

RADIOLOGICAL ANATOMY OF UPPER LIMB

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Radiological Modalities to evaluate upper limbs

- Plain X ray
- Ultrasound
- CT
- MRI
- Fluoroscopy

Learning bony anatomy using plain X Rays

Upper limb bones that assess in radiography.

- Scapula.
- Clavicle.
- Humerus.
- Radius.
- Ulna.
- Carpal bones - 8 bones in 2 rows
- Metacarpal bones.

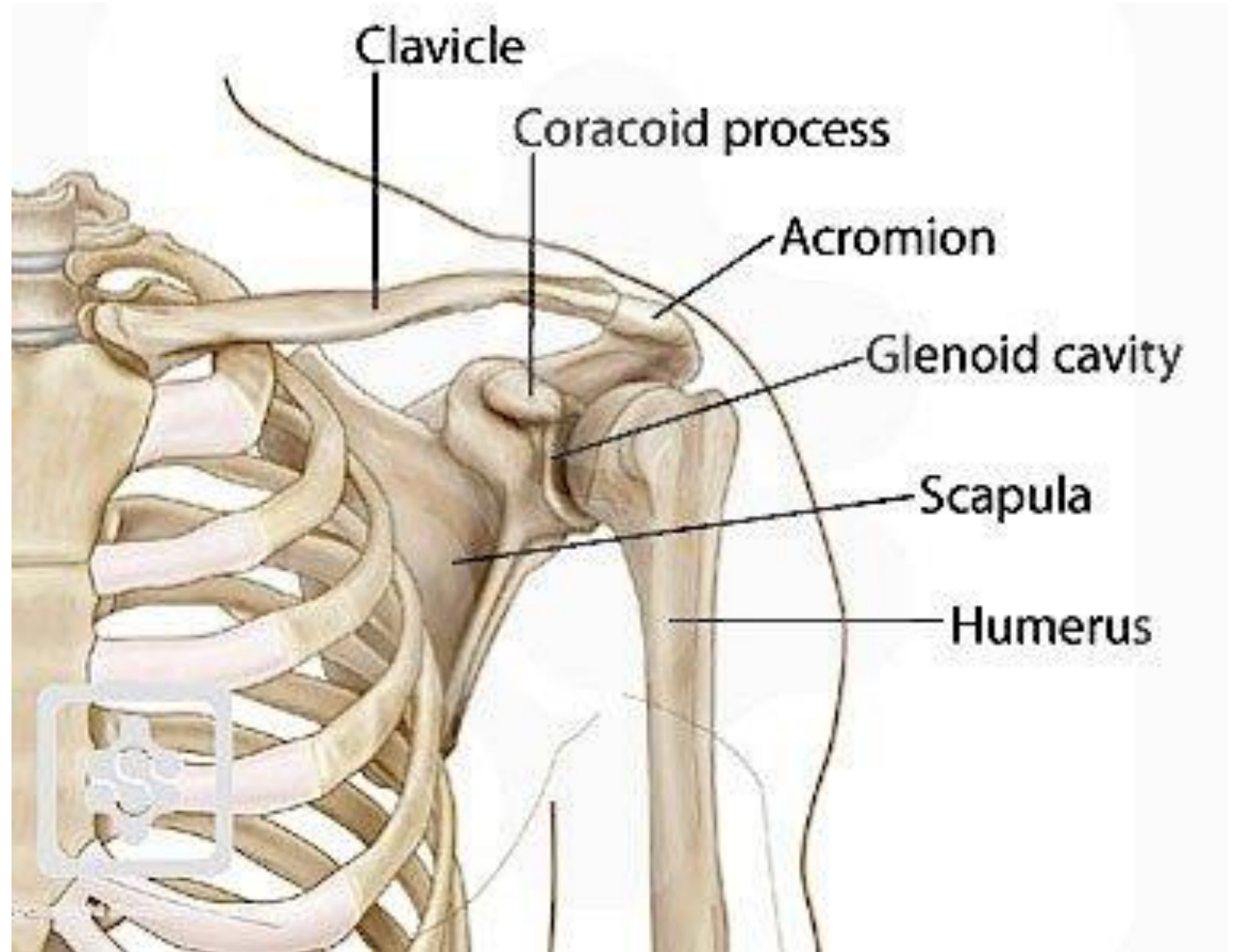
Indications for shoulder radiographs.

- Shoulder trauma
- Bony tenderness at the glenohumeral joint/region
- Restriction of rotation
- Instability
- Suspected dislocation
- AC joint injury
- Scapula trauma
- Suspected arthritis
- Non-traumatic shoulder pain

SHOULDER

Shoulder bones

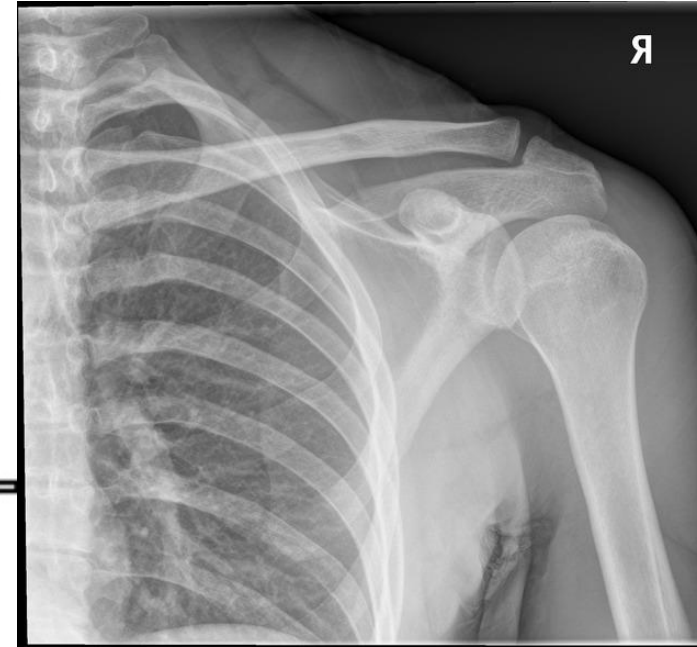
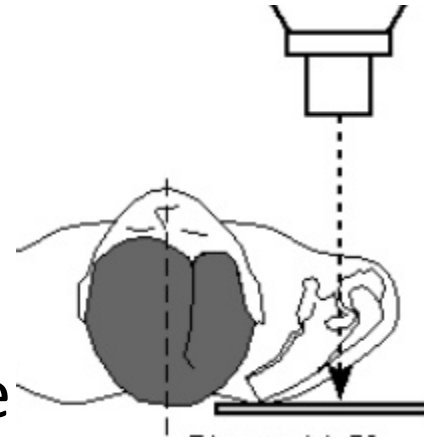
- Proximal humerus
- Scapula
- Lateral end of clavicle



Standard radiographic projections

AP view

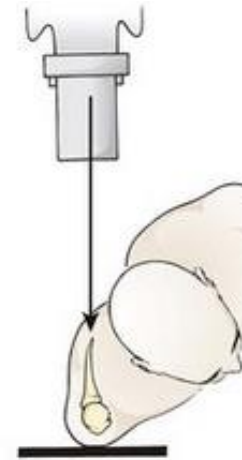
- Show glenohumeral joint in the natural anatomical position
- Shows the humeral head superimposing the glenoid of the scapula
- Displays the entire clavicle, AC joint, scapula, superior ribs, SC joint and proximal humerus



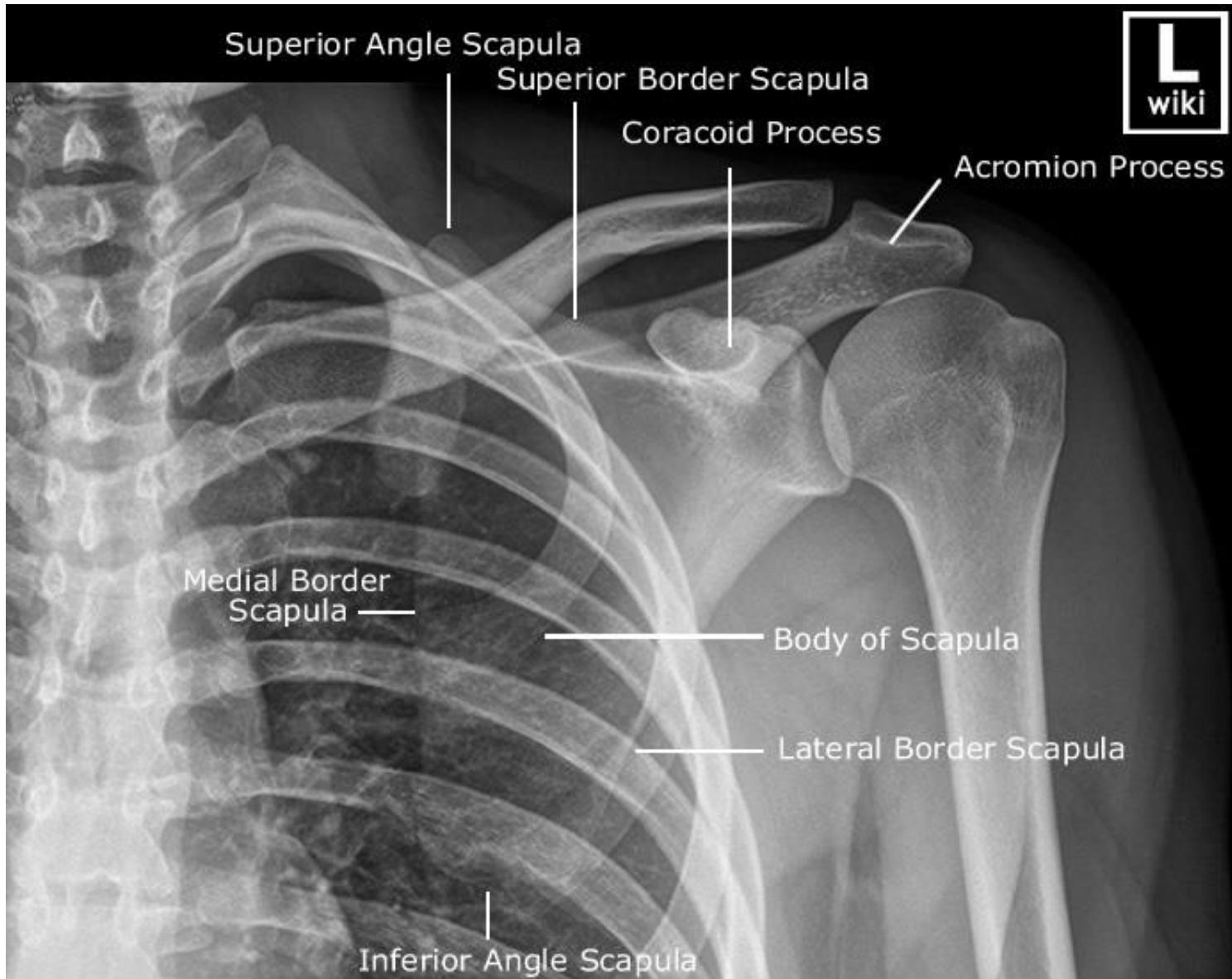
Lateral or scapular Y view

- Orthogonal view of the AP shoulder view
- Profile view of the scapula
- Demonstrates the degree and direction of any suspected dislocations

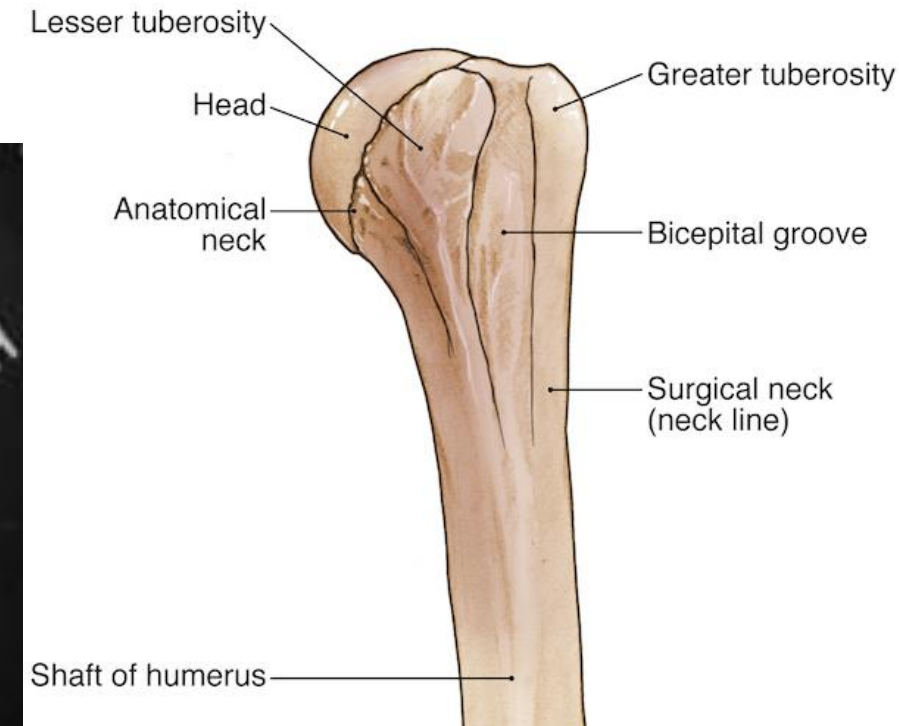
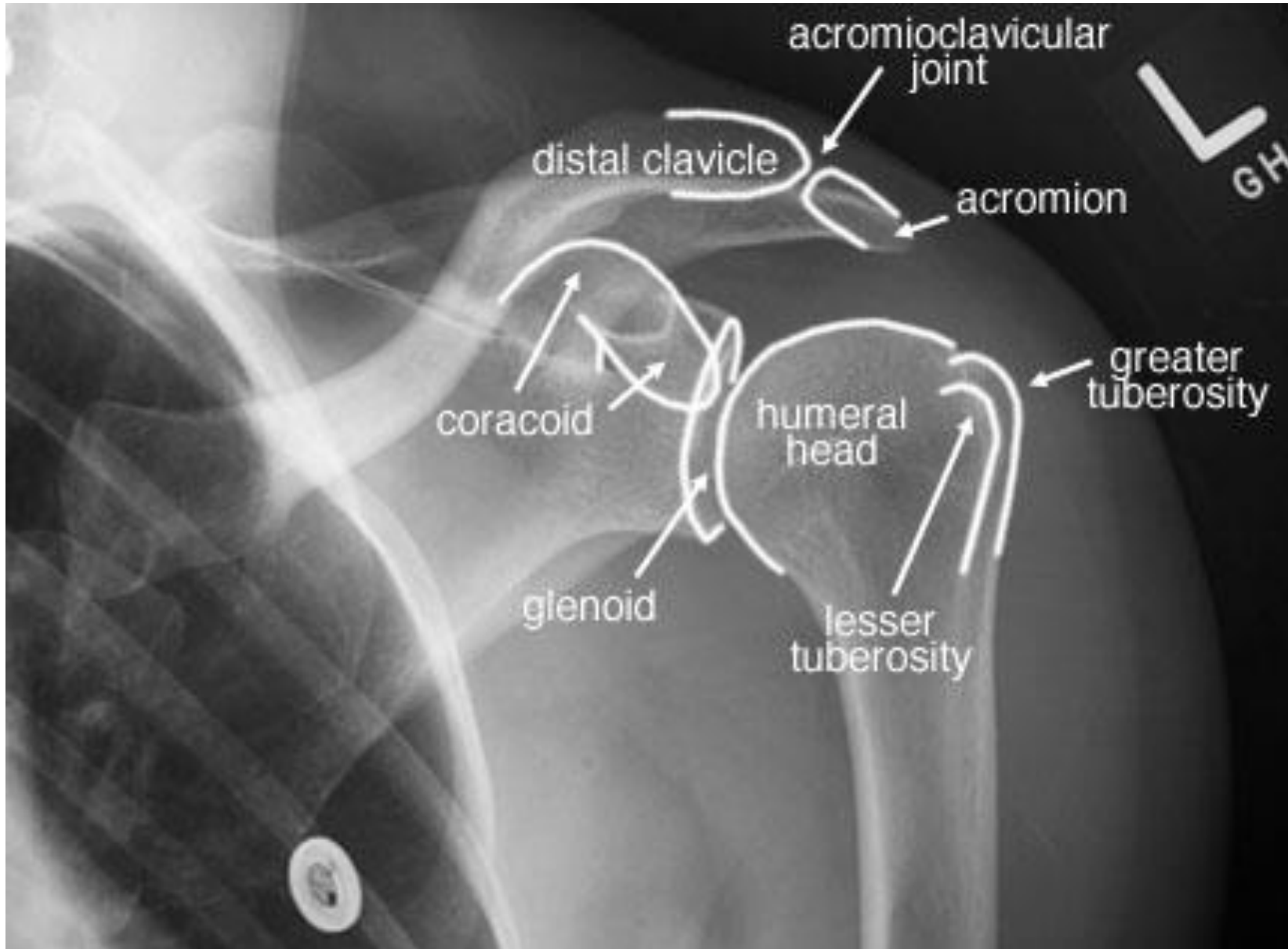
Scapular
"Y" view



Anatomy of the X Ray SJ - AP view

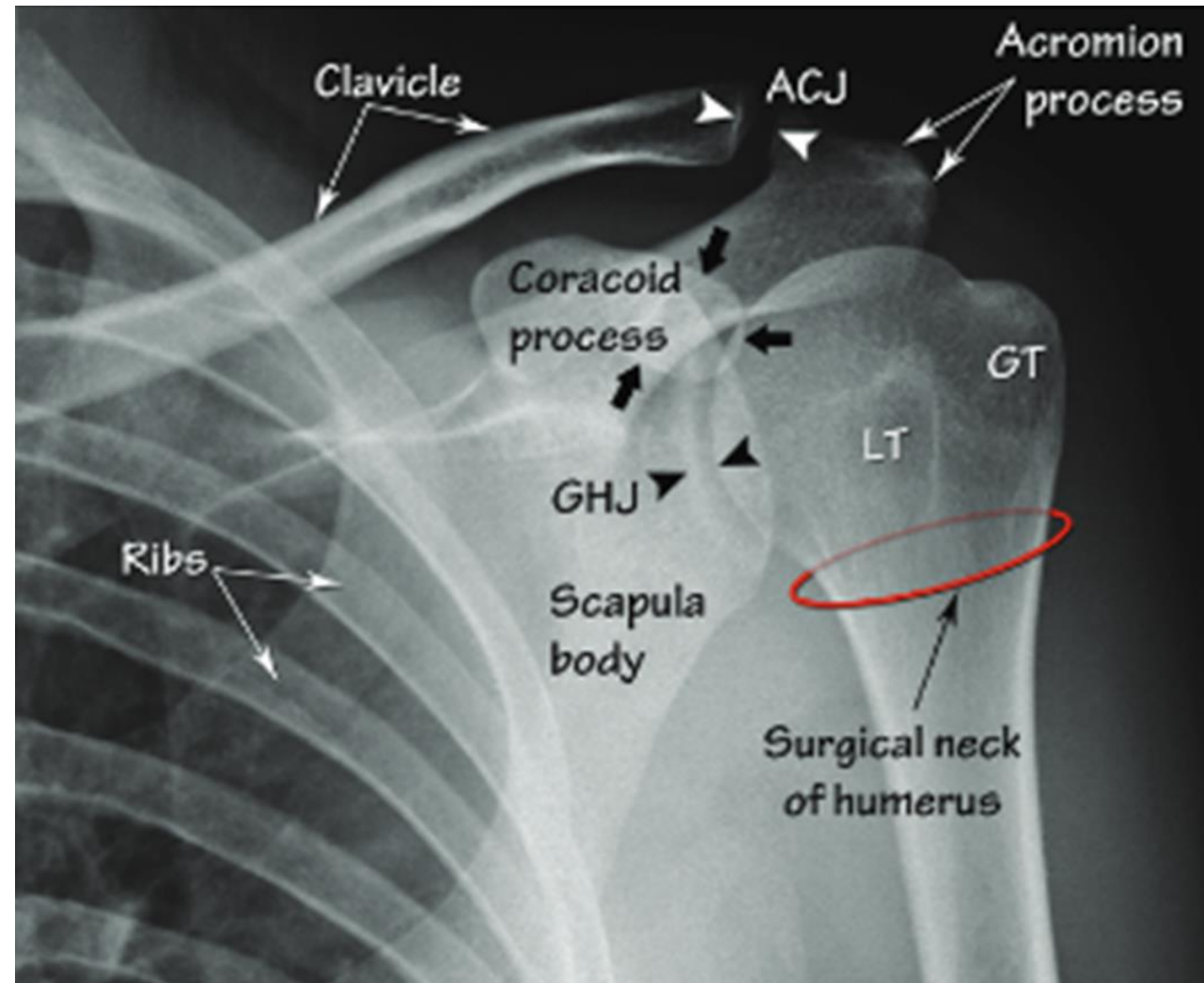


Anatomy of the X Ray SJ - AP view



Proximal humerus

- **Head** - Sits in the glenoid of the scapula
- **Glenohumeral joint** –
synovial ball - and – socket
- **Anatomical neck** - forms an insertion surface of the glenohumeral joint capsule
- **Surgical neck**- is a common site for fractures
- **Greater and lesser tubercles** -rotator cuff muscles (supraspinatus, infraspinatus, teres minor,subscapularis- SITS).



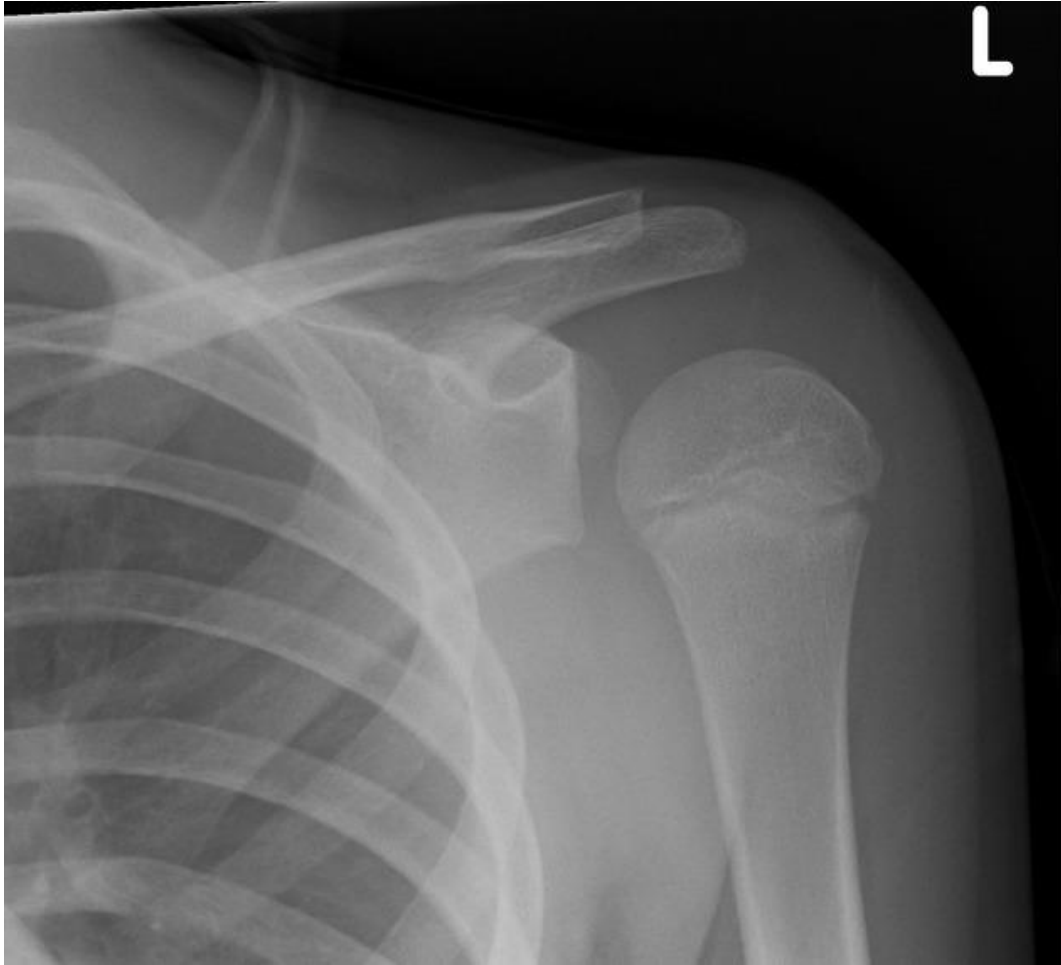
Shoulder dislocation

- Separation of the humerus from the glenoid of the scapula at the glenohumeral joint.
- [Anterior](#) >95%
- [Posterior](#) 2-4%
- [Inferior](#) (luxatio erecta) <1%

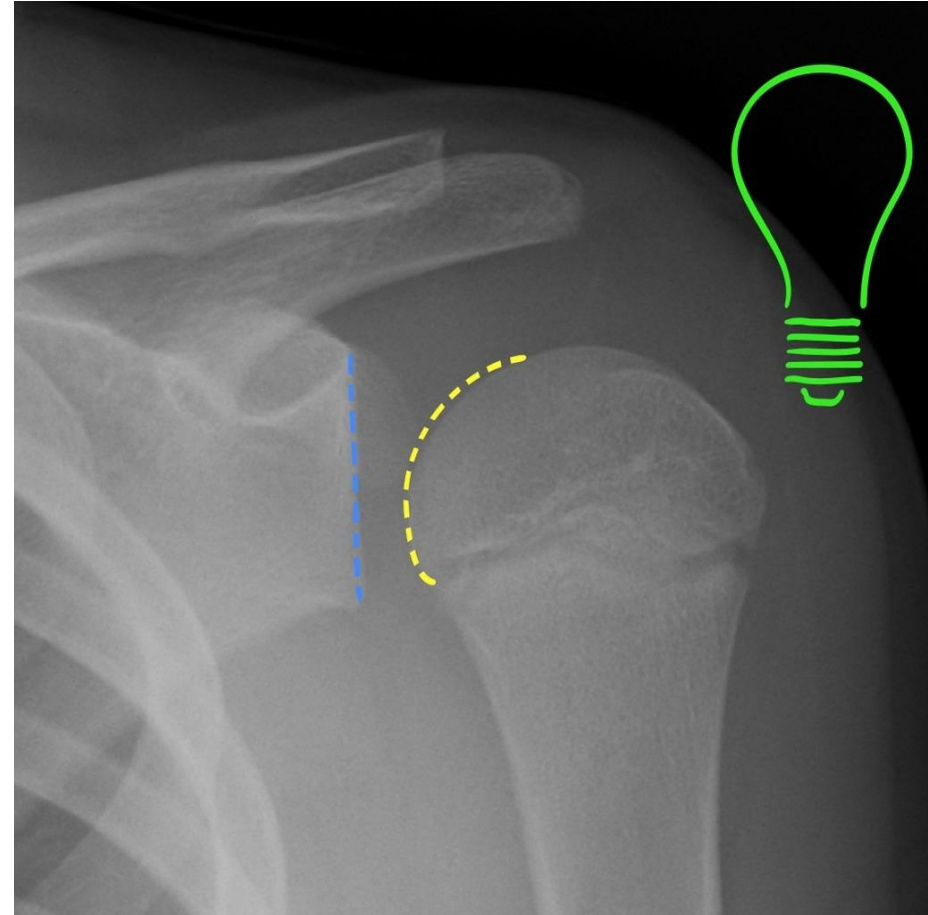
Anterior dislocation



Shoulder dislocation-Posterior dislocation

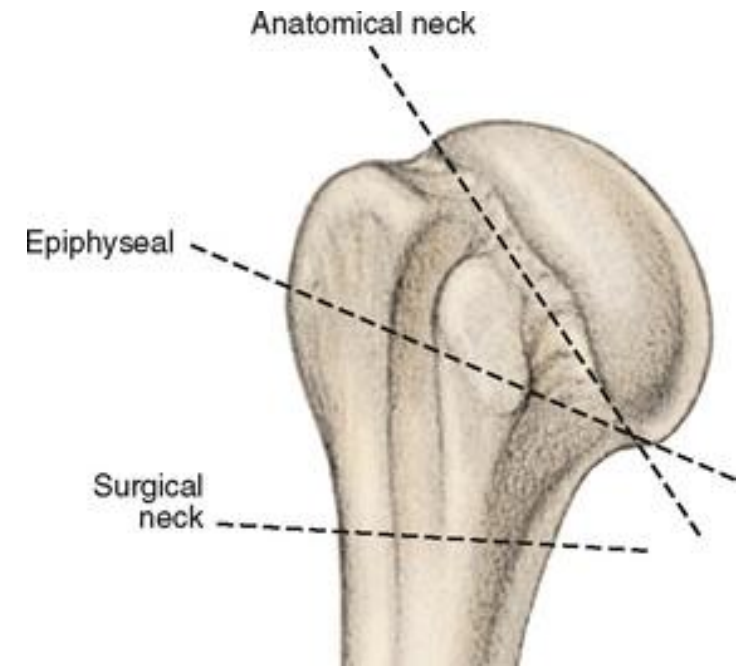


50 % missed in normal A-P view

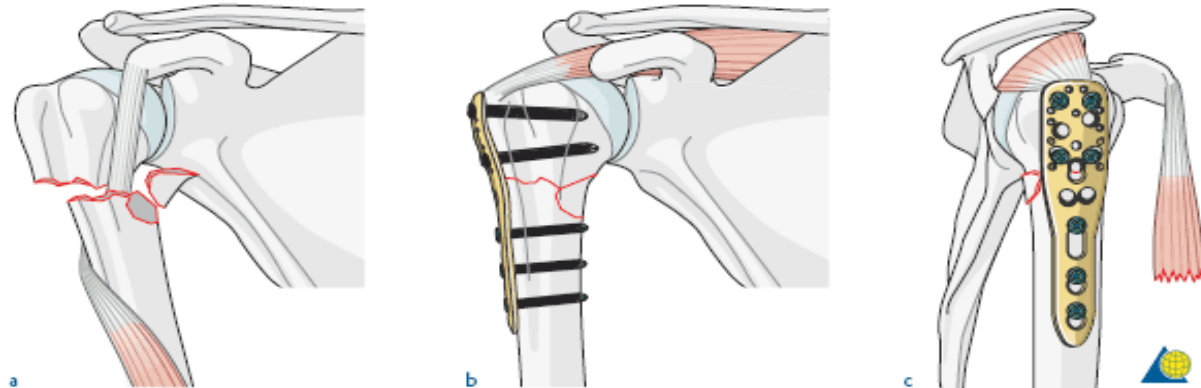


Light bulb appearance

Fracture proximal humerus



- Third most common fracture pattern seen in elderly
- Complications
 - Axillary nerve injury /palsy
 - Shoulder dislocation



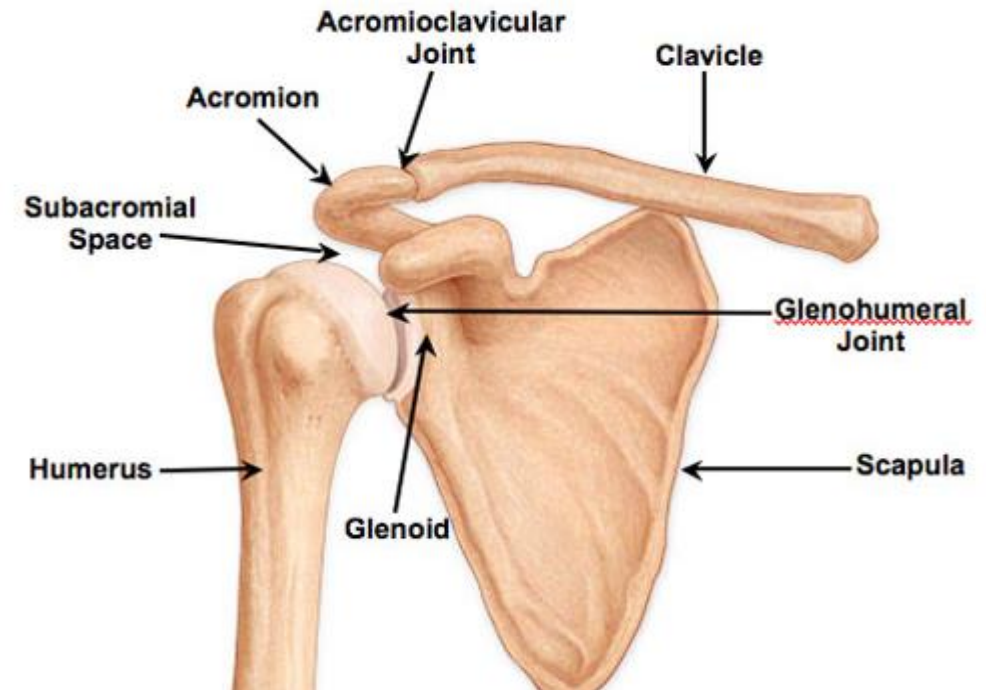
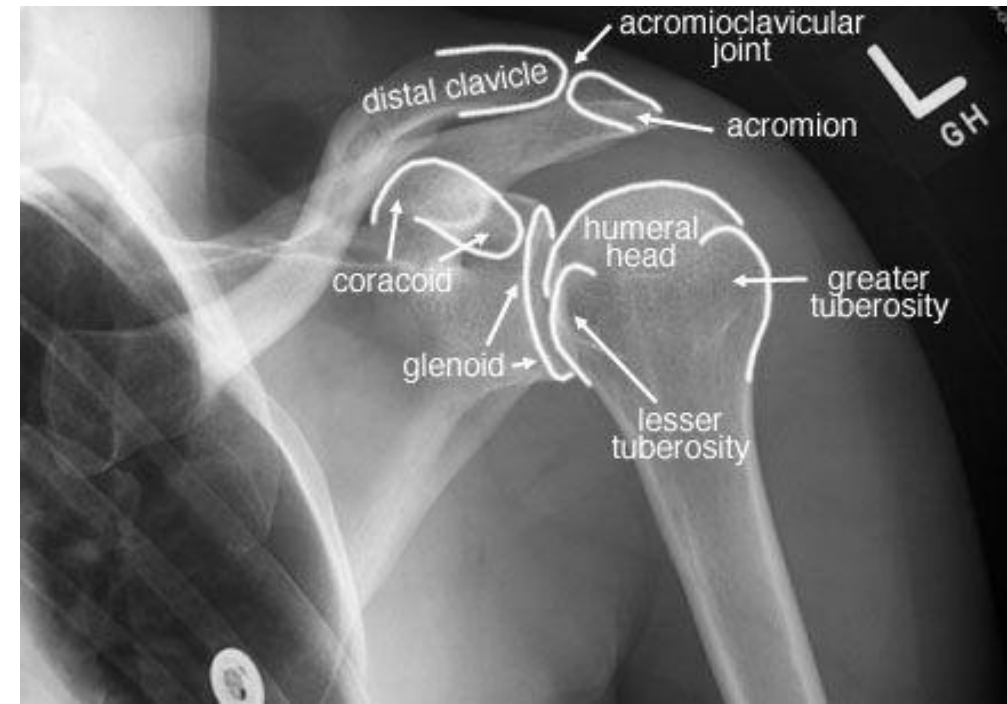
Scapula in shoulder joint

Glenoid fossa –

- Articulates with the humeral head.
- Attachment points for the long head of biceps and the long head of triceps muscles.

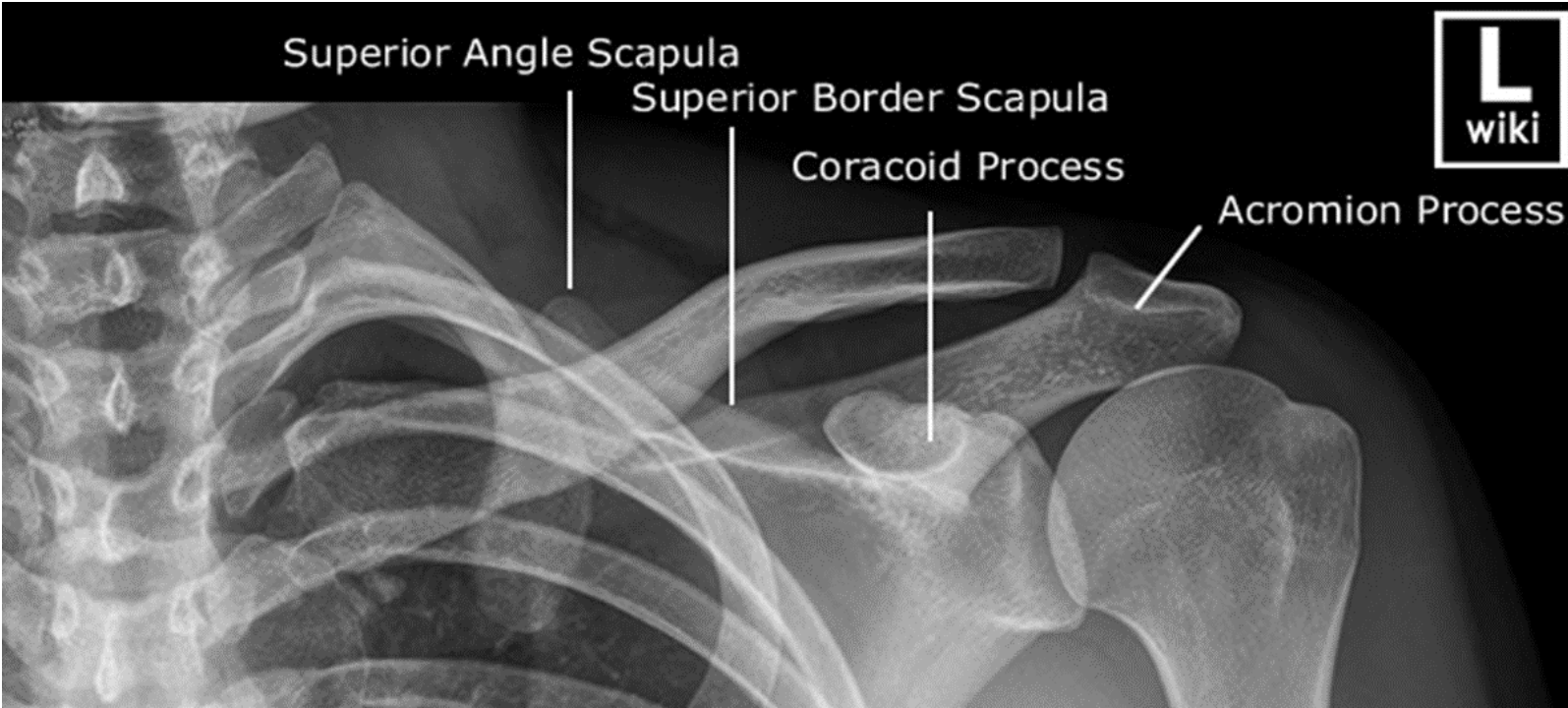
Acromion –

- Is the highest point of the shoulder and articulates with the lateral end of the clavicle
- Synovial acromioclavicular joint



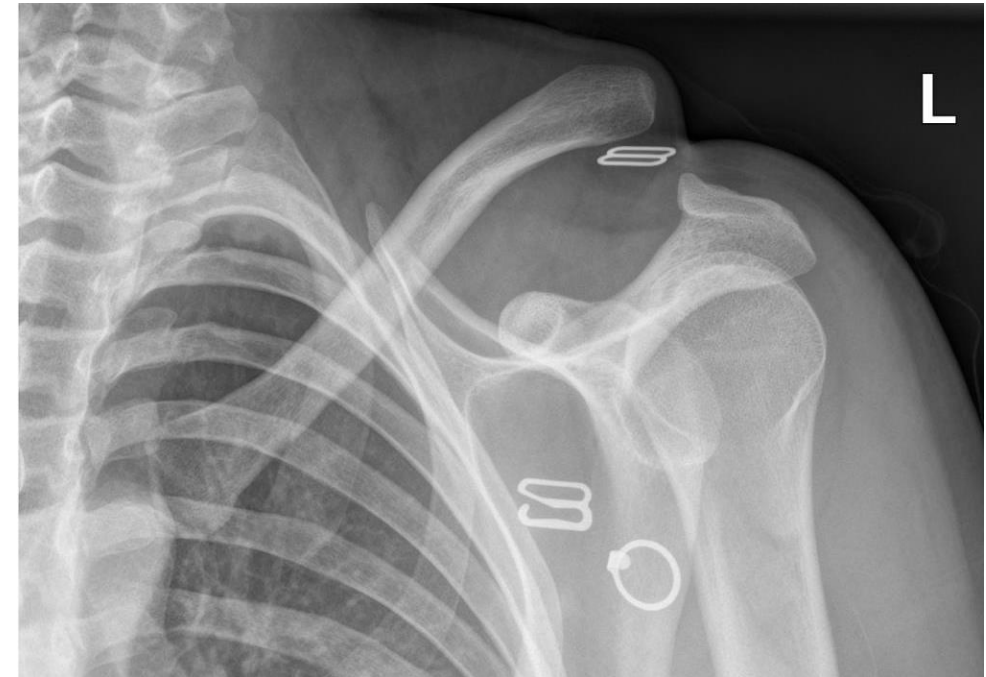
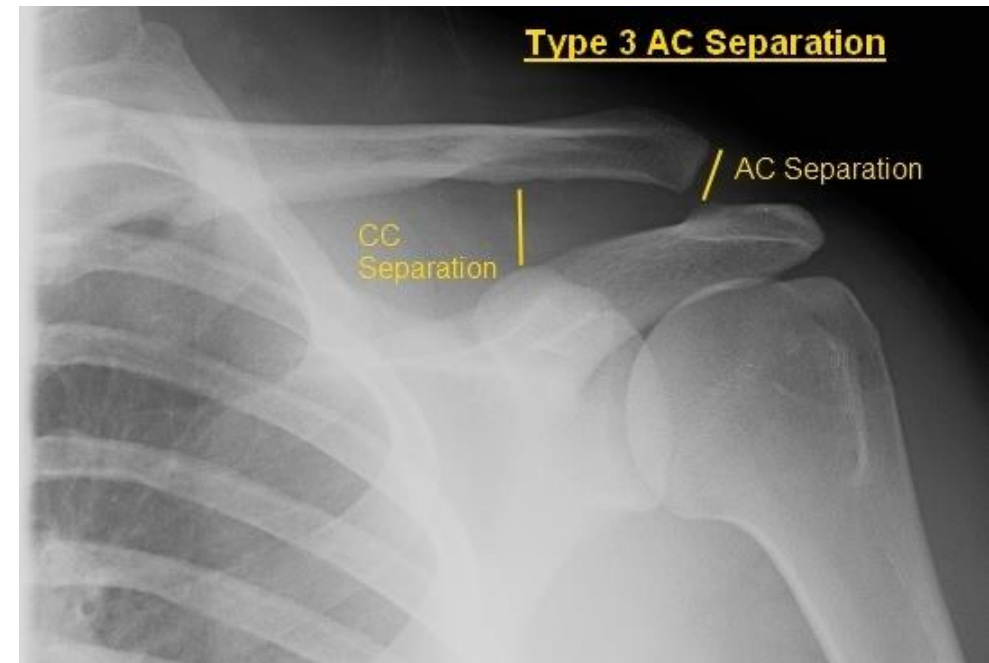
Clavicle

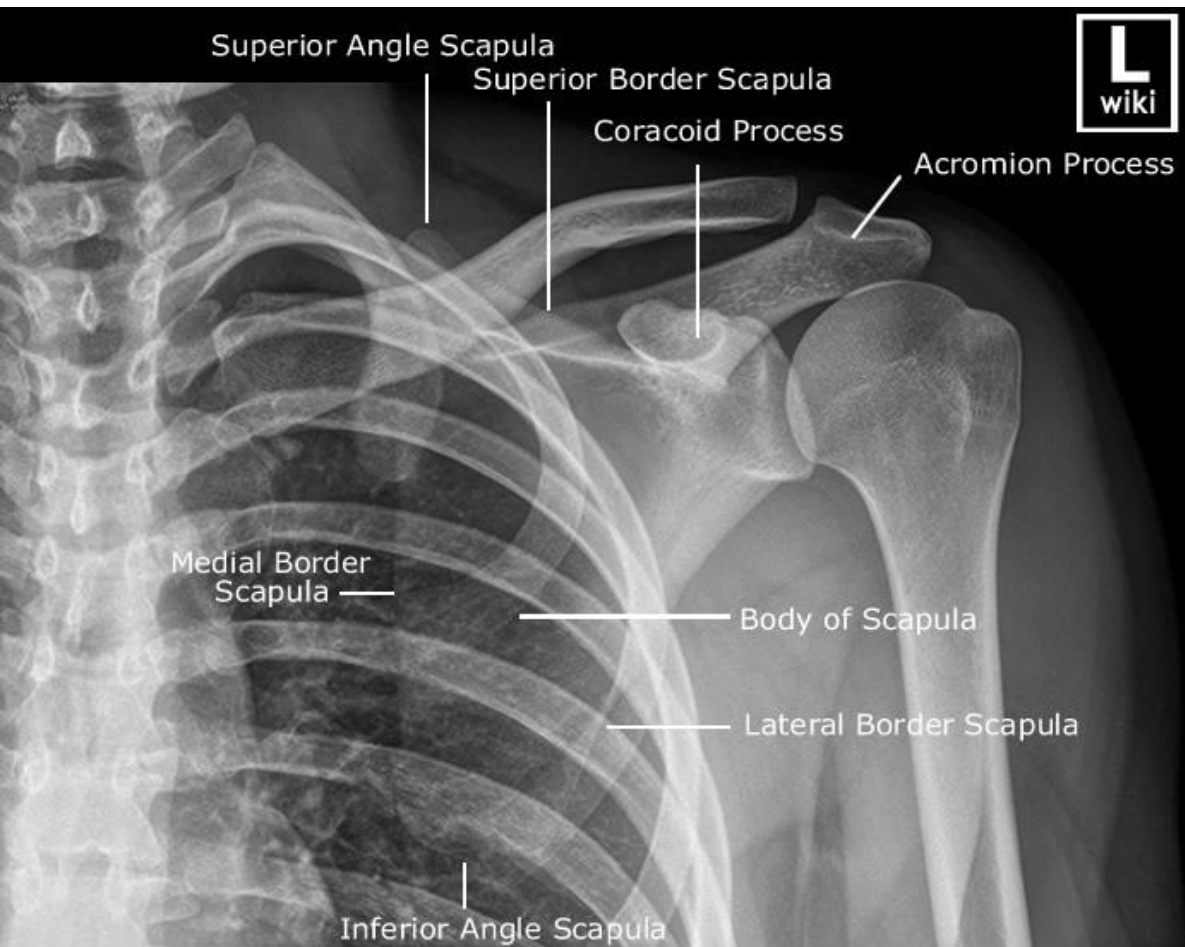
- Connect the scapula to the sternum
- Attachment points for the
 - Trapezius
 - Deltoid
 - Pectoralis major muscles



Acromioclavicular dislocation

- Occur from a direct blow or following
- Widening of the AC joint
 - normal: 5-8 mm (narrower in the elderly)
 - greater than 2-4 mm asymmetry (compare NL side)
- Increased coracoclavicular (CC) distance
 - normal: 10-13 mm
 - greater than 5 mm asymmetry (compare NL side)
- Superior displacement of the distal clavicle





Illustrations : anterior view

Labels on the left side (Humerus):

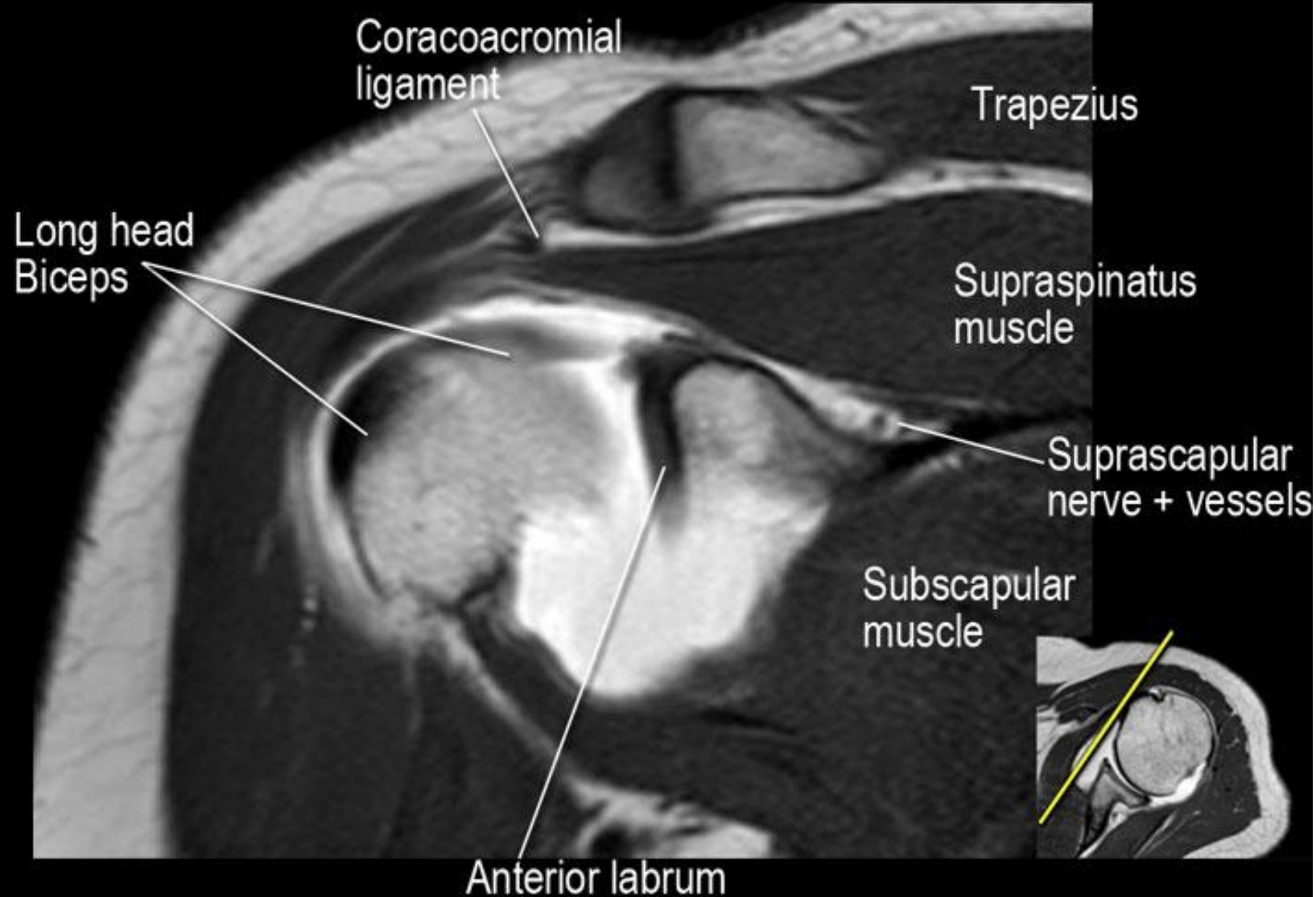
- Acromion
- Acromial angle
- Supraglenoid tubercle
- Head
- Greater tubercle
- Lesser tubercle
- Anatomical neck
- Intertubercular sulcus; Bicipital groove
- Glenoid cavity
- Surgical neck
- Infraglenoid tubercle
- Crest of greater tubercle; Lateral lip
- Crest of lesser tubercle; Medial lip
- Humerus

Labels on the right side (Scapula and Clavicle):

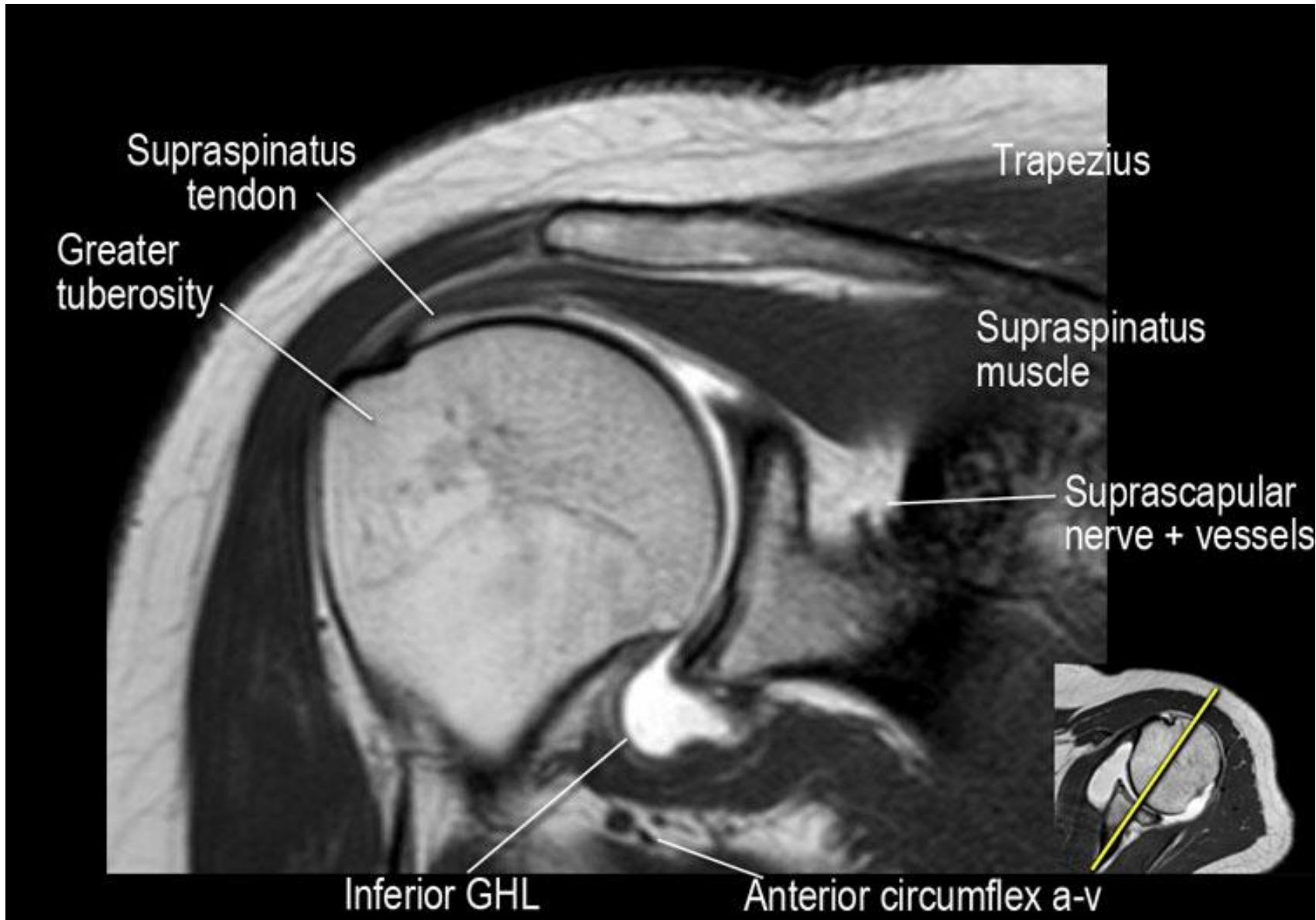
- Spine of scapula
- Superior angle
- Superior border
- Supraspinous fossa
- Suprascapular notch
- Clavicle
- Coracoid process
- Scapula
- Medial border
- Neck of scapula
- Subscapular fossa
- Lateral border
- Inferior angle



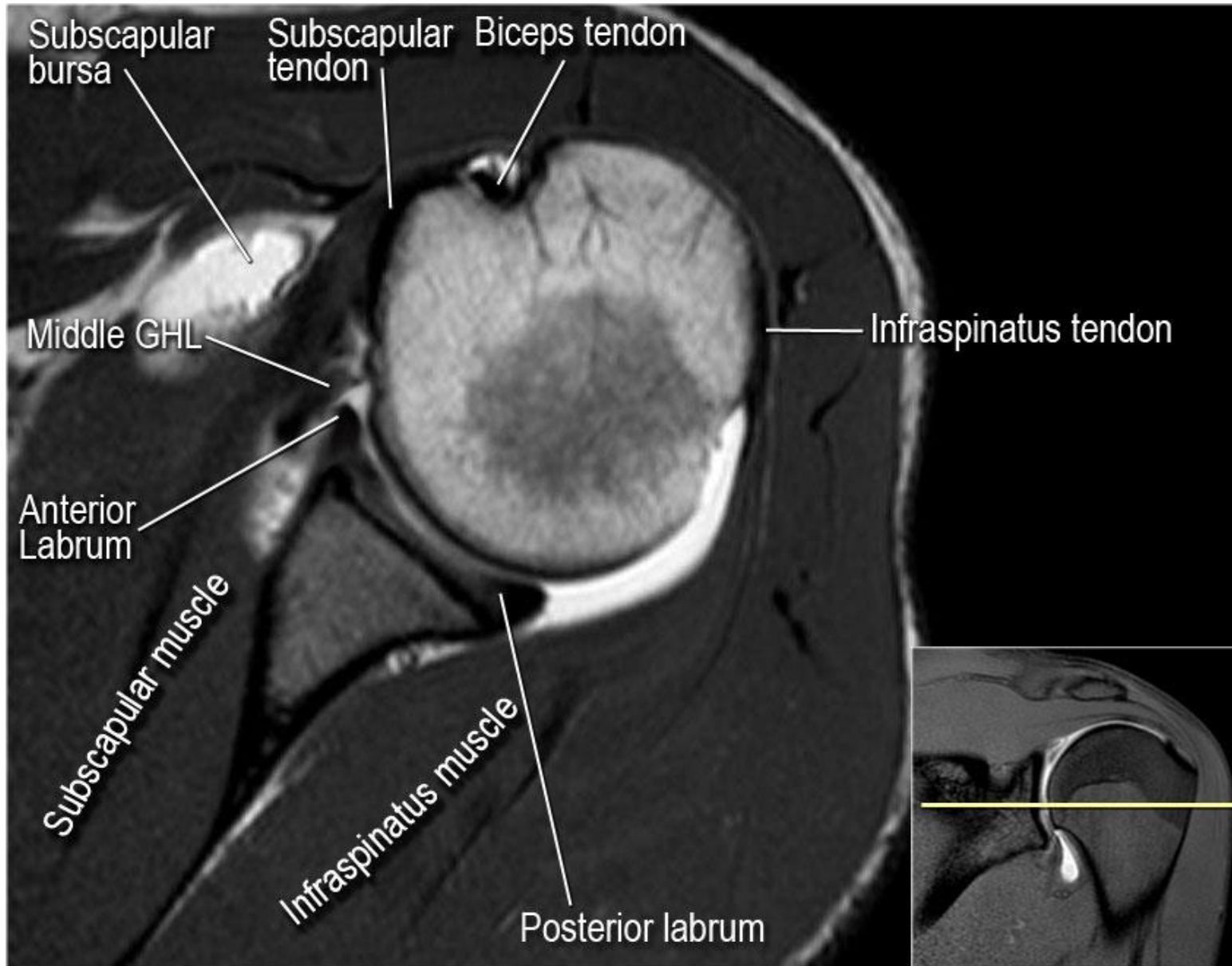
MRI - Anatomy of shoulder joint –Coronal view

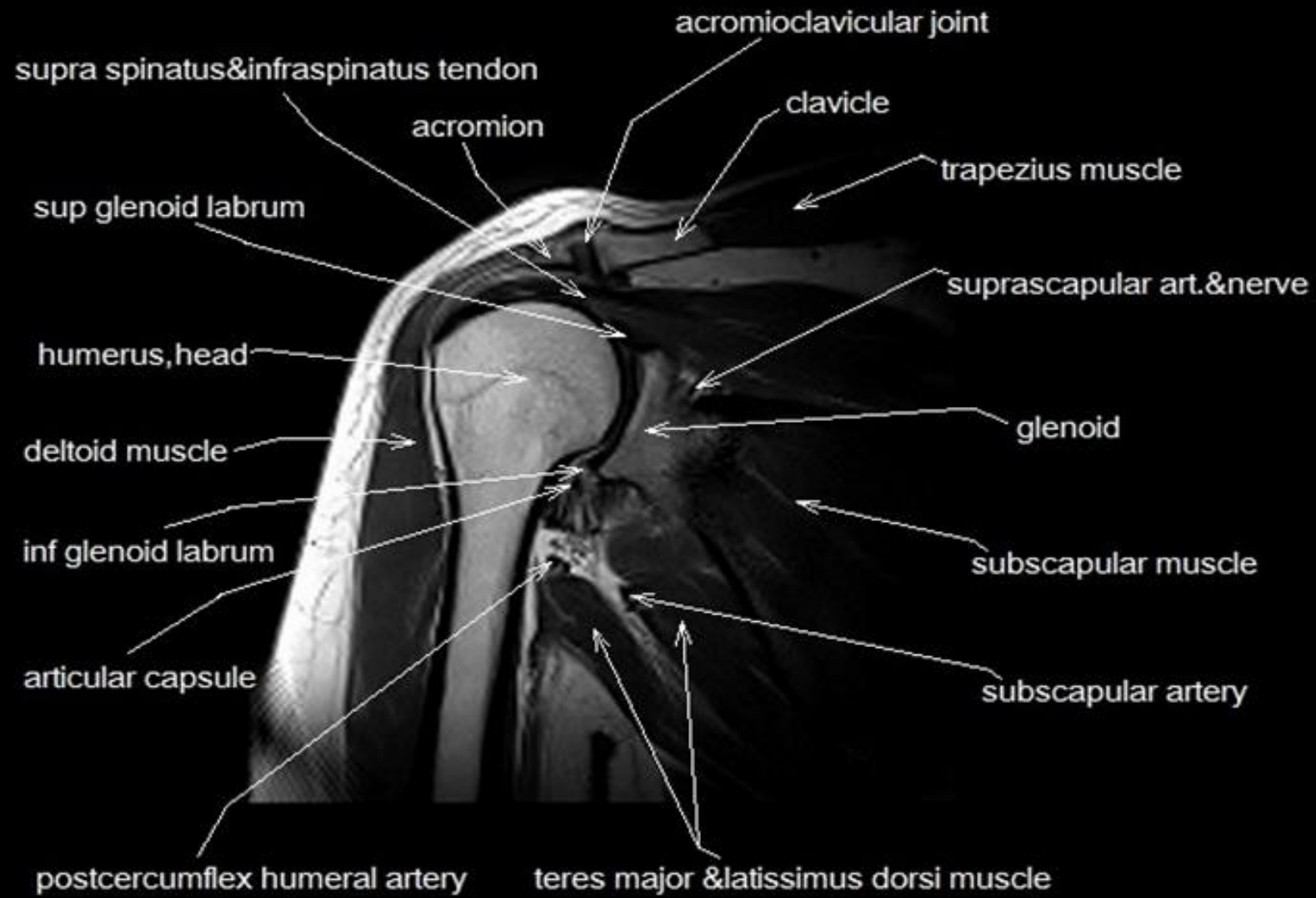


MRI - Anatomy of shoulder joint-Coronal view



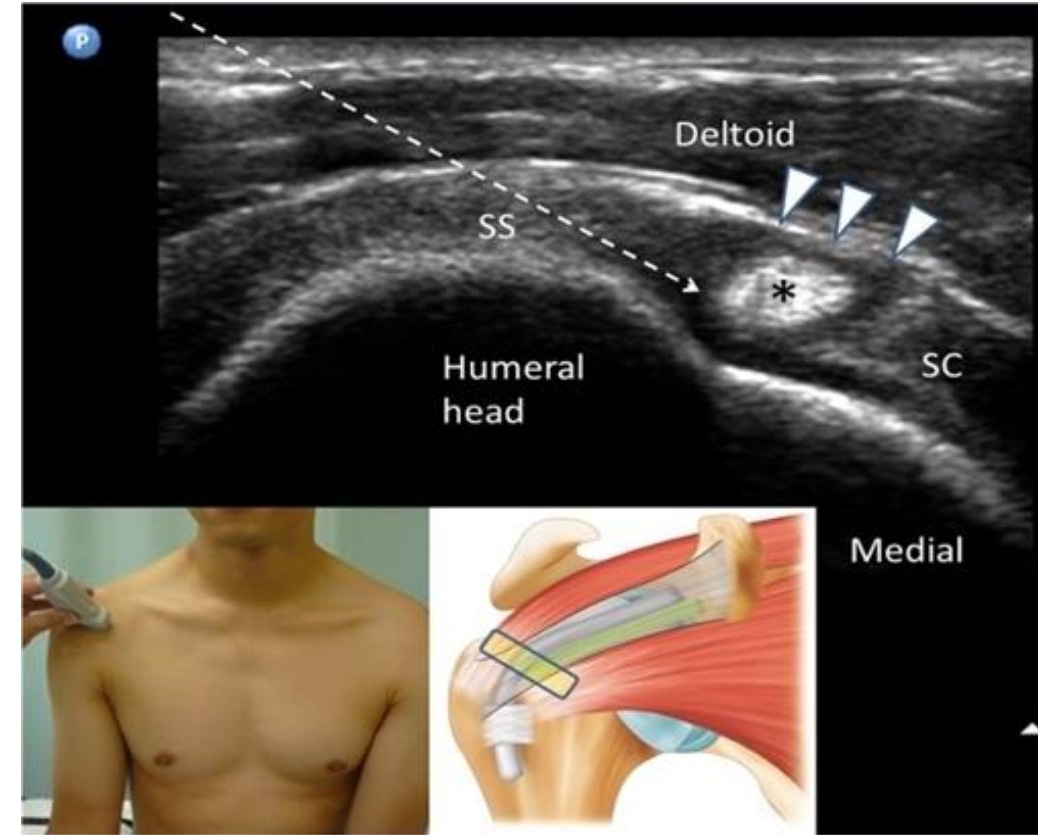
MRI - Anatomy of shoulder joint- axial view





Ultrasound of the shoulder joint

- Fast, relatively cheap and dynamic way to examine the rotator cuff
- Useful in diagnosing:
 - [Shoulder impingement](#)
 - [Shoulder instability](#)
 - [Rotator cuff](#) disorders



Elbow joint

Elbow x-rays are indicated for a variety of settings including:

- trauma
- bony tenderness
- suspected fracture of the proximal radius and ulna
- suspected fracture of the distal humerus
- radial head dislocations
- obvious deformity
- detecting joint effusions
- arthritis
- infection

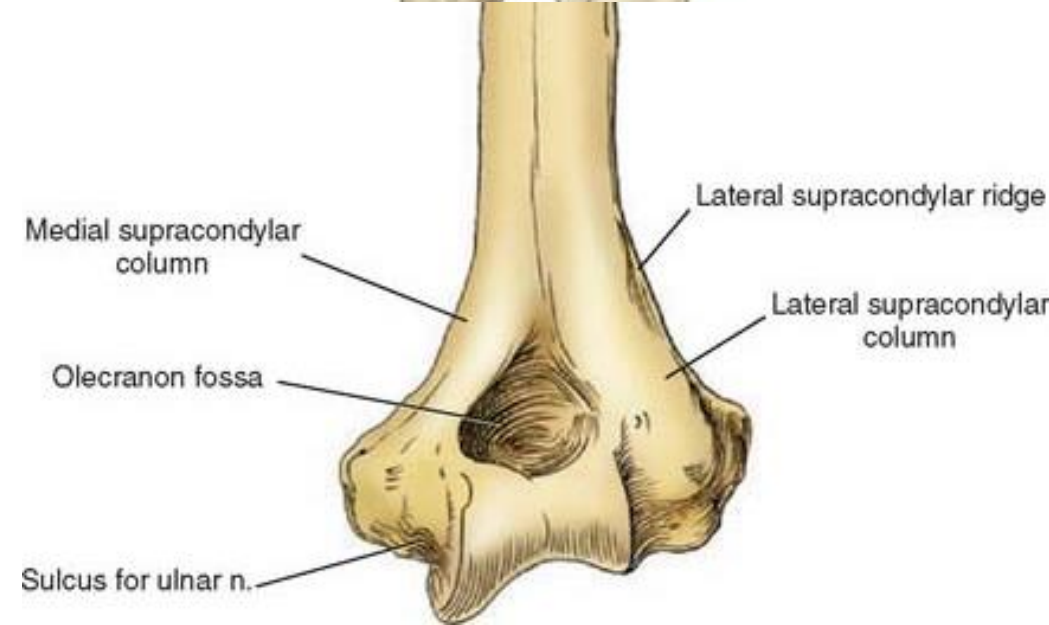
Standard radiographic projections

- AP
 - Demonstrates distal humerus, proximal ulna, and radius
 - Shows both the medial and lateral epicondyles in profile
- Lateral
 - Best demonstrates the ulna-trochlear joint, coronoid process, and the olecranon process
 - Used to assess both the anterior humeral line and the radiocapitellar line



Elbow

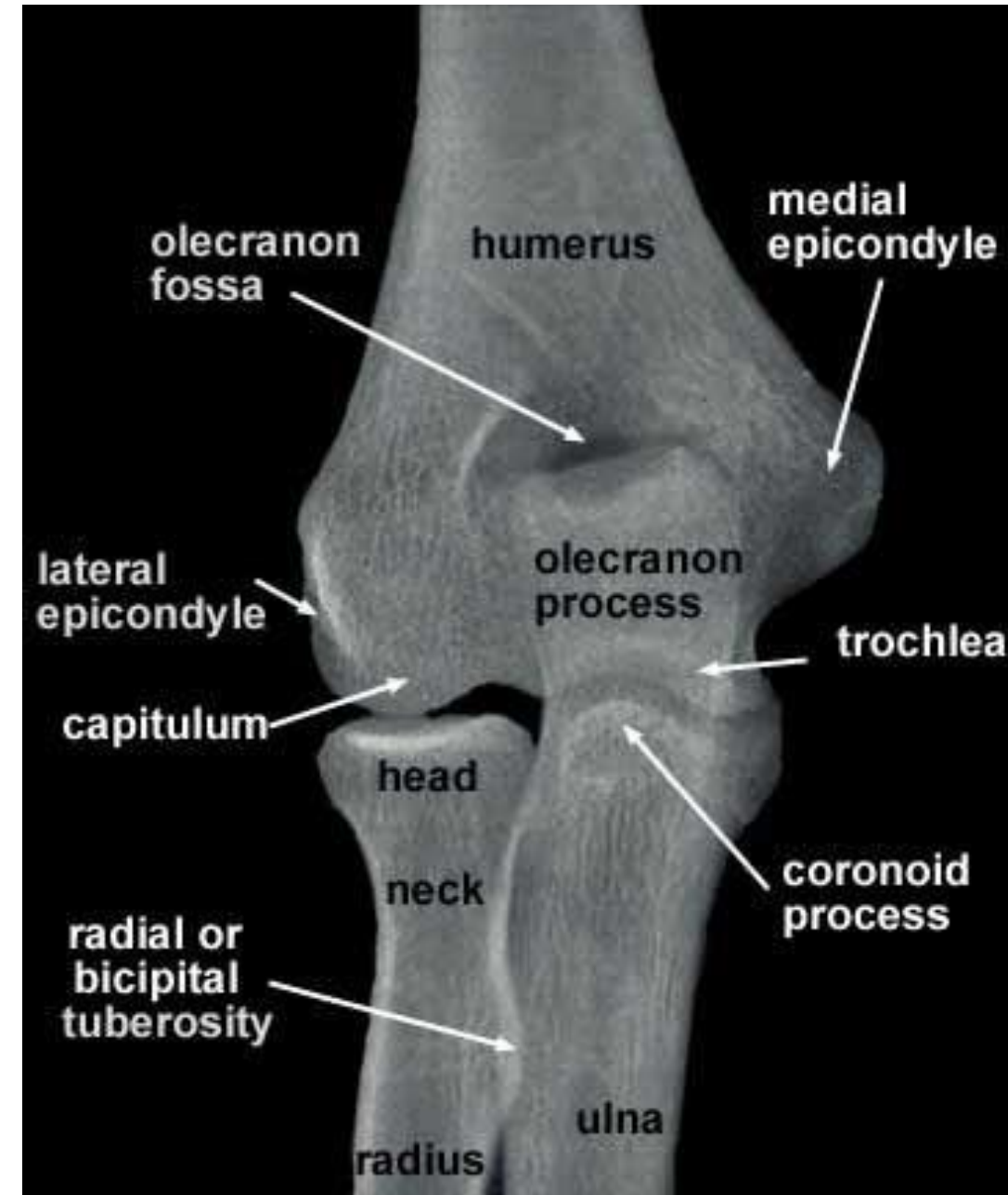
- **Distal humerus-**
 - Medial and lateral epicondyles**
 - Capitulum** - articulates with the radius
 - Trochlea** - articulates with the ulna
 - Olecranon fossa** - lies posteriorly to accommodate the olecranon of the ulna
 - Coronoid fossa** – lies anteriorly accommodates the coracoid process of the proximal ulna



Elbow

- **Distal humerus-**

- Medial and lateral epicondyles
- Capitulum** - articulates with the radius
- Trochlea** - articulates with the ulna
- Olecranon fossa** - lies posteriorly to accommodate the olecranon of the ulna
- Coronoid fossa** – lies anteriorly
accommodates the coronoid process of the proximal ulna



Elbow

- **Proximal radius** – this is cylindrical and lies lateral to the wider and bulkier proximal ulna
- **Head** - articulates with the capitulum of the humerus proximally and the radial notch of the ulna medially
- ‘neck’, and radial tuberosity - attachment point of the biceps muscle.

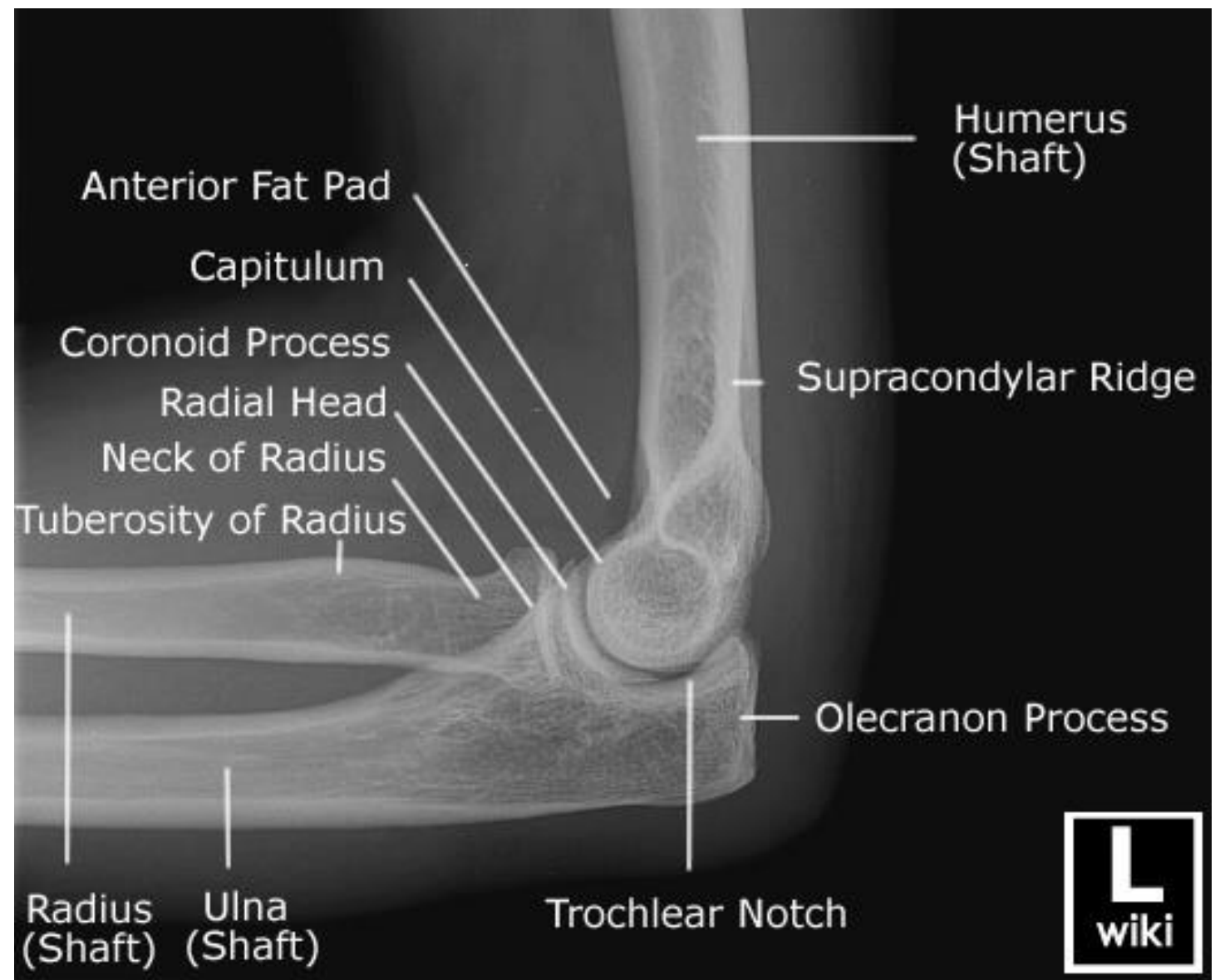
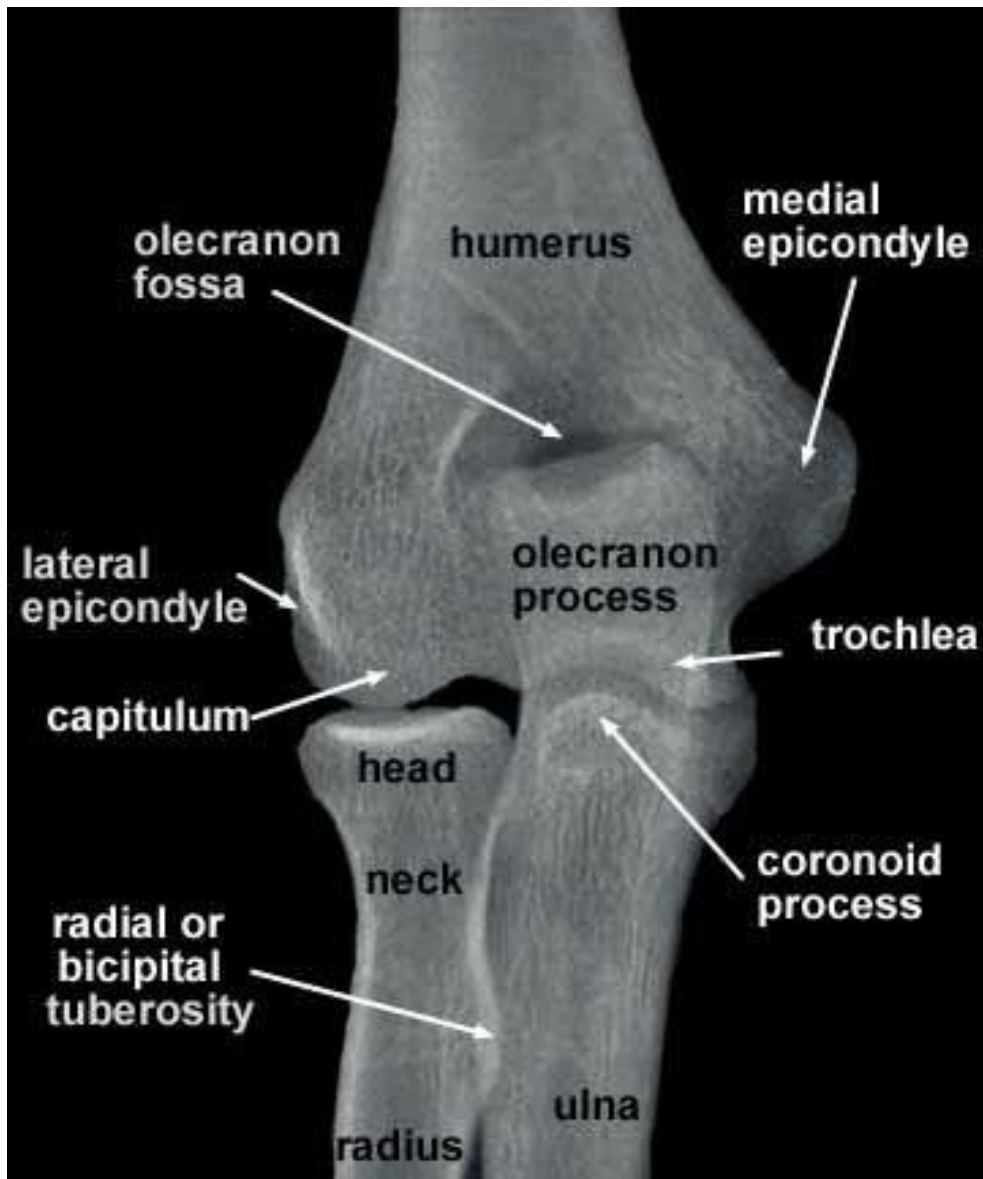


Elbow

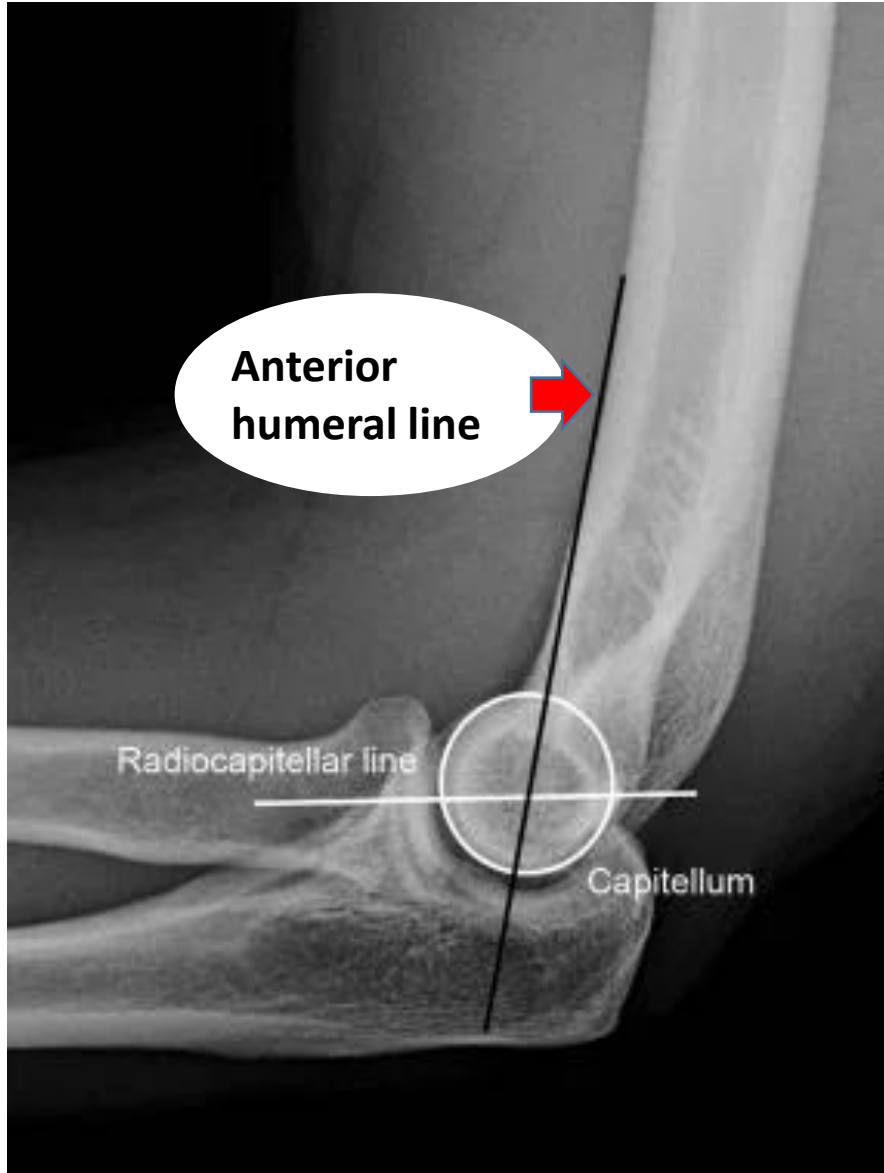
- **Proximal ulna** – this is broad and lies medial to the narrow proximal radius.
- comprises the olecranon
- sits in the olecranon fossa of the humerus and articulates as a hinge joint with the trochlea of the humerus
- Radial notch which articulates with the radial head and permits pronation of the radius over the ulna



X Ray elbow joint AP and Lat



X Ray elbow joint –Lat-Important lines



Anterior humeral line:

- Drawn down the anterior aspect of the humerus and should intersect with the middle third of the capitellum.
- Posterior displacement of the capitellum should raise suspicion for a supracondylar fracture.

Radiocapitellar line:

- A disruption along this line should raise suspicion for a lateral condyle fracture or a radial head/elbow dislocation.

Elbow joint –Fracture and dislocations



Dislocation



Supracondylar fracture



- Abnormal anterior and posterior fat pads
- Children- suggests a condylar fracture
Adults - suggests radial head fracture.
- Fat pad sign only occurs after an intra-articular fracture.

Wrist

Wrist x-rays are indicated for a variety of settings including:

- Wrist trauma-suspected fracture
- Bony tenderness
- Non-traumatic deformity
- Non traumatic wrist pain

Wrist-Standard radiographic projections

- PA
 - demonstrates the metacarpals, radius and the ulna in the natural anatomical position
 - the best view to inspect the joint spaces of the carpal bones and the distal radio-ulnar joint
- oblique
 - external oblique projection of the wrist
- lateral
 - projection 90° to the PA view
 - demonstrates multiple carpal bones overlapping
 - the essential view to assessing the alignment of the radius, lunate, and capitate in the setting of a suspected dislocation

Wrist



Wrist-AP



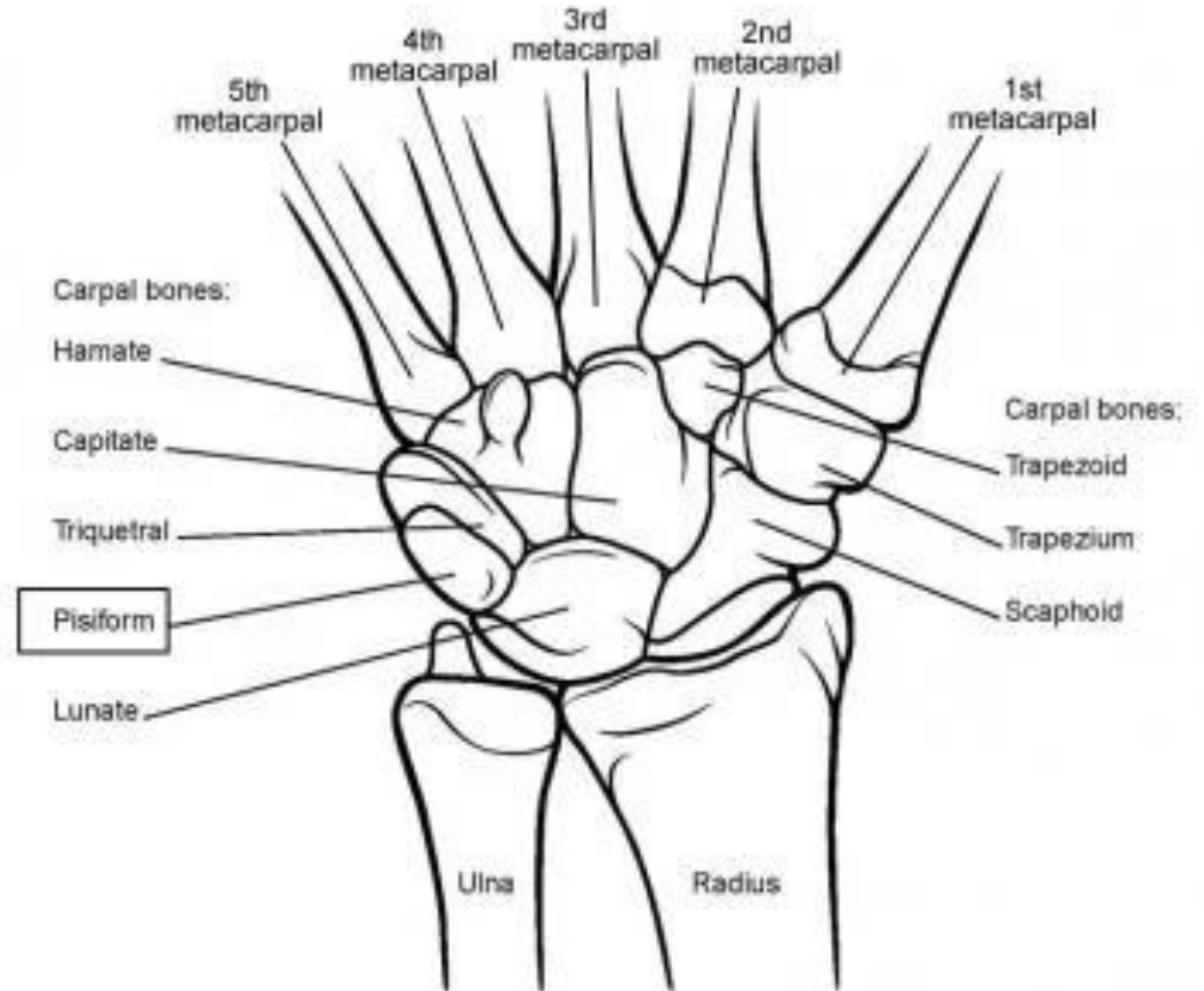
Wrist-Oblique



Wrist-Lat

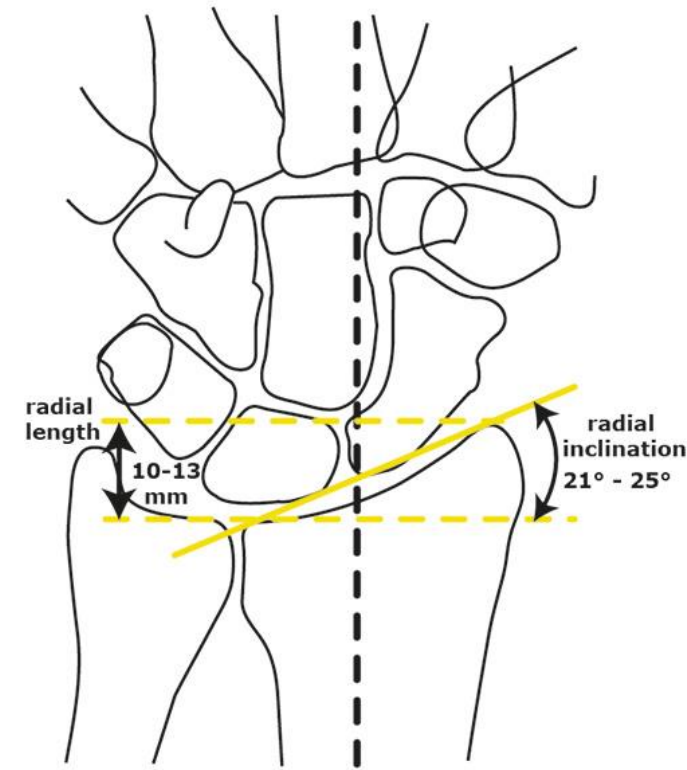
Wrist

- The wrist bones include.
 - Distal radius and ulna
 - Eight carpal bones,
 - Proximal metacarpals



Wrist-distal radius

- This is broad and lies lateral to the narrow distal ulna.
- The distal radius has a bifaceted surface to articulate with the **scaphoid and lunate** in the proximal carpal row.
- The distal radius also has an articulation with the distal ulna to form the distal radioulnar joint (DRUJ).



L

TRAPEZOID

TRAPEZIUM

SCAPHOID

LUNATE

HAMATE

CAPITATE

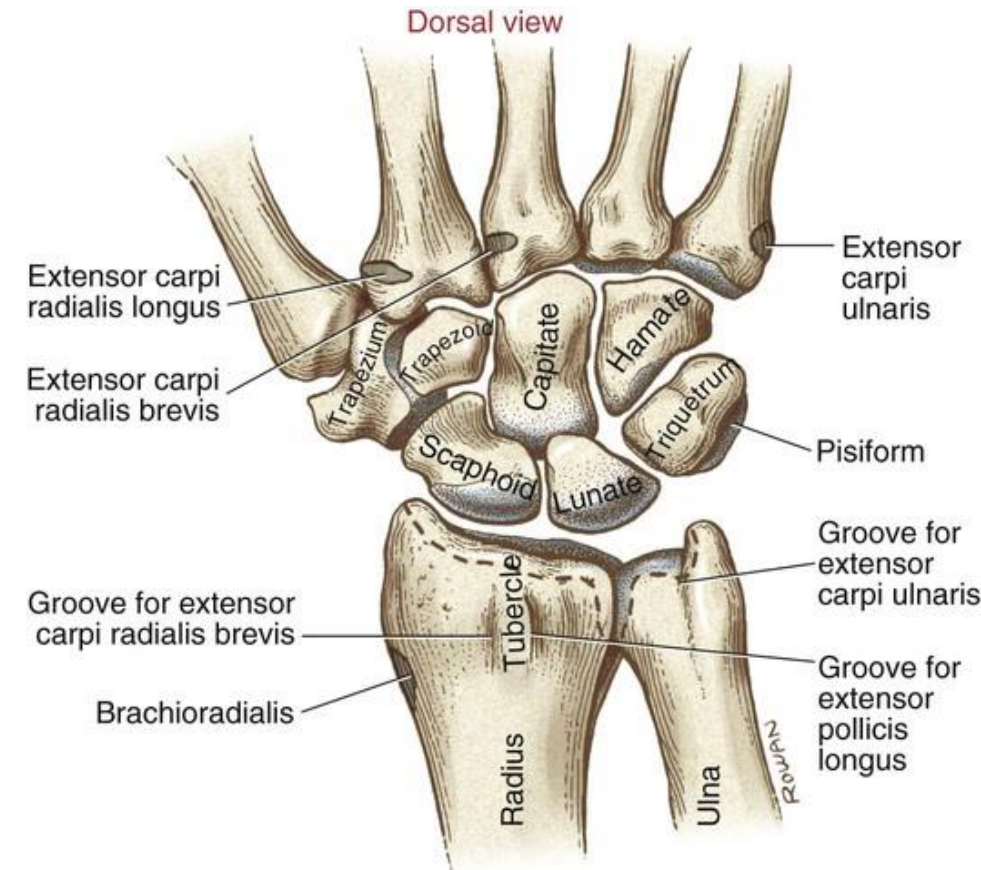
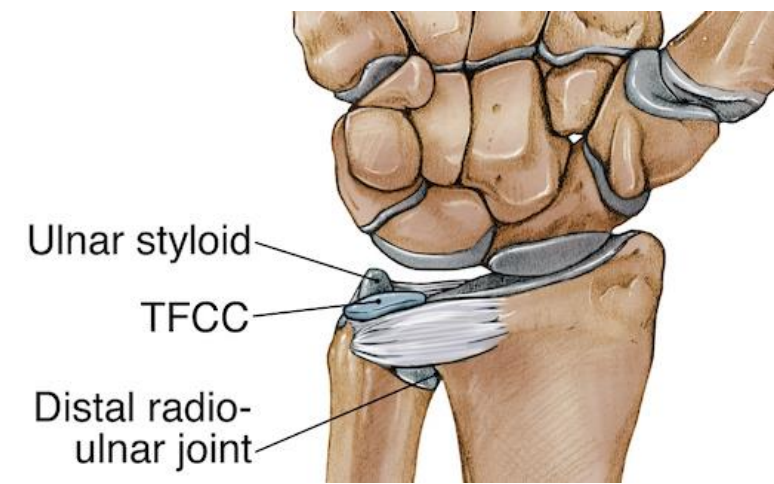
TRIQUETRIUM

PISIFORM



Wrist-distal ulna

- This is narrow and lies medial to the broad distal radius.
- It does not articulate directly with the proximal carpal row
- Articulate with the radius at the DRUJ and forms attachment for the clinically important triangulofibrocartilage complex (TFCC) which lies between the ulnar styloid and the triquetrum



Wrist-carpal bones

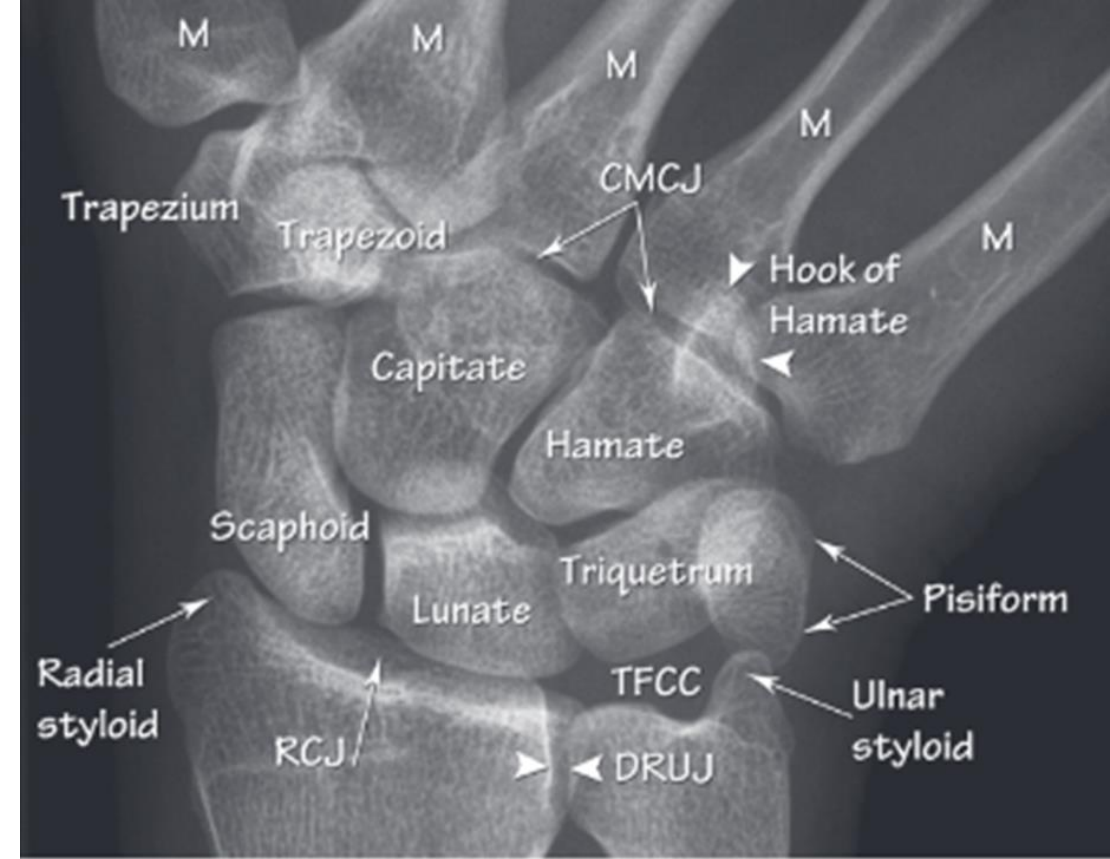
- Eight carpal bones are divided into two rows
- **Carpal bones (lateral to medial)**

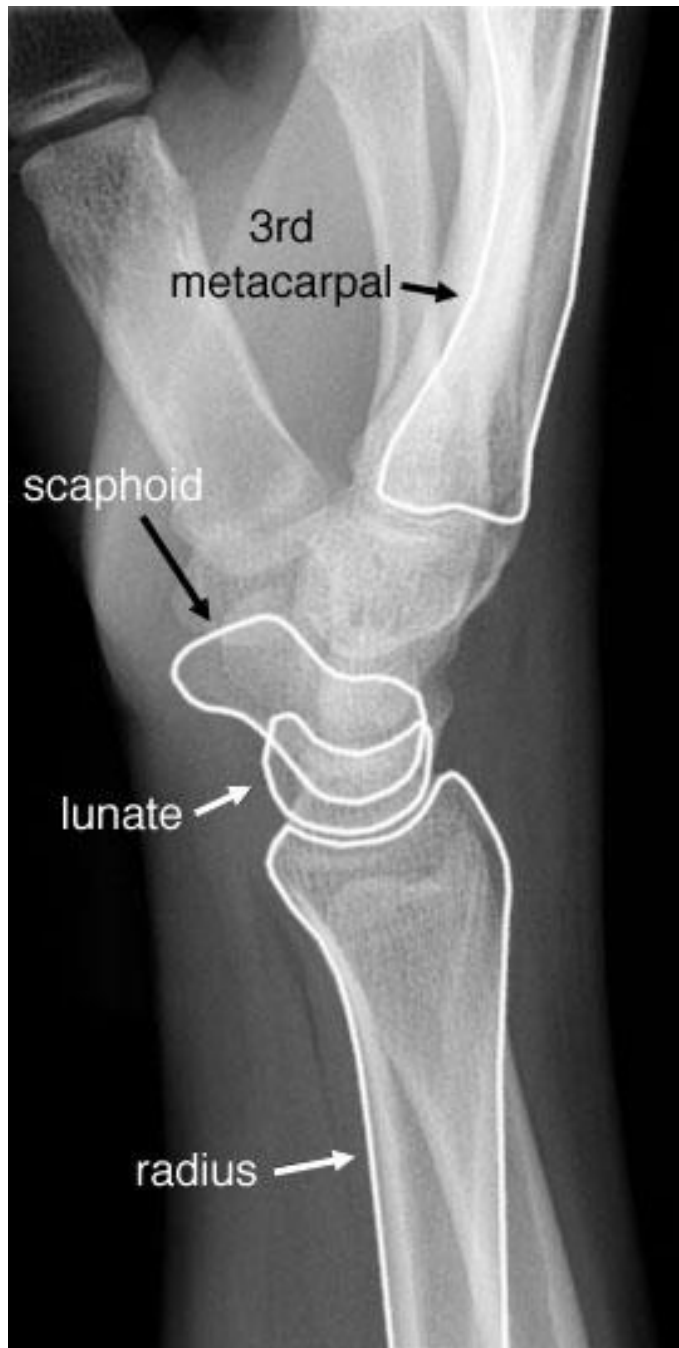
Proximal row

- Scaphoid, lunate, triquetrum, pisiform

Distal row

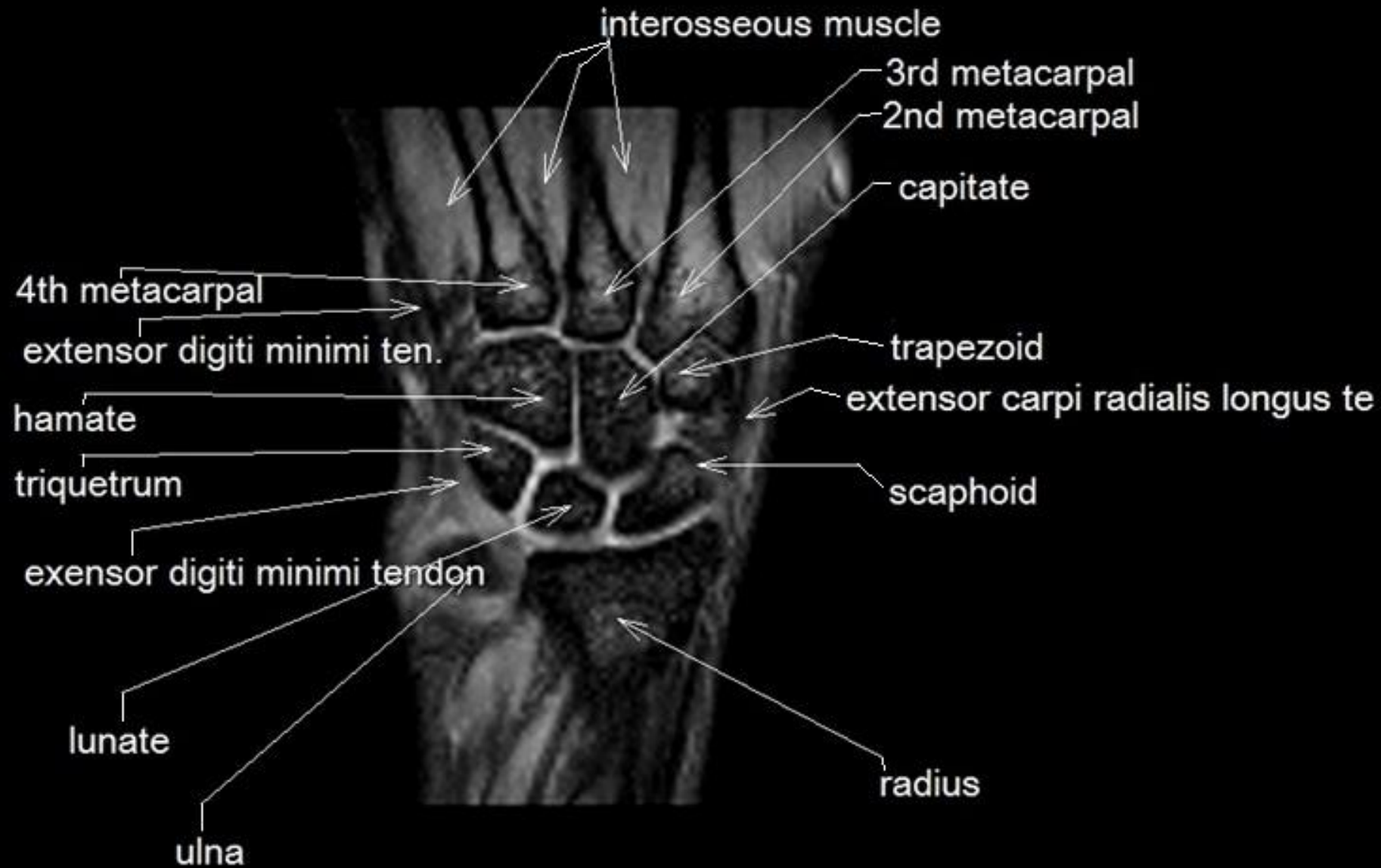
- Trapezium, trapezoid, capitate, hamate





CT - Wrist joint

MRI Wrist joint



Hand

- AP and oblique views are the commonest. The hand bones include the metacarpals, phalanges and sesamoids.
- *Metacarpals* – these are numbered lateral to medial and each has a ‘ base ’ proximally, a ‘ shaft ’, and ‘ head ’ distally.
- The base of the **first** metacarpal articulates with the **trapezium**, the **second** with the **trapezoid**, the **third** with the **capitate**, the **fourth** with **both the capitate and hamate**, and the **fifth** with the **hamate**.
- The metacarpal heads articulate with their respective proximal phalanx at a metacarpophalangeal joint(MCPJ).



HAND

- *Phalanges* – these are numbered lateral to medial. The thumb only has proximal and distal phalanges, which articulate through an interphalangeal joint.
- The remaining four digits have proximal, middle and distal phalanges that articulate through a proximal and distal interphalangeal joint (PIPJ and DIPJ)..



Monteggia Fracture

Fracture of the ulnar shaft with concomitant dislocation of the radial head.



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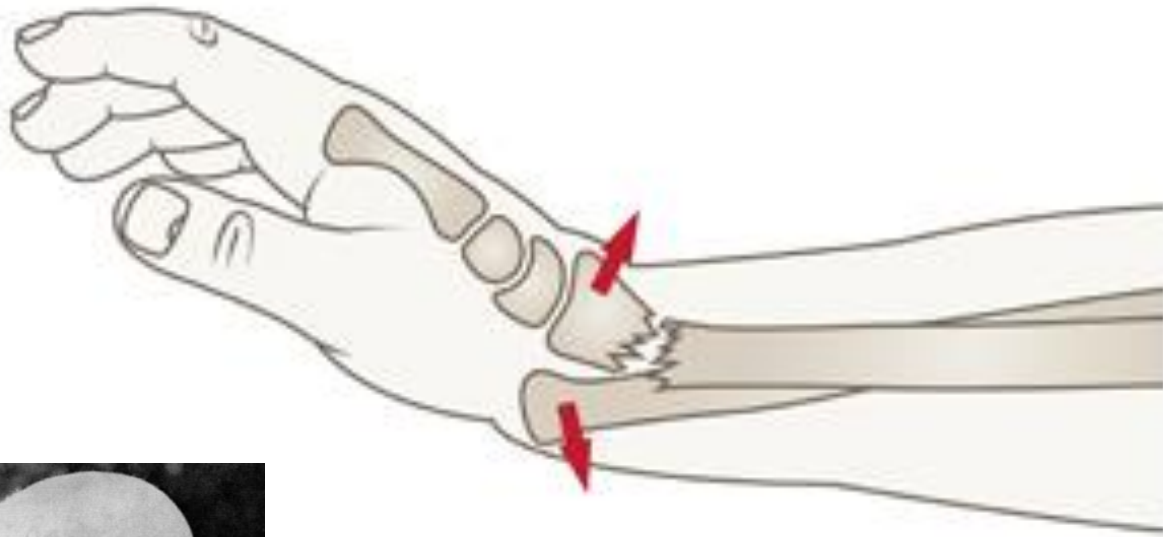


Giovanni Battista Monteggia

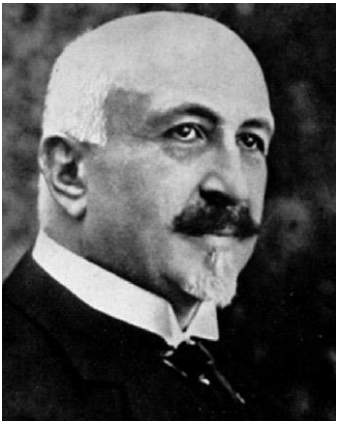


Galeazzi fracture

fracture of the distal part of the radius with dislocation of distal radioulnar joint and an intact ulna



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Riccardo Galeazzi





Thank You !