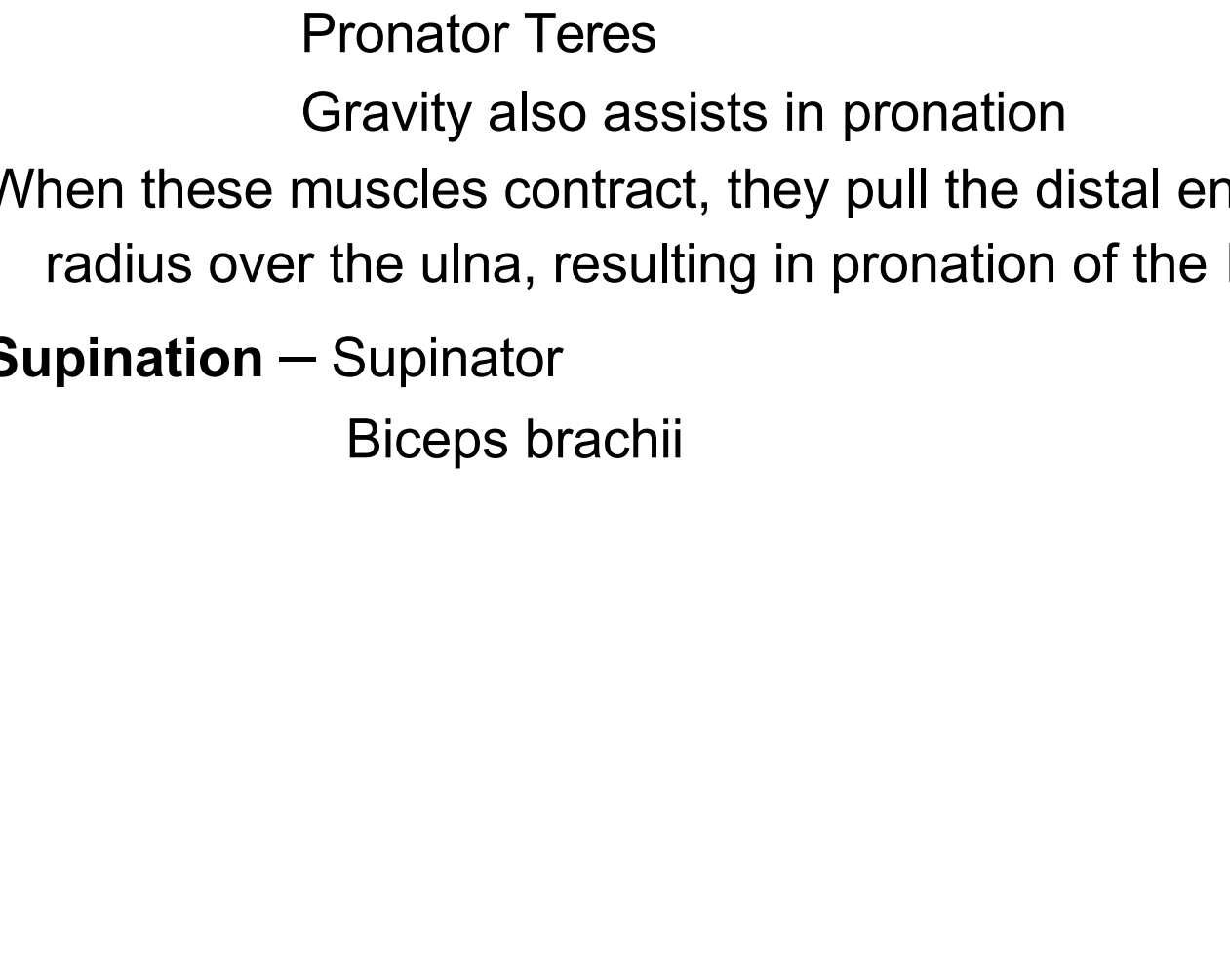
In this movement the distal head of the ulna is not stationary, but describes a curve in a direction opposite to that taken by the head of the radius.

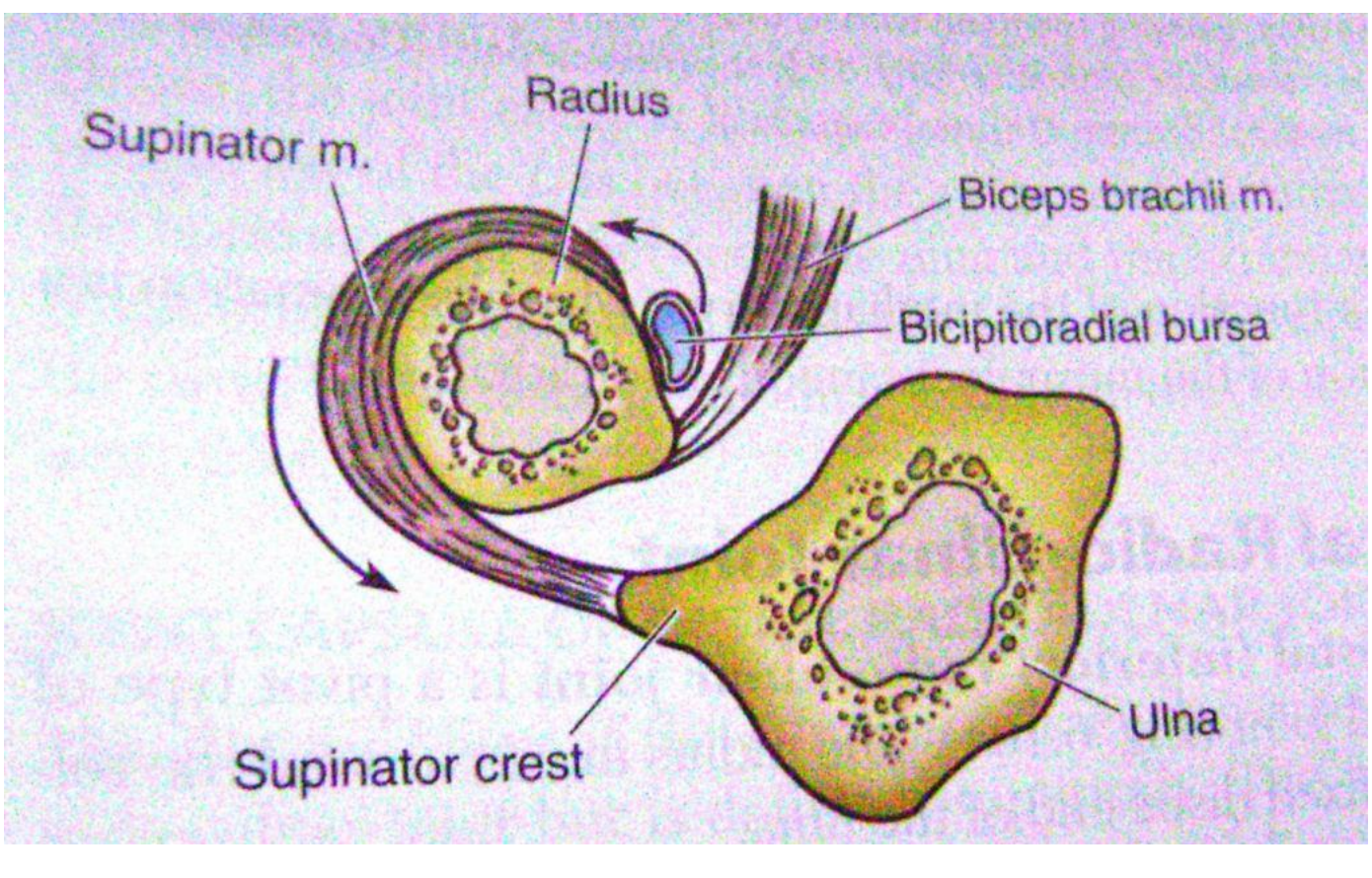
Muscles Producing Movement

Pronation – Pronator quadratus
Pronator Teres
Gravity also assists in pronation

When these muscles contract, they pull the distal end of the radius over the ulna, resulting in pronation of the hand

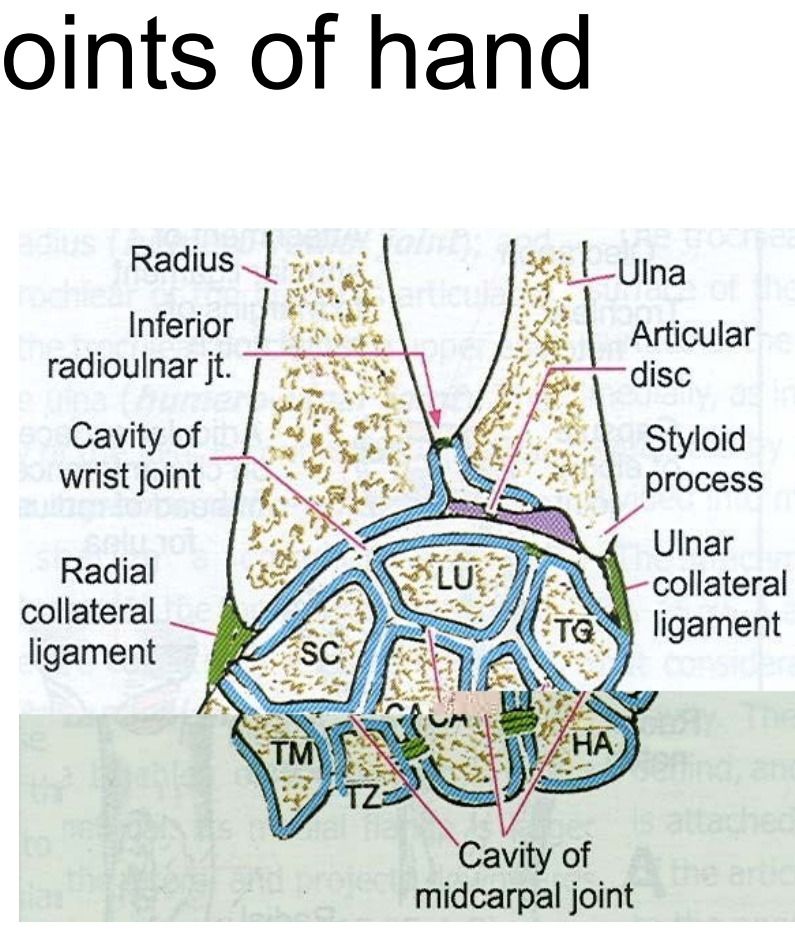
Supination – Supinator
Biceps brachii





Wrist joint & joints of hand

- **Synovial** joint
- Variety –**ellipsoid**
- **Articular surface-** Proximal-Distal end of radius &Inferior surface of articular disc of inferior radioulnar joint
- Distal- Proximal surface of scaphoid, lunate & triquetral



Capsular ligament-
Attached to the margin of proximal & distal surface

Thickenings in the capsule-

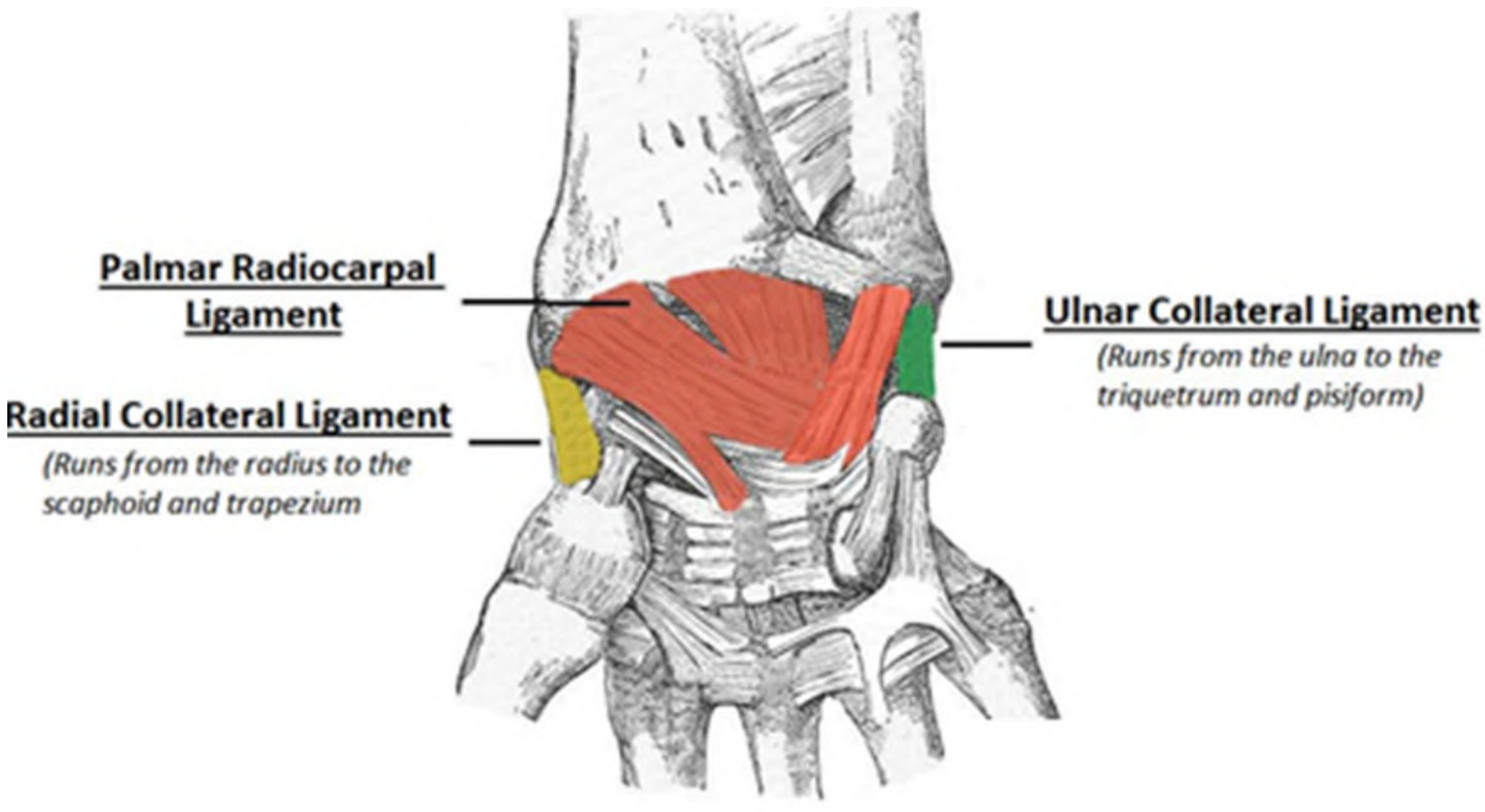
Anteriorly -

In lateral part palmar radiocarpal ligament

Thickenings in the capsule-

Posteriorly- dorsal radiocarpal ligament

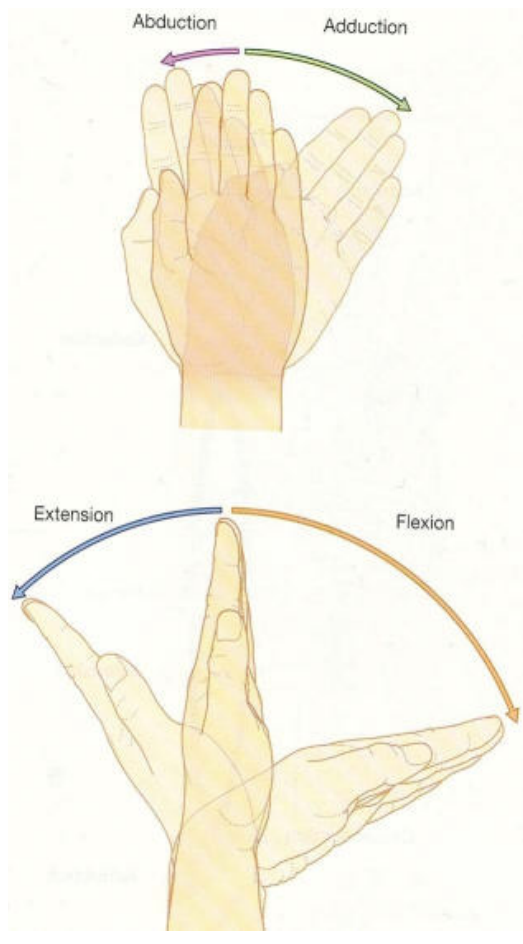
- Ulnar collateral ligament
- Radial collateral ligament



- **Nerve supply-** Anterior & posterior interosseous nerves
- **Blood supply-** Radial, ulnar & anterior interosseous artery

Movements occuring at wrist joint

- **Flexion 85 degree, occur more at midcarpal joint by -Flexor carpi radialis, FCU act as prime mover** Palmaris longus, FDS, FDP & FPL
- **Extension(60 degree)**- ECRL, ECRB, ECU act as prime mover assisted by ,Extensor digitorum, EDM & extensor indicis
- **Adduction(45 degree)-** ECU & FCU
- **Abduction(15 degree)-** ECRL, ECRB



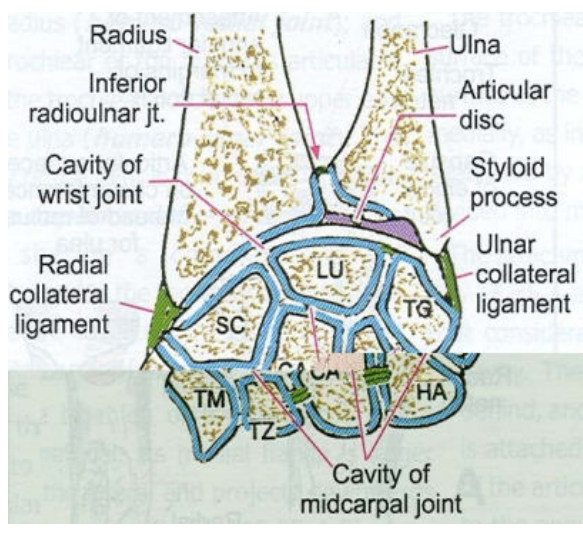
Joints of hand

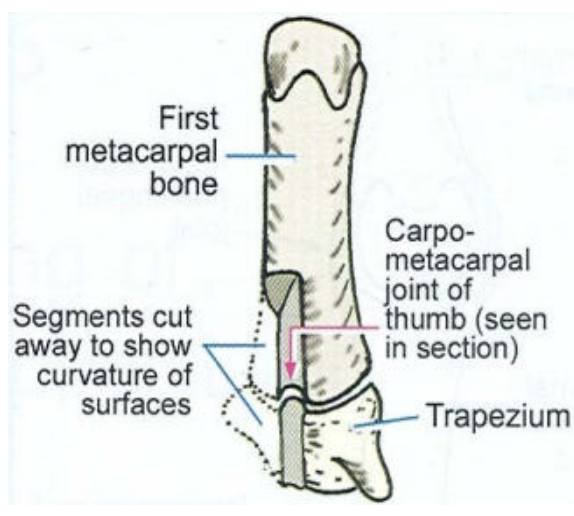
- Mid carpal ligament-present between proximal & distal row of carpal bones

Carpometacarpal joint of thumb-

- Saddle variety of synovial joint
- Articular surface- Distal surface of trapezium

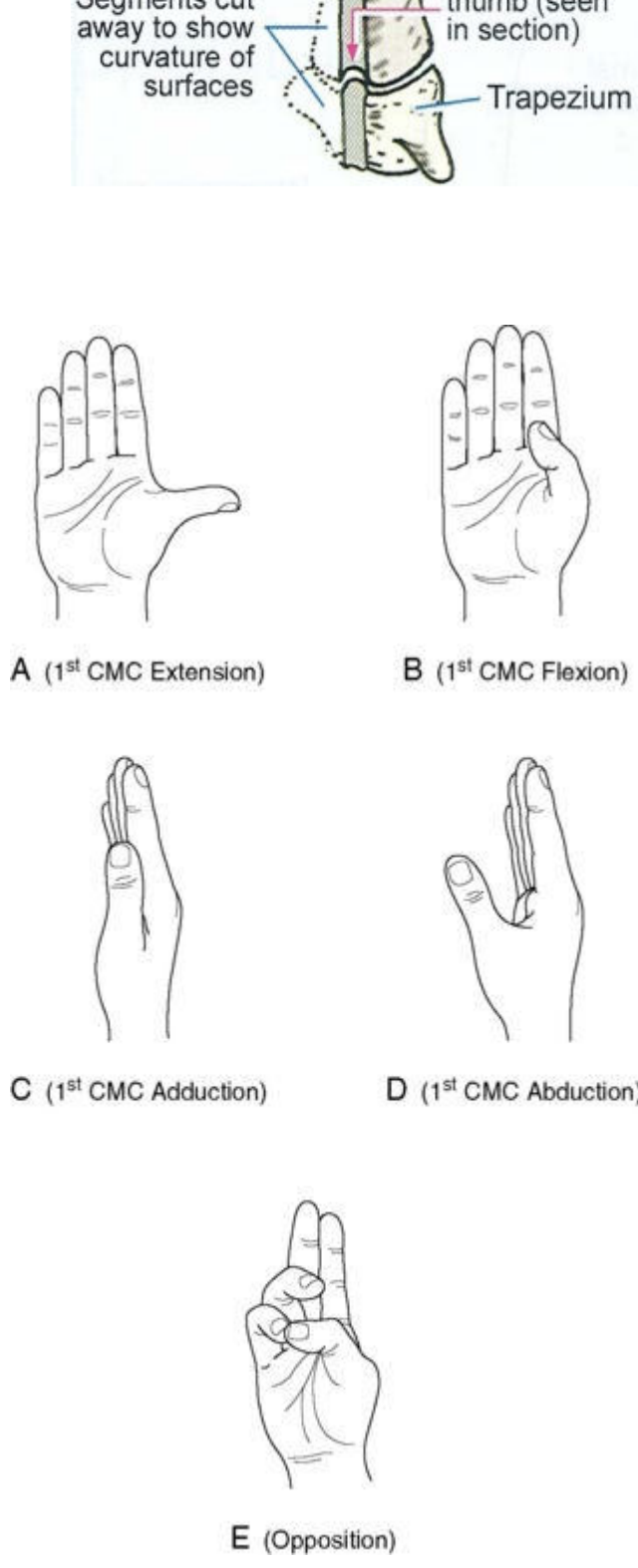
  Proximal surface of the first metacarpal

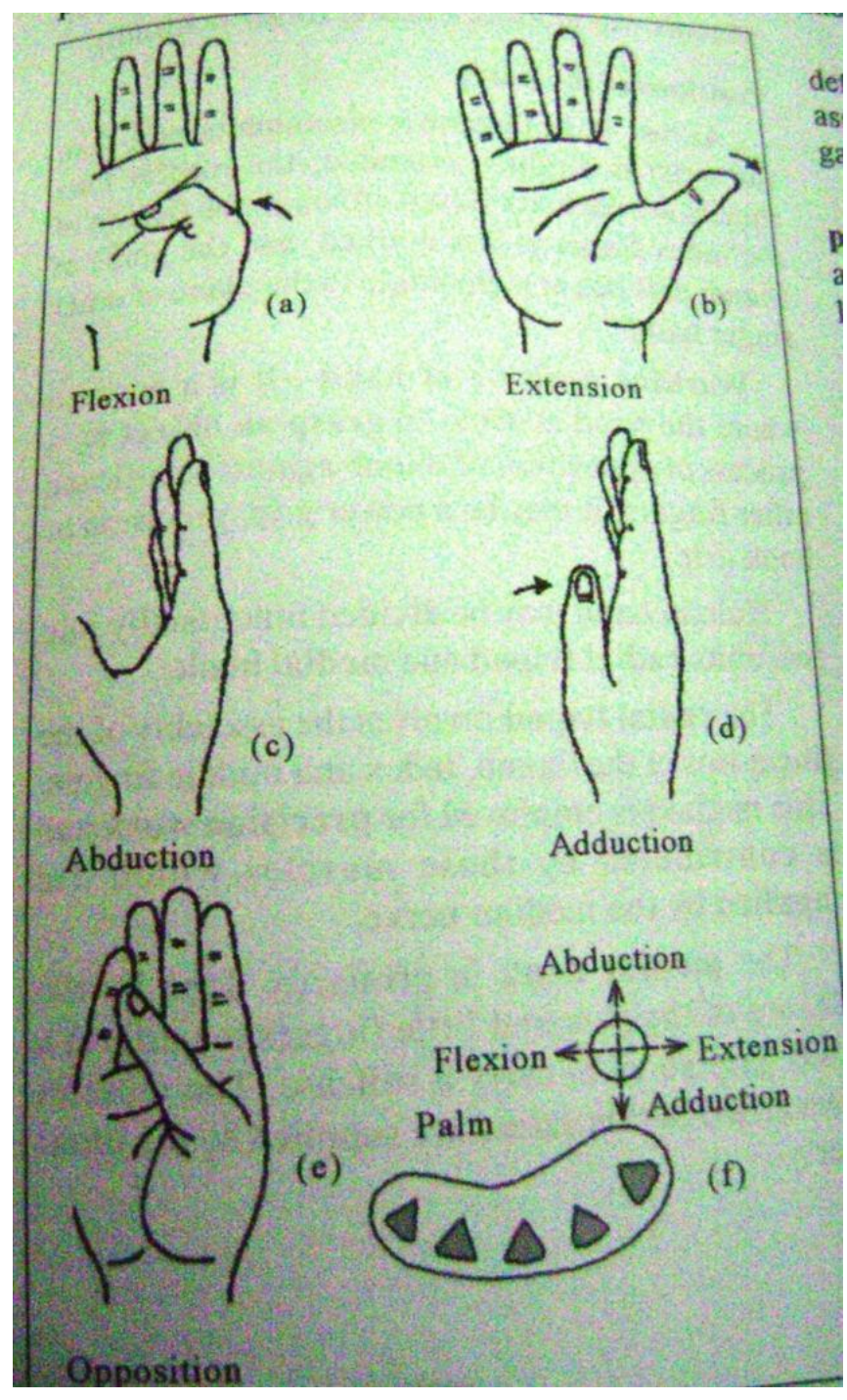


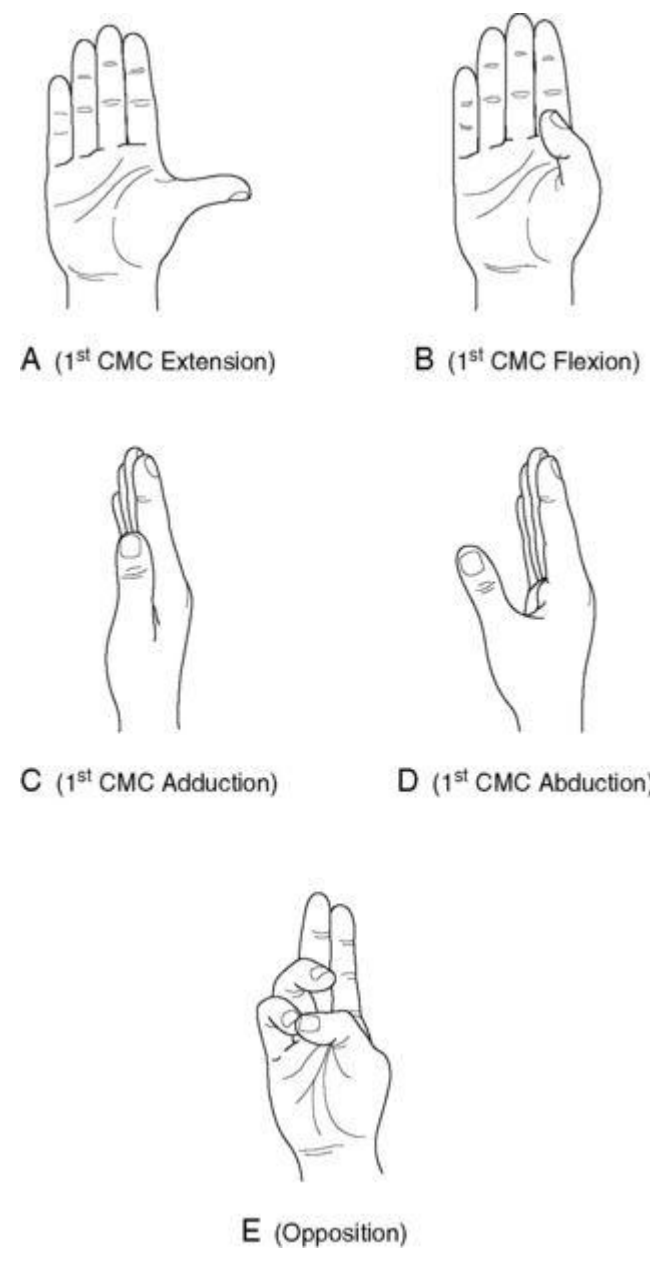


Movement occuring at **first Carpometacarpal joint** of thumb-

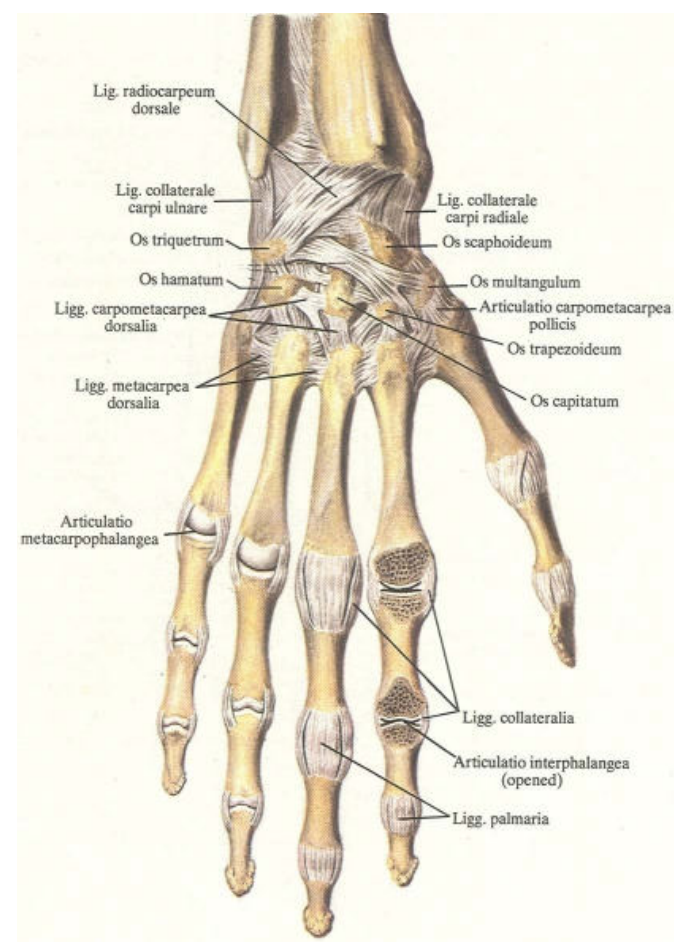
- Flexion- FPL, FPB,& OP
- Extension- EPL,EPB and APL
- Abduction- APB and APL
- Aduction - AP



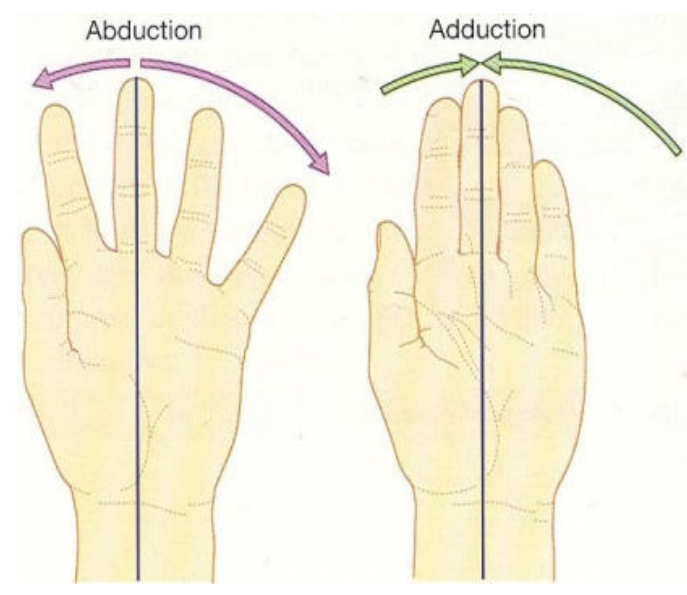


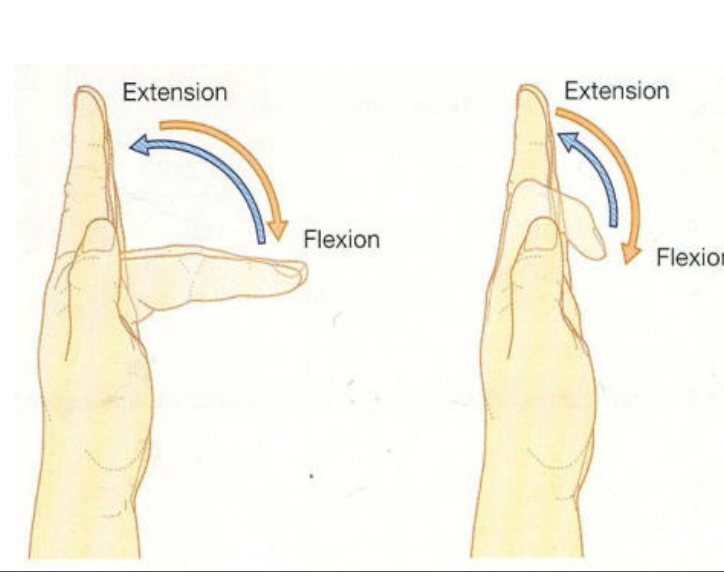


- **Intercarpal, carpo-metacarpal and intermetacarpal joints** - all plane joints having gliding movements only.



- **Metacarpophalangeal joints-** ellipsoid joints allows
- Flexion- Lumbricals, FDS, FDP , PI & DI
- Extension- ED
- Abduction- ED and DI
- Adduction-PI and FDS and FDP of the fingers.





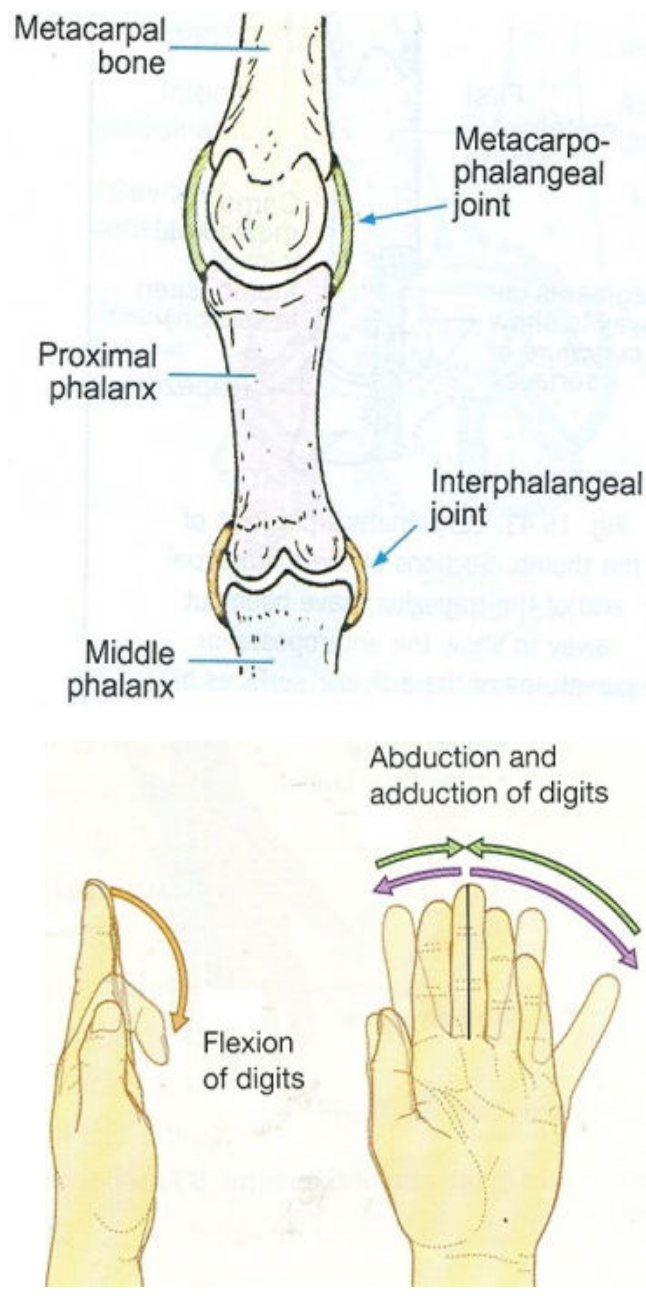
- **Interphalangeal joints-** Hinge joints of the condylar type.
- Each finger has two joints proximal and distal.

Flexion at proximal IP joints by FDS and FDP

- Flexion at distal IP joints by FDP

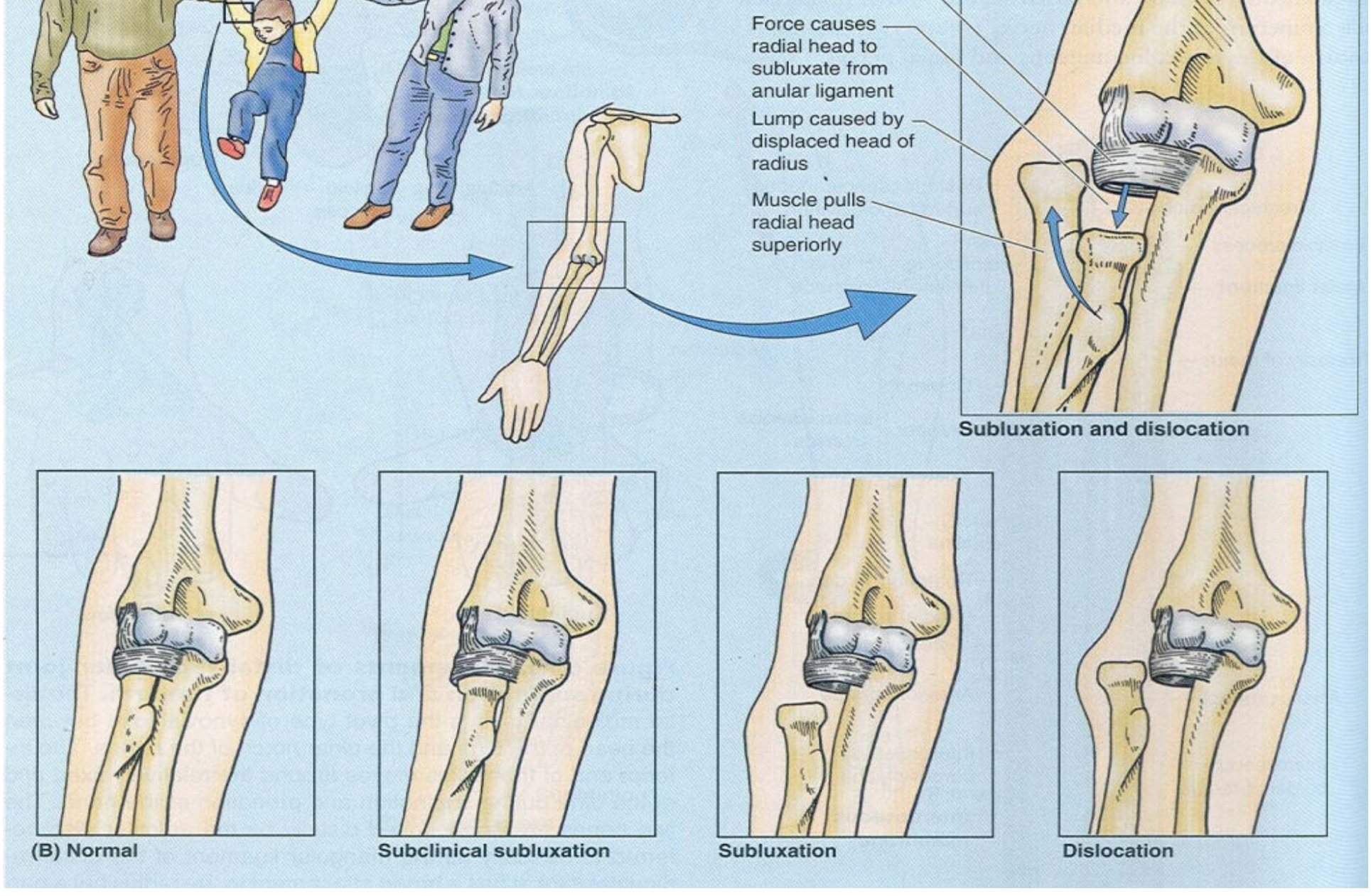
Extension at proximal and distal IP joints by ED, lumbricals and interossei

- The EI helps in extension of index finger and EDM helps in that little finger



Applied

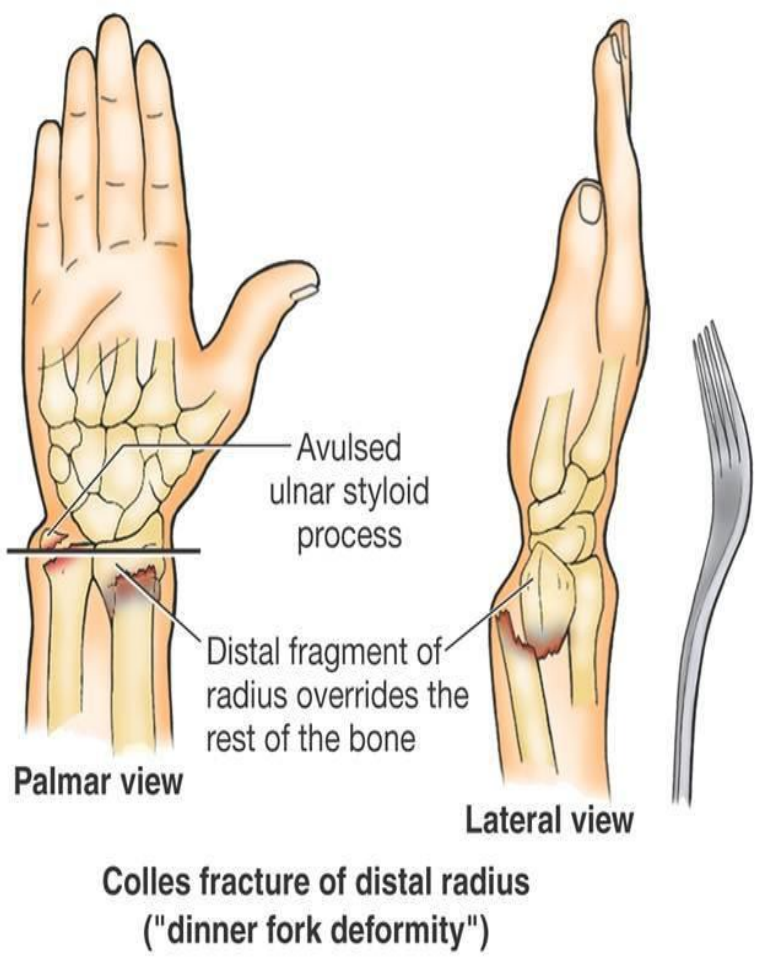
- Wrist joint is commonly involved in rheumatoid arthritis
- Back of wrist is common site of ganglion



Mechanism of injury In Colles' fracture

Colles' fracture

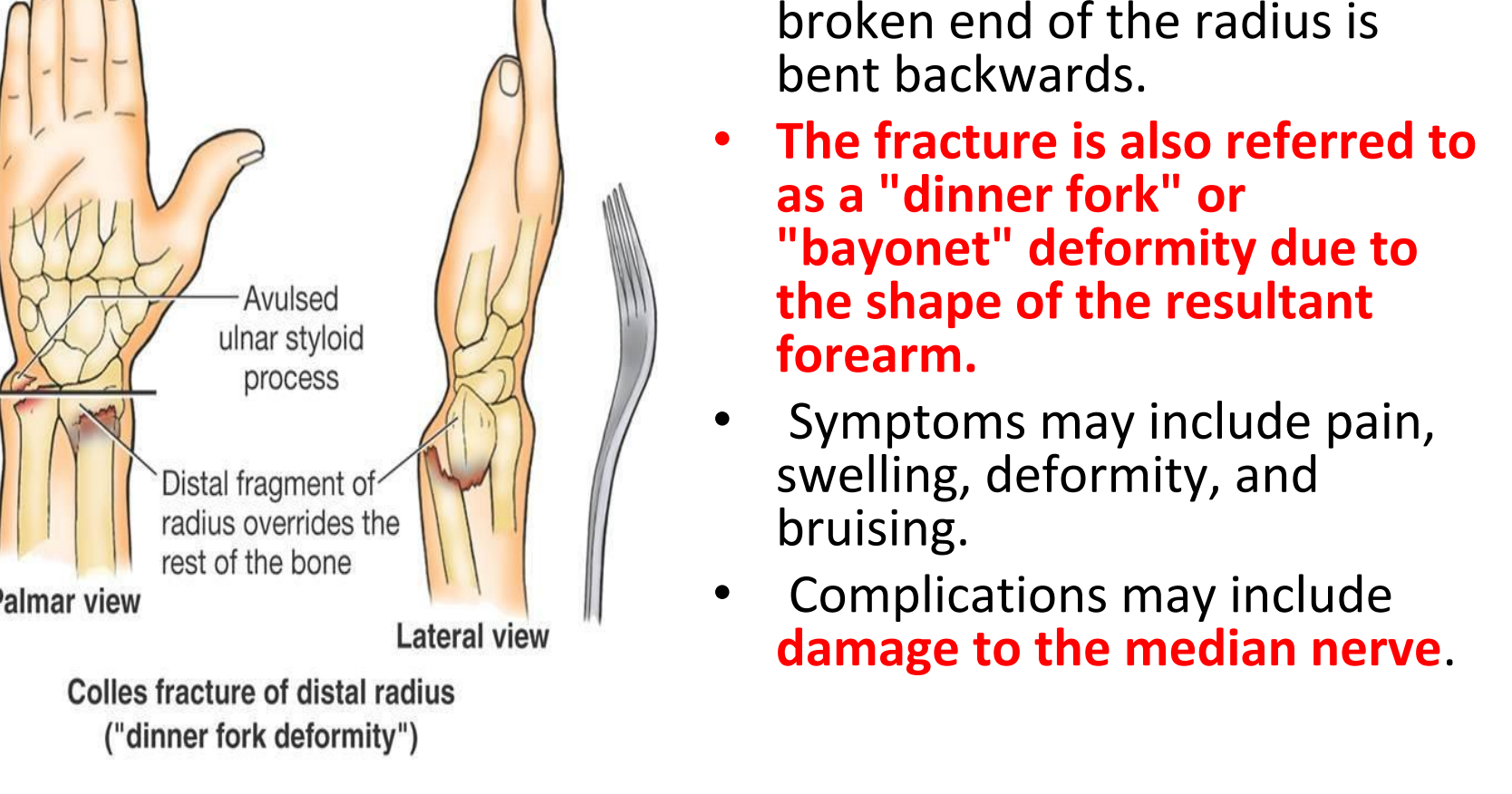
Colles' fracture



Colles fracture of distal radius ("dinner fork deformity")

- Colles' fracture - fracture of the distal forearm in which broken end of the radius is bent backwards.
- **The fracture is also referred to as a "dinner fork" or "bayonet" deformity due to the shape of the resultant forearm.**
- Symptoms may include pain, swelling, deformity, and bruising.
- Complications may include **damage to the median nerve**.

Smith's fracture



MCQ

Q. Injury to the following nerve will affect both flexion at elbow joint and supination at radioulnar joint

a. Radial nerve
b. Musculocutaneous nerve
c. Median nerve
d. Radial nerve

MCQ

Q. Injury to the following nerve will affect both flexion at elbow joint and supination at radioulnar joint

a. Radial nerve
b. Musculocutaneous nerve(Biceps)
c. Median nerve
d. Radial nerve

MCQ

- Q Following bone do not take part in formation of wrist joint

A Lower end of radius
B Lower end of ulna
C Scaphoid
D Lunate

MCQ

- Q Following bone do not take part in formation of wrist joint

A Lower end of radius
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