Shoulder & Elbow Viva

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Viva 1

A 25-year-old recreational soccer player has recurrent shoulder dislocations. He first dislocated his shoulder playing football in high school, was treated in a sling for 6 weeks

- *What is the difference between instability & laxity?*
- *What are the primary restrains of the GH joint?*
- *What are the periscapular muscles?*
- *Tell me about the GHL and coracohumeral ligament anatomy ?*
- *What is the most important risk factor of recurrent shoulder instability?*
- *What are the associated injuries?*
- *What are the recommended radiographic views in shoulder instability?*
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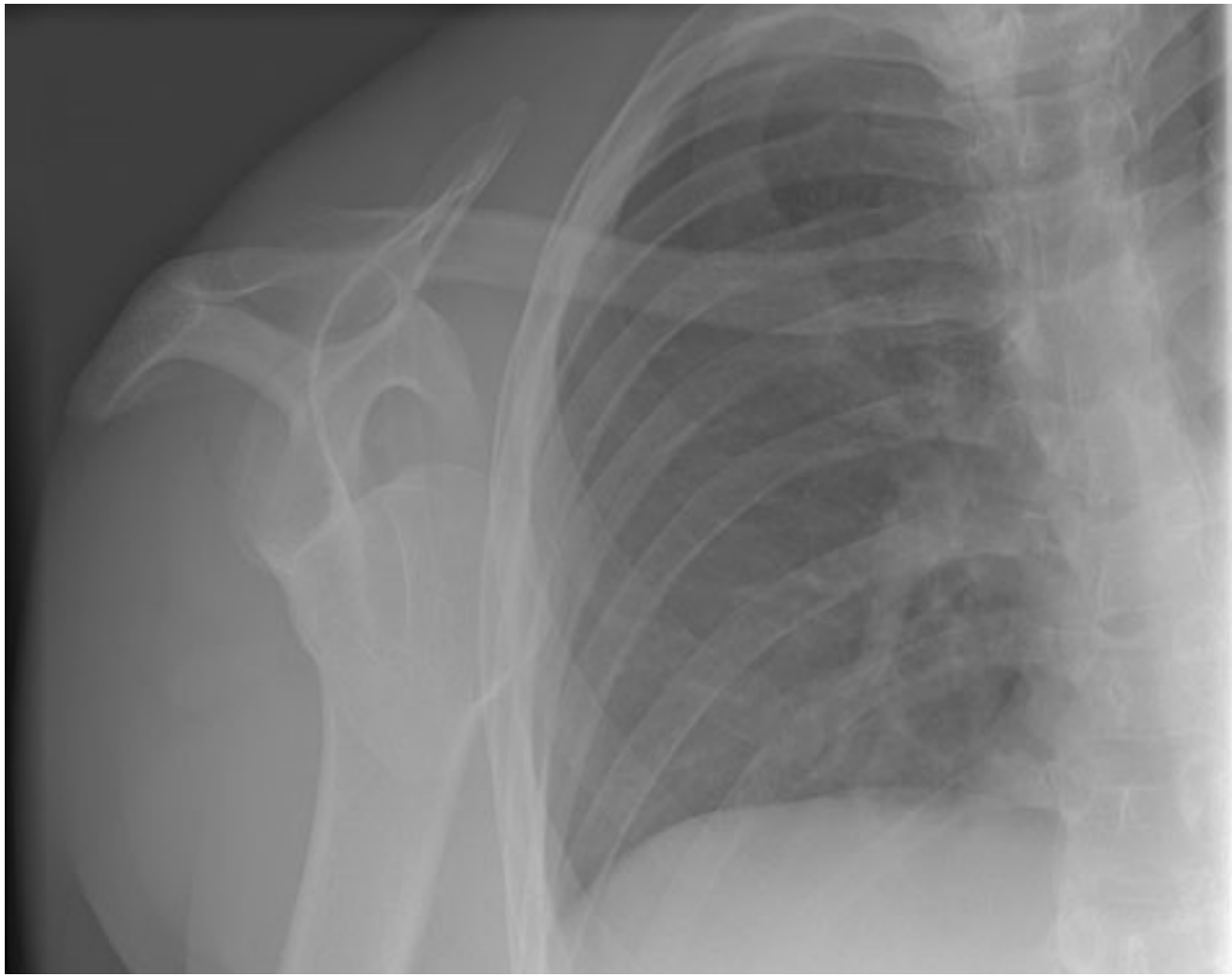
- *What is rotator interval?*
- *What are the techniques used for reduction of acute shoulder dislocation?*
- *What are the treatment options?*
- *What is the triple effect of Bristow- Latarjet Procedure?*



What is the difference between instability & laxity?

- *Instability: abnormal symptomatic motion in the joint.*
- *Laxity: degree of translation in the joint that falls within a physiological range and is asymptomatic*

What are the primary restrains of the GH joint?

- *Static restraints*
  - Glenohumeral ligaments
  - Glenoid labrum
  - Articular congruity and version
  - Negative intra-articular pressure
- *Dynamic restraints*
  - Rotator cuff muscles(primary role is to stabilize the glenohumeral joint by compressing the humeral head against the glenoid)
  - Rotator interval
  - Long head of biceps
  - Periscapular muscles

What are the periscapular muscles?

There are 17 muscles:

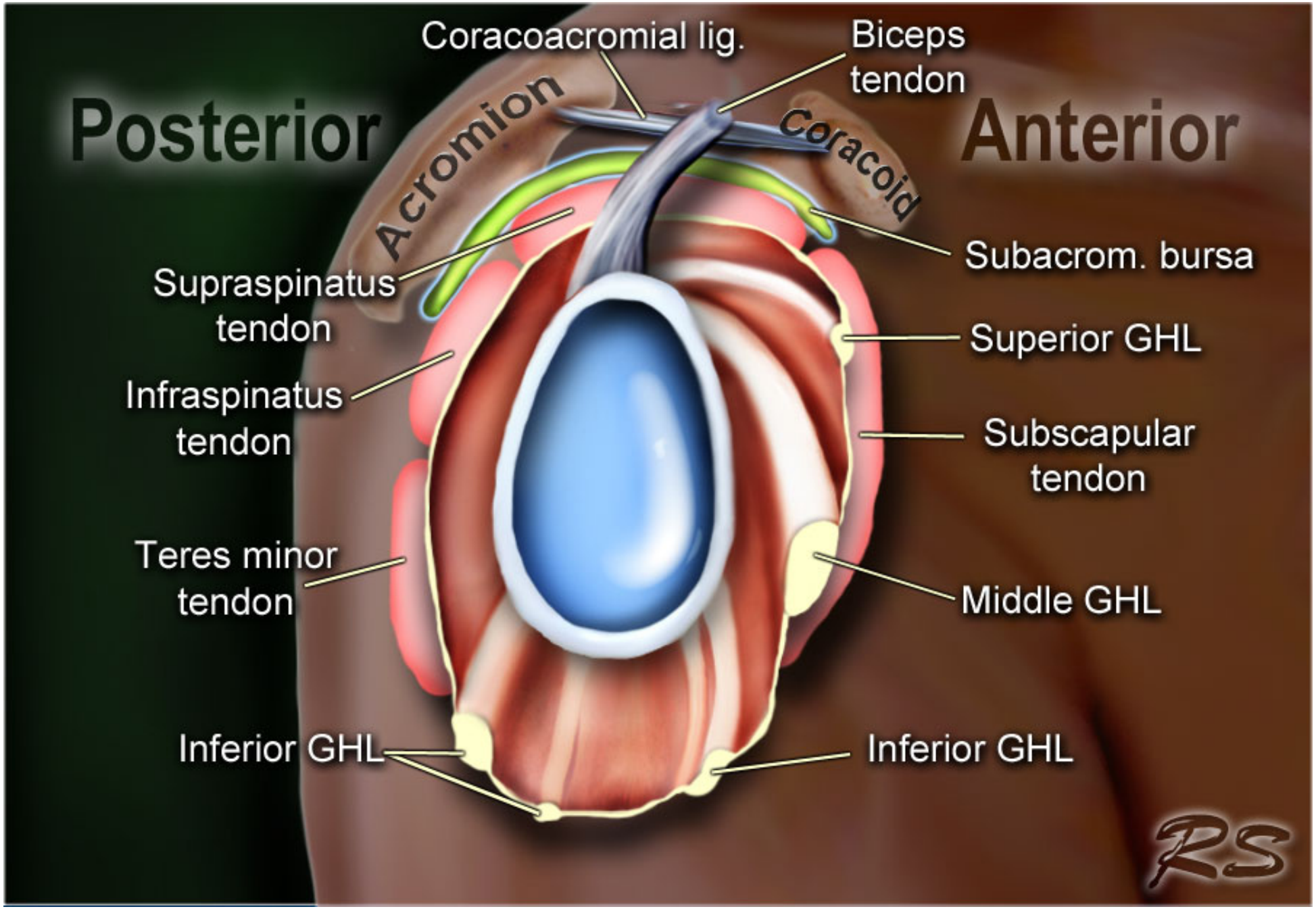
1. *Serratus anterior*
2. *Supraspinatus*
3. *Subscapularis*
4. *Trapezius*
5. *Teres major*
6. *Teres minor*
7. *Long head of triceps*
8. *Biceps brachii*
9. *Rhomboid major*
10. *Rhmoboid minor*
11. *Coarcobracchialis*
12. *Omohyoid inferior belly*
13. *Deltoid*
14. *Latissimus dorsi*
15. *Levator scapulae*
16. *Infraspinatous*
17. *Pectoralis minor*

Tell me about the GHL and coracohumeral ligament anatomy ?

- *SGHL*
  - *from anteriosuperior labrum to humerus*
  - *Primary restraint to inferior translation at 0° degrees of abduction (in neutral rotation)*
- *MGHL*
  - *Primary restrain to anterior and posterior translation at the midrange of abduction (~45°) in ER*

Tell me about the GHL and coracohumeral ligament anatomy ?

- *IGHL*
  - *posterior band IGHL*
    - *Primary restraint to posterior subluxation at 90° flexion and IR*
    - *tightness leads to internal impingement*
  - *anterior band IGHL*
    - *primary restraint to anterior/inferior translation at 90° abduction and ER (late cocking phase of throwing)*
  - *Inferior ?? Or superior band IGHL*

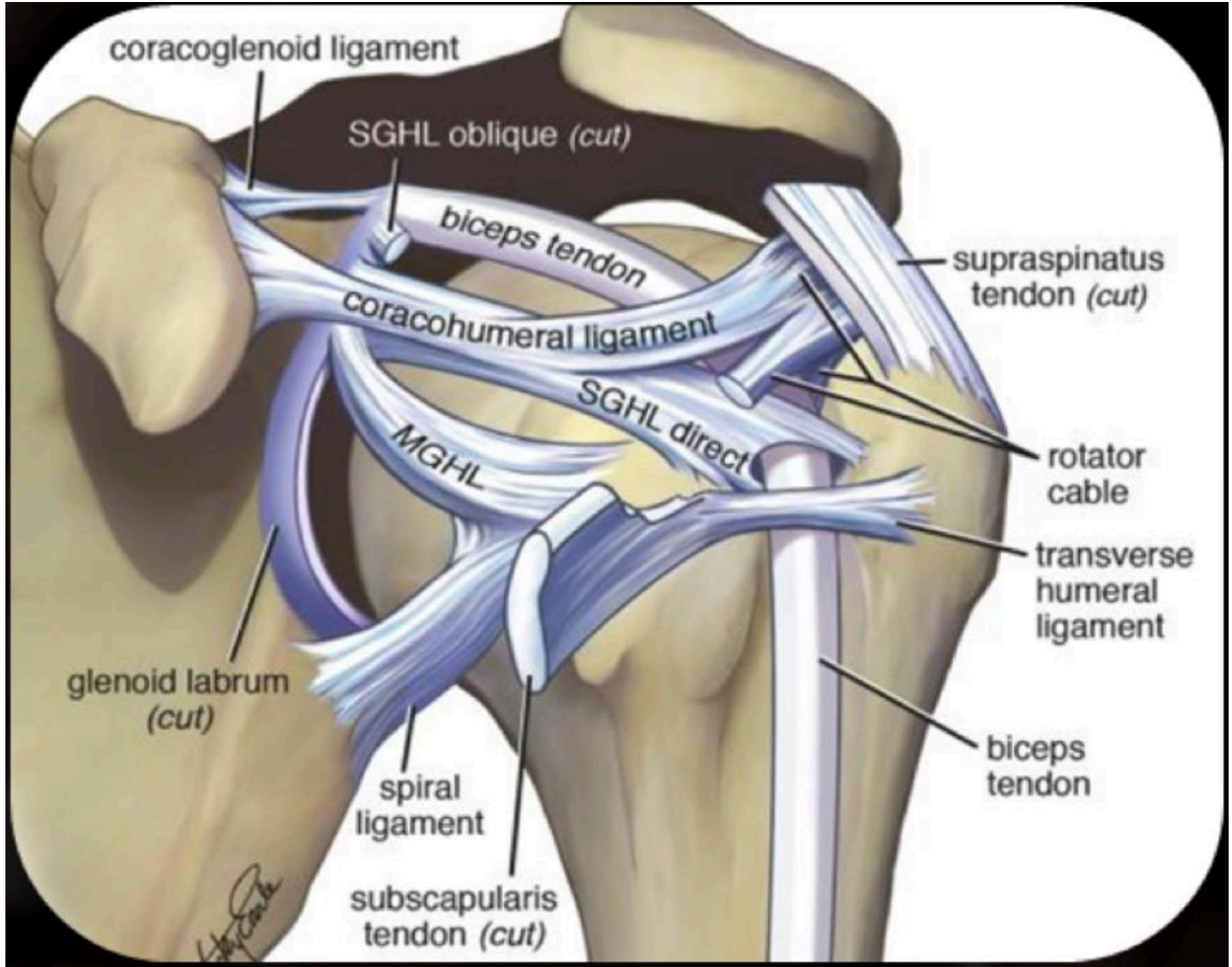

Coracoacromial lig.
Biceps tendon
Posterior
Anterior
Acromion
Coracoid
Subacrom. bursa
Supraspinatus tendon
Superior GHL
Infraspinatus tendon
Subscapular tendon
Teres minor tendon
Middle GHL
Inferior GHL
Inferior GHL
RS

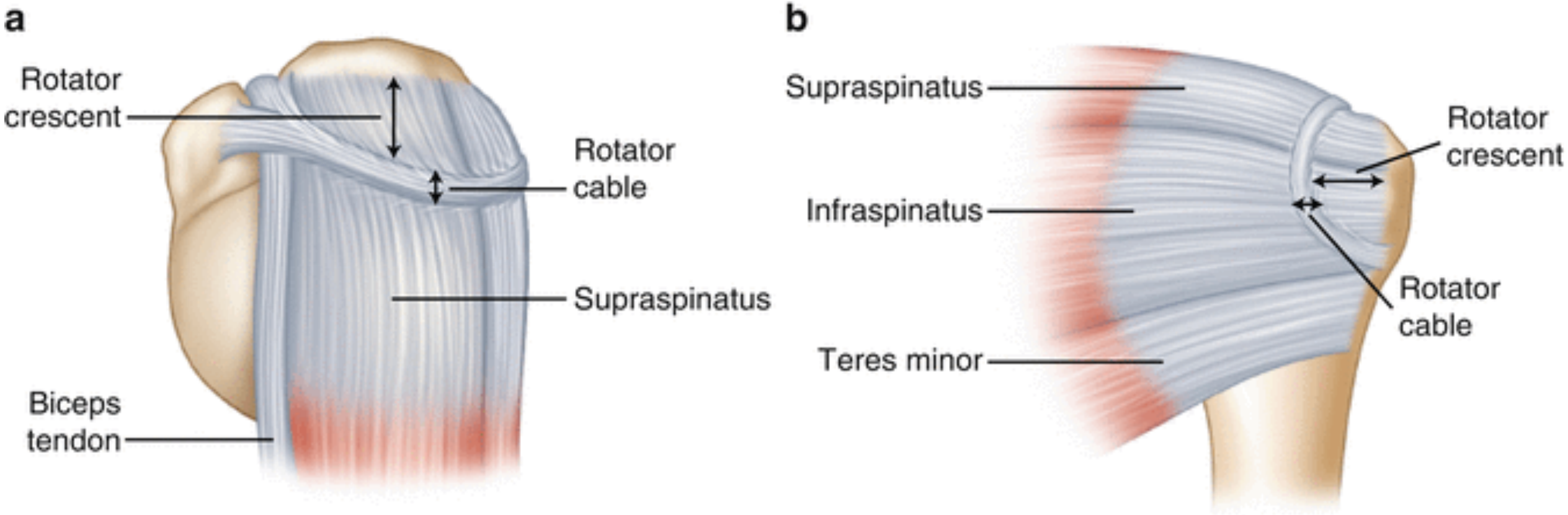
Tell me about the GHL and coracohumeral ligament anatomy ?

- Coracohumeral ligament (CHL)
  - from coracoid process to rotator cable
  - limits posterior translation with the shoulder in flexion, adduction, and internal rotation
  - limits inferior translation and external rotation at adducted position

Tell me about the GHL and coracohumeral ligament anatomy ?

- The rotator cable is a fibrous structure associated with rotator cuff.
- It is located at the medial aspect of the rotator crescent and formed by a thick bundle of fibers perpendicular to the supraspinatus and infraspinatus tendons.


coracoglenoid ligament
SGHL oblique (cut)
biceps tendon
supraspinatus tendon (cut)
coracohumeral ligament
SGHL direct
MGHL
rotator cable
transverse humeral ligament
glenoid labrum (cut)
spiral ligament
biceps tendon
subscapularis tendon (cut)


a
Rotator crescent
Rotator cable
Supraspinatus
Biceps tendon
b
Supraspinatus
Infraspinatus
Teres minor
Rotator crescent
Rotator cable

What is the most important risk factor of recurrent shoulder instability?

- *The radiograph shows anterior dislocation of right shoulder.*
- *The patient's age is the most important risk factor for recurrent anterior shoulder instability.*
- *Recent published reports have noted that a 90% of recurrent instability for patients younger than 20 years, a 60% recurrent instability for patients between 20 to 40 years and less than 10% recurrence rate for patients older than 40 years.*

What are the associated injuries?

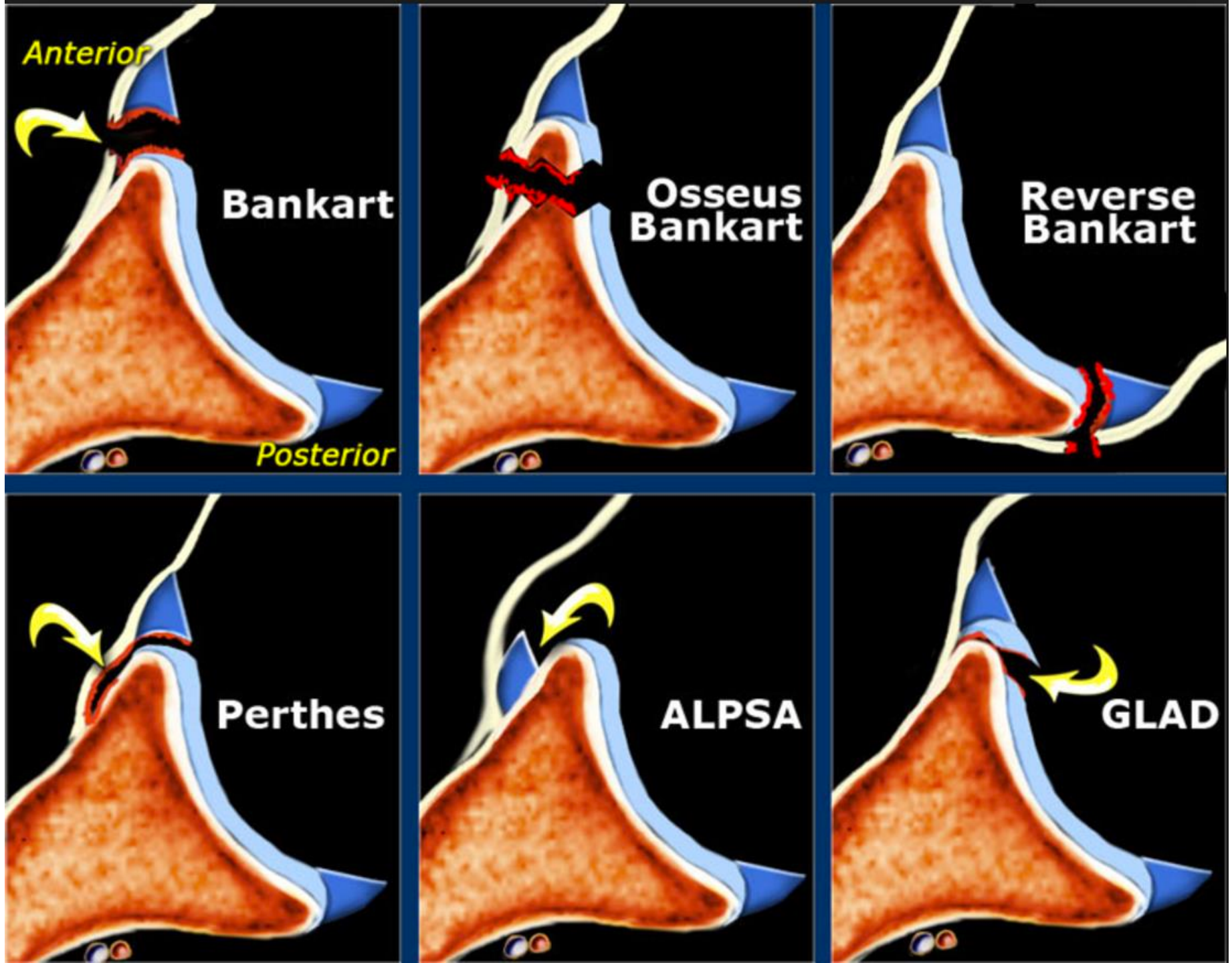
- *Bankart lesion: an avulsion of the anterior labrum and anterior band of the IGHL from the anterior inferior glenoid, present in 80-90% of patients with TUBS.*
- *Bony Bankart lesion: is a fracture of the anterior inferior glenoid, present in up to 49% of patients with recurrent dislocations, associated with higher risk of failure with arthroscopic treatment if not addressed,* defect >20-25% is considered "critical bone loss" and is biomechanically highly unstable.
- *Hill-Sach lesion: is a chondral impaction in the posterosuperior humeral head secondary to contact with the glenoid rim, present in 80% of traumatic dislocations and 25% of traumatic subluxations.*

What are the associated injuries?

- *HAGL: is a humeral avulsion of the anterior band of IGHL, present in 7-9% of anterior shoulder instability, associated with a higher recurrence rate if not recognized and repaired*
- *Glenoid labral articular defect (GLAD): is a sheared off portion of the articular cartilage along with the labrum*
- *Anterior labral periosteal sleeve avulsion (ALPSA): can cause torn labrum to heal medially along the medial glenoid neck.*

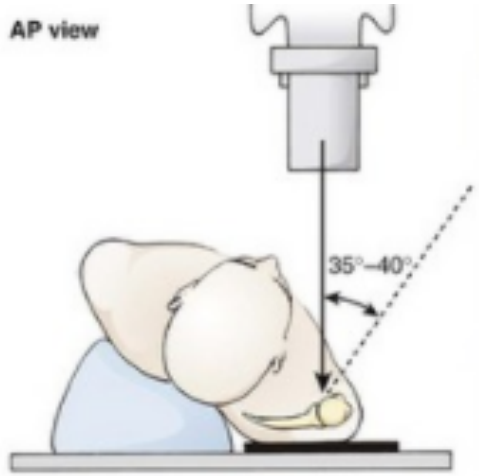
What are the associated injuries?

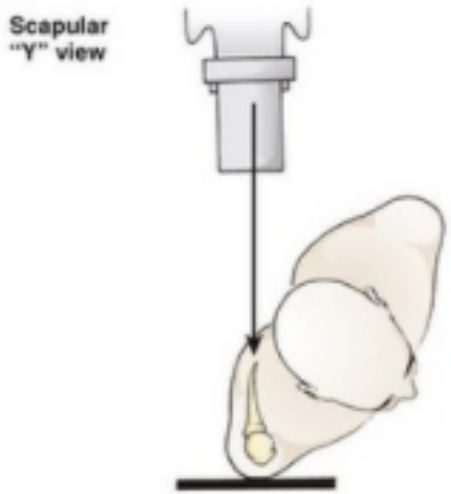
- *Rotator cuff tears: 30% incidence in patients < 40 years, 80% in patients > 60 years.*
- *Axillary nerve injury: in 5%. It is most often a transient neurapraxia*
- *Greater tuberosity fracture: common in patients older than 50 years*
- *Lesser tuberosity fracture: with posterior dislocation*

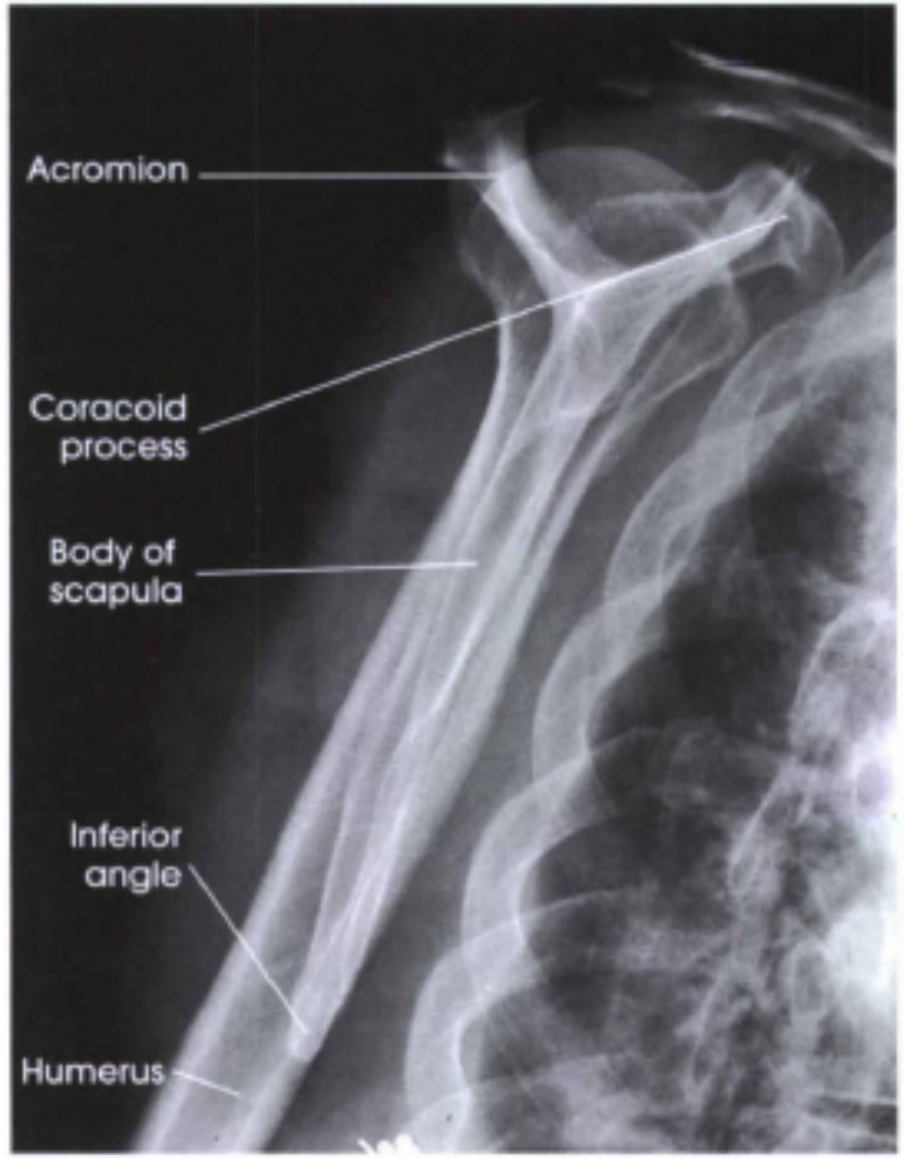

Anterior
Bankart
Posterior
Osseus Bankart
Reverse Bankart
Perthes
ALPSA
GLAD

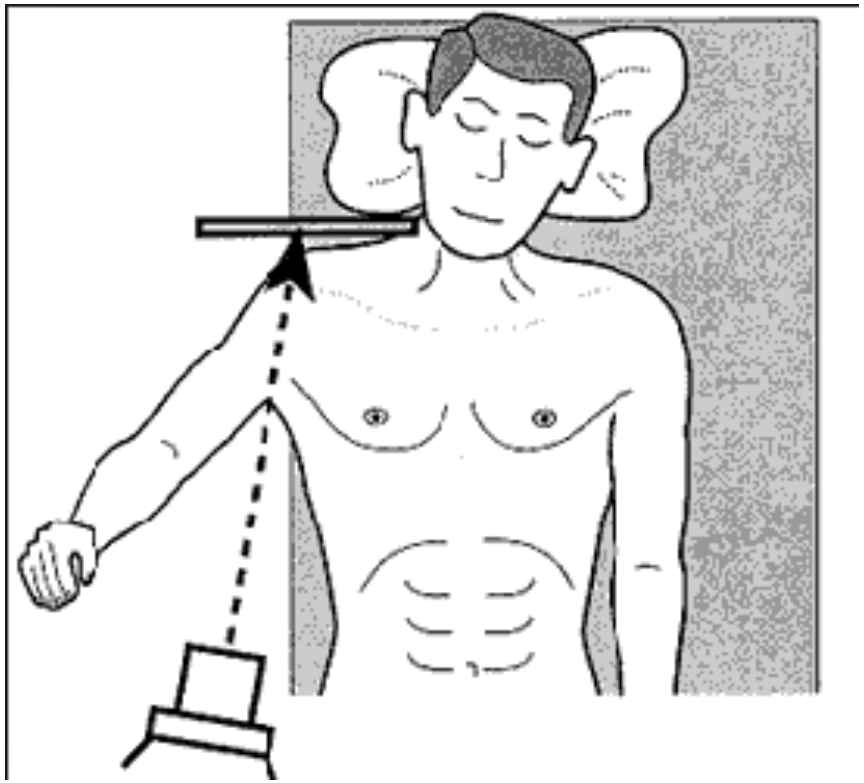
What are the recommended radiographic views in shoulder instability?

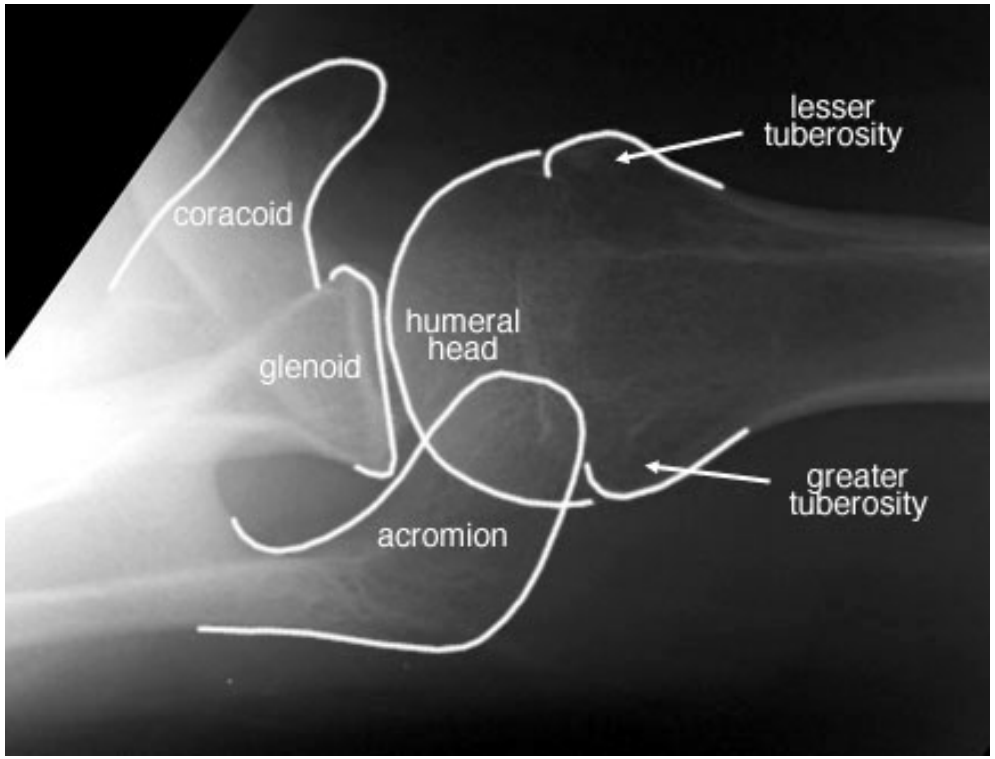
- *Recommended radiographic views*
  - *true AP*
  - *scapular Y*
  - *axillary*
- *other helpful views*
  - *West Point view*
    - *shows glenoid bone loss*
  - *Stryker notch view*
    - *shows Hill-Sachs lesion*

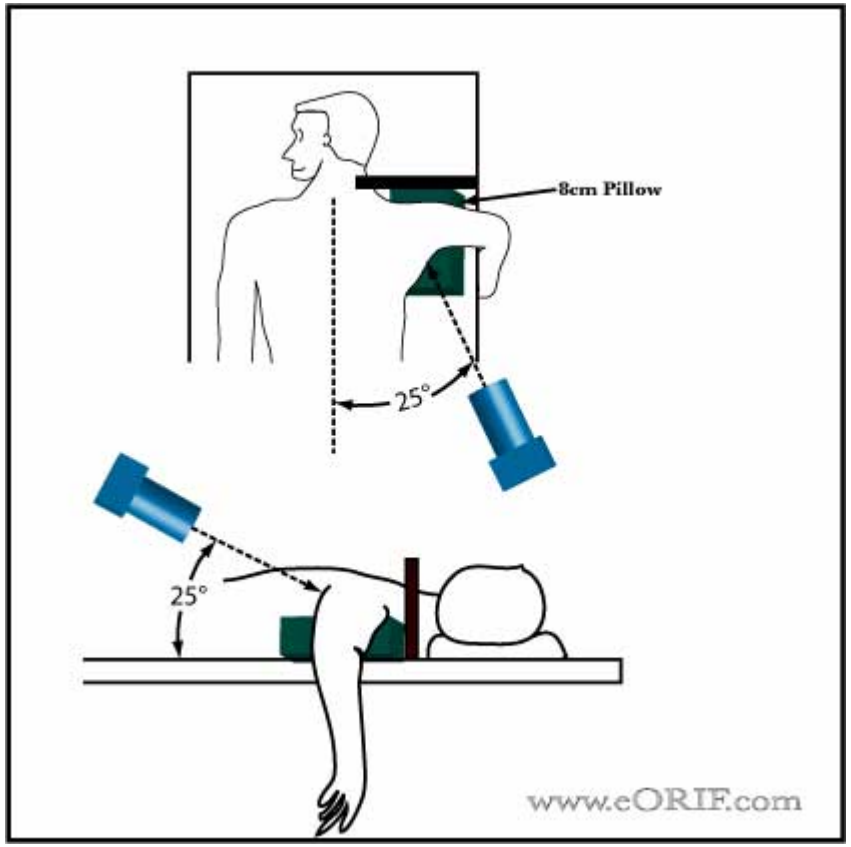

AP view
35°–40°


Scapular
"Y" view

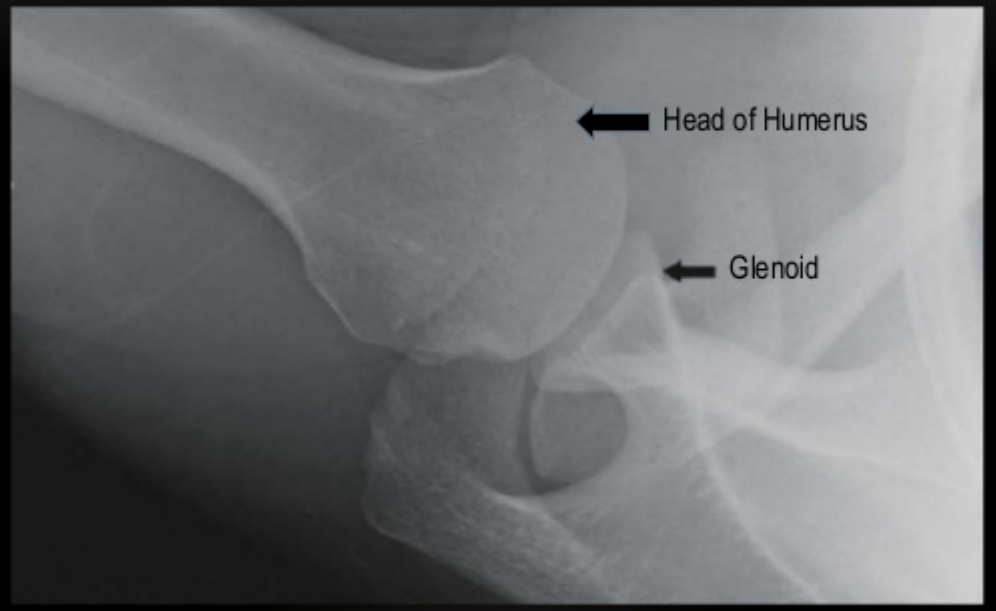

Acromion
Coracoid process
Body of scapula
Inferior angle
Humerus



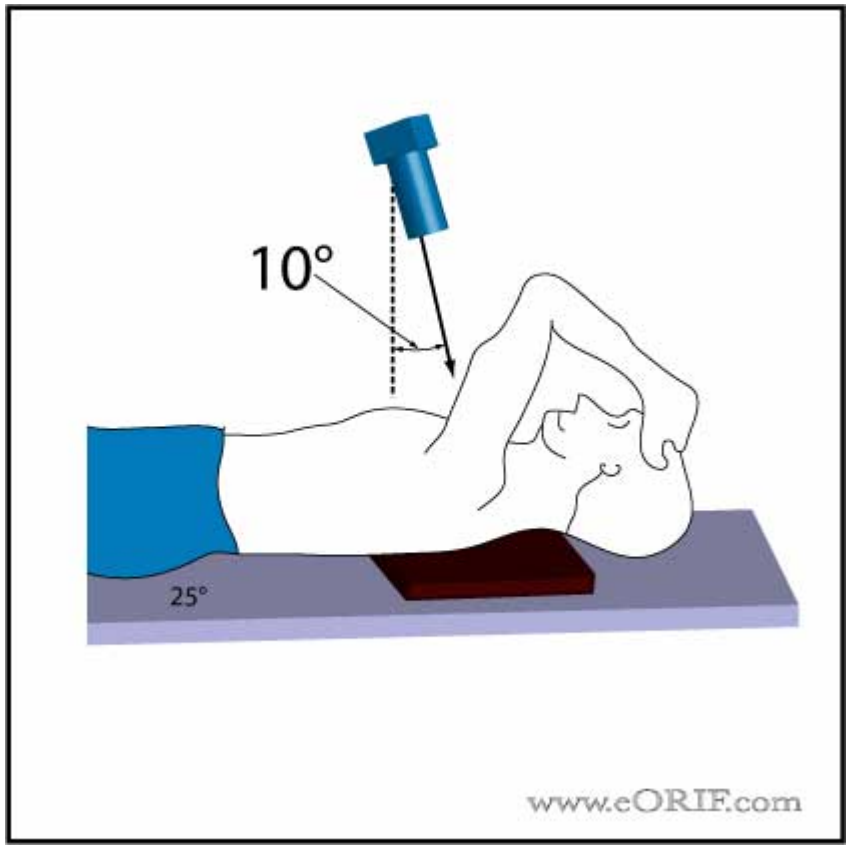

lesser
tuberosity
coracoid
humeral
head
glenoid
greater
tuberosity
acromion



WEST POINT VIEW : NORMAL ANATOMY



The anteroinferior (arrow) portion of the glenoid is seen without overlap of the coracoid.


10°
25°
www.eORIF.com

Are you aware of any classification used for instability?

- *Degree of instability: subluxation or dislocation*
- *Direction of instability: unidirectional or multidirectional.*
- *Chronicity of instability: acute or chronic.*
- *Volunteering of instability: voluntary or involuntary.*

❖***The most commonly used classification is by Thomas & Masten 1989:***

- *TUBS: Traumatic Unidirectional Bankart lesion treated with Surgery.*
- *AMBRI: Atraumatic Multidirectional Bilateral treated with Rehabilitation and if surgery is required, an inferior capsular shift and closure of rotator interval*

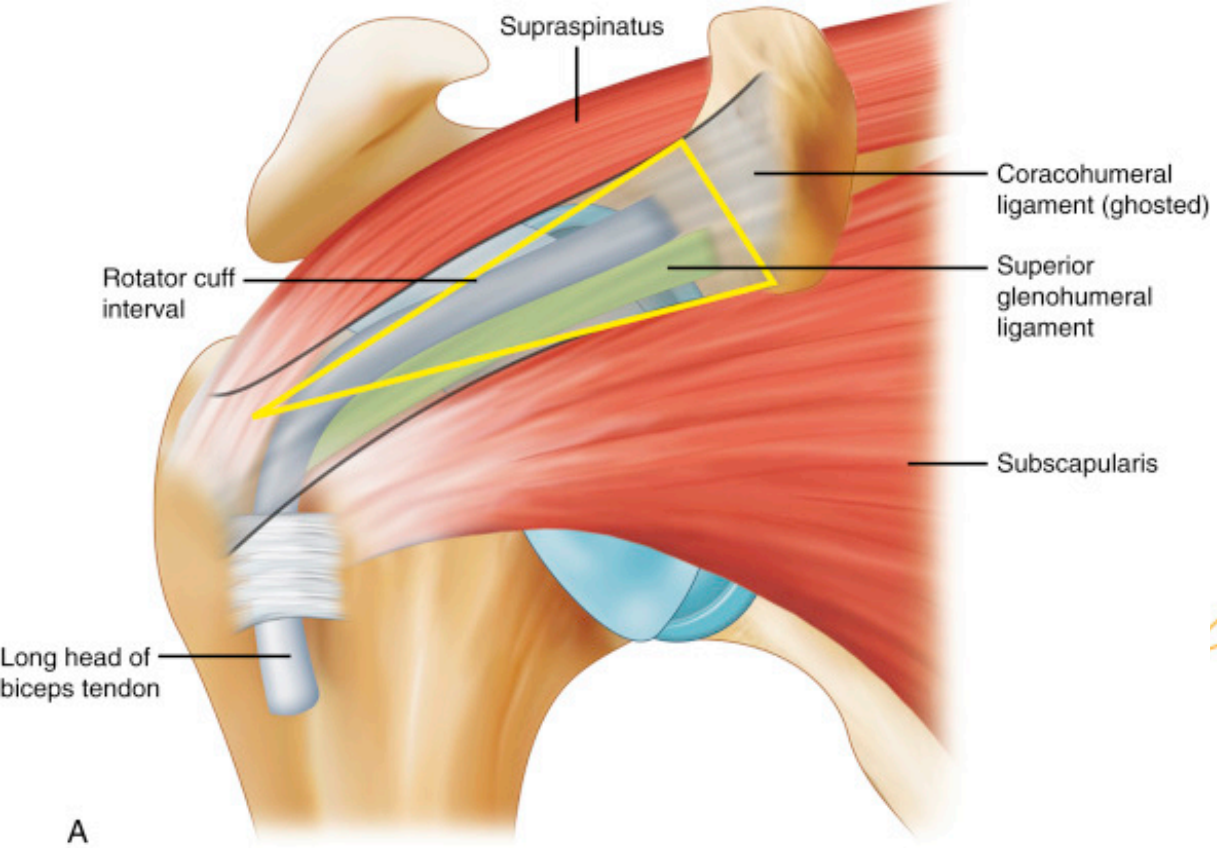
What is rotator interval?

- *It is a triangular anatomic area in the anterosuperior aspect of the shoulder, & represent the anterior superior aspect of the GH capsule.*

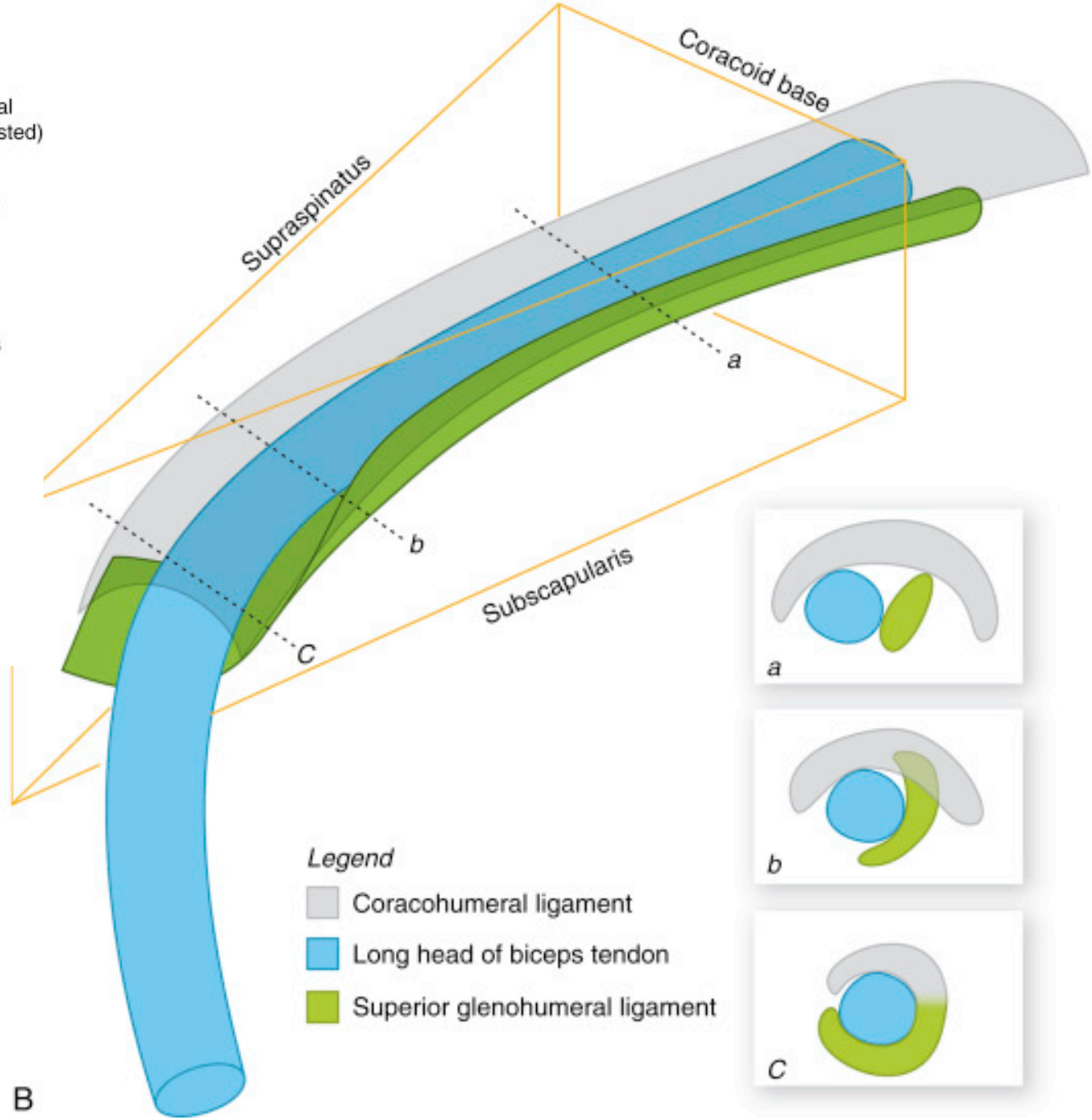
- *defined by the coracoid process at its base, superiorly by the anterior margin of the supraspinatus tendon, and inferiorly by the superior margin of the subscapularis tendon.*

- *The RI merges with the CHL and SGHL insertions medial and lateral to the bicipital groove, maintaining the biceps tendon within the groove.*

- *It contains the long head of biceps, CHL and SGHL.*


Supraspinatus
Coracohumeral ligament (ghosted)
Rotator cuff interval
Superior glenohumeral ligament
Subscapularis
Long head of biceps tendon

A


Coracoid base
Supraspinatus
a
b
C
Subscapularis
Legend
Coracohumeral ligament
Long head of biceps tendon
Superior glenohumeral ligament
a
b
C

B

What are the techniques used for reduction of acute shoulder dislocation?

- *Traction-counter-traction method*
- *Kocher method:* elbow flexion 90 degrees, adduct the shoulder against the body; Slowly ER between 70º to 85º until resistance is felt. Lift the ER upper arm in the sagittal plane as far as possible forwards now internally rotate the shoulder this brings the patient's hand towards the opposite shoulder“. Redislocation rate is slightly higher with this technique.
- *Hippocratic method:* the surgeon grasps the affected side at the hand and forearm. The heel of the surgeon is placed in the axilla. And traction is applied to the limb
- *Stimson: prone with application of downward traction*
- *Spaso technique: supine with longitudinal traction and external rotation*
- *Posterior dislocation is reduced by longitudinal traction followed by external rotation*

What are the treatment options?

- ***Acute reduction, immobilization, followed by physical therapy***
- *management of first time dislocation remains controversial*
- *It is reasonable for most patients with an initial **uncomplicated** anterior shoulder dislocation.*
- *studies show immobilization in external rotation decreases recurrence rates, thought to reduce the anterior labrum to the glenoid leading to more anatomic healing*
- *A brief period of immobilization is followed by ROM exercises, & strengthening of dynamic stabilizers (rotator cuff and periscapular musculature)*

What are the treatment options?

- *Unreduced and chronic dislocation need open reduction.*
- *Chronic posterior dislocation with minimal discomfort and good functional range can be managed with* ***supervised neglect****.*

What are the treatment options?

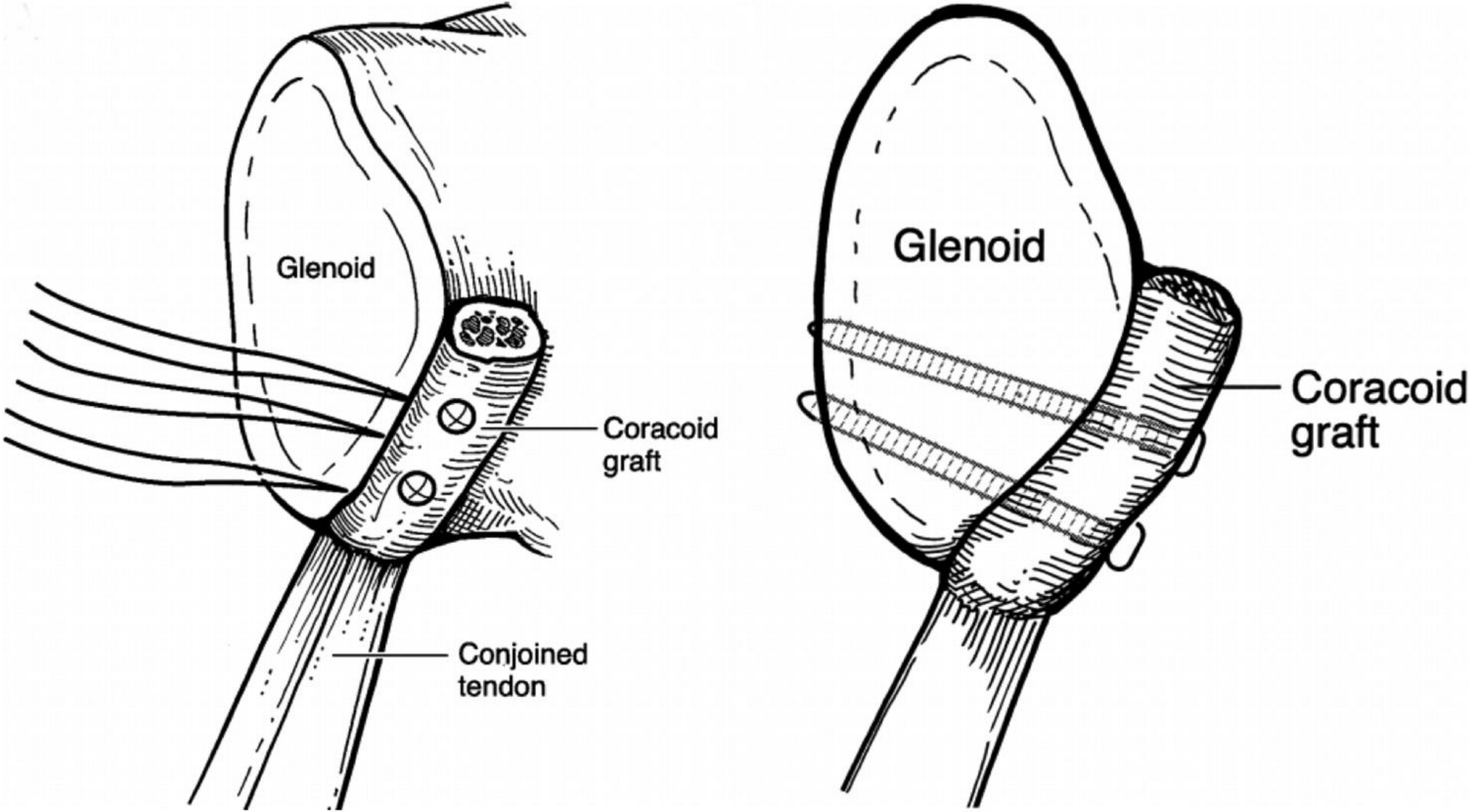
- ***Arthroscopic Bankart repair +/- capsular shift***
- *Indications: recurrent dislocations– first time traumatic shoulder dislocation with Bankart lesion confirmed by MRI in athlete younger than 25 years of age*
- *Contraindications for arthroscopic: bony deficiency > 20% of the anteroinferior glenoid (inverted pear) – HAGL lesion (can be done arthroscopically but it is technically challenging).*
- *Outcomes: equally effective as open repair with the advantage of less pain and greater motion preservation*

What are the treatment options?

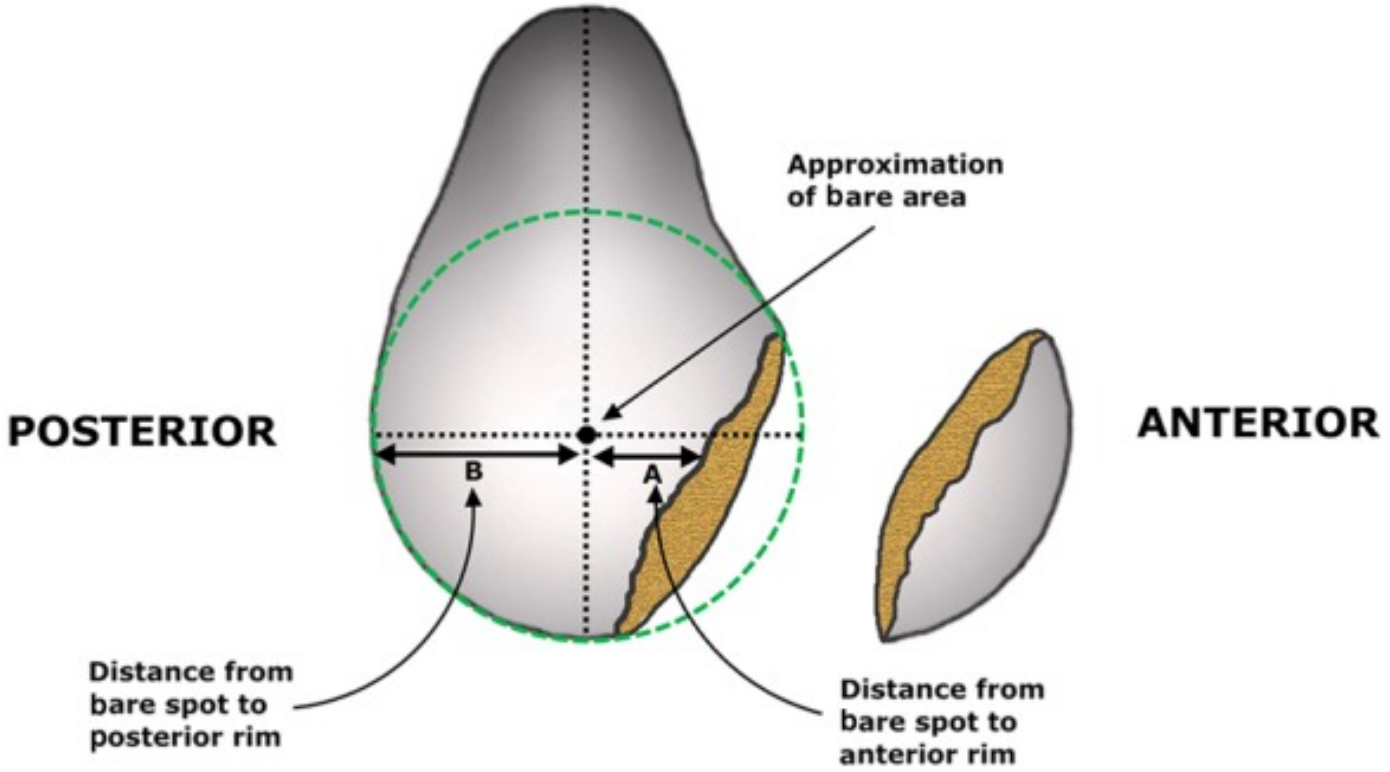
- ***Treatment of glenoid bone loss***
- *<20% : soft tissue stabilization*
- *>20%: Bristow and Latarjet Procedure: transfer of coracoid process and conjoined tendon through a split in the proximal 1/3 of subscab for sling effect +/- iliac bone grafting(done through deltopectoral approach)*

What is the triple effect of Bristow- Latarjet Procedure?

- *1) Increase glenoid contact surface area.*
- *2) The conjoind tendon stabilizes the joint when the arm is abducted and externally rotated, by reinforcing the inferior subscapularis and anteroinferior capsule.(sling effect)*
- *3) Repair of the capsule.*


Glenoid
Coracoid graft
Conjoined tendon
Glenoid
Coracoid graft

Quantification of glenoid bone loss



$$\text{Percent Bone Loss} = \frac{(B - A)}{2 \times B}$$

What are the treatment options?

- ***Treatment of Hill-Sach***
- *>30% :* Remplissage technique: *posterior capsule and infraspinatus tendon sutured into the Hill-Sachs lesion (in posterior instability, reverse Hill-Sach, Mclaughlin procedure where subscap and lesser tuberosity are transferred to fill the defect in the humeral head)*

- *>50%: hemiarthroplasty*

Viva 2

- What is tennis elbow?
- What are the risk factors associated with tennis elbow?
- What is the Pathoanatomy?
- What is the differential diagnosis?
- What physical examination findings are typically seen with tennis elbow?
- How would you manage this condition?

What is tennis elbow?

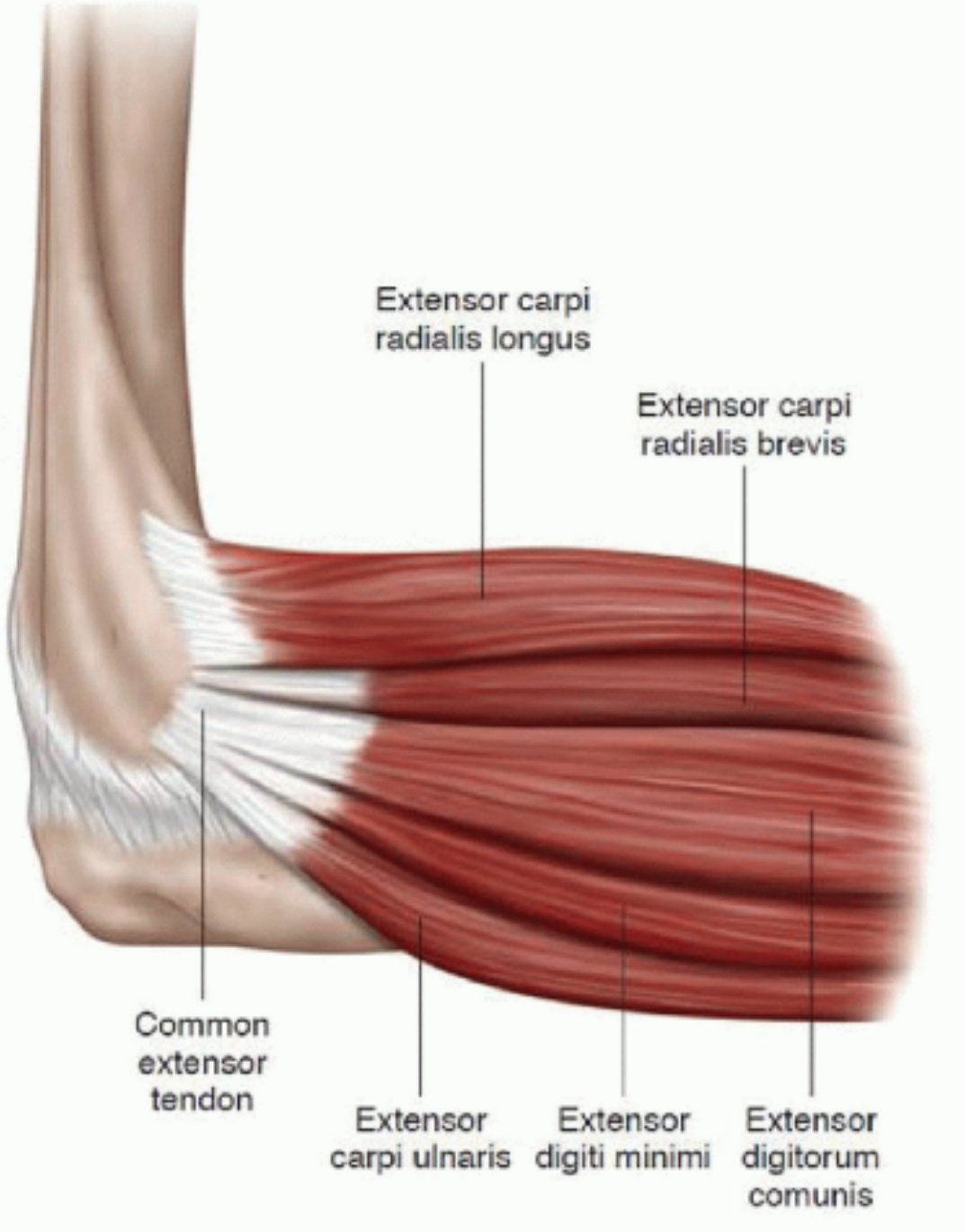
- *Tennis elbow or lateral epicondylitis is an overuse syndrome due to repetitive overloading tension of the wrist extensors origin at the lateral epicondyle.*
- *Common in activities with repetitive pronation & supination while the elbow in extension*

What are the risk factors associated with tennis elbow?

- *Heavy racquet*
- *Inappropriate grip size*
- *Poor swing technique*

what is the Pathoanatomy?

- *Muscle that originate from the lateral supracondylar ridge: ECRL*
- *Muscles that originate from the lateral epicondyle: ECRB-Anconeus (shares same attachment as ECRB)-EDC-EDM-ECU*
- *ECRB is commonly involved*
- *The histopathologic change at the tendon origin is **angiofibroblastic hyperplasia and disorganised collagen**. There are no inflammatory cells.*


Extensor carpi radialis longus
Extensor carpi radialis brevis
Common extensor tendon
Extensor carpi ulnaris
Extensor digiti minimi
Extensor digitorum comunis

What is the differential diagnosis?

- *Differential diagnoses include:*

✓*cervical spine pathology*

✓*radio-capitellar osteoarthropathy*

✓*radial tunnel syndrome*

What physical examination findings are typically seen with tennis elbow?

- *Physical exam findings*
  - *tenderness over the lateral epicondyle at the ECRB origin (Anterior to lateral epicondyle – ECRB tendonosis. Posterior to lateral epicondyle – EDC tendonosis.)*
  - *Pain with pinch gripping (thumb & middle finger),*
  - *Pain with resisted long finger extension,*
  - *Pain with resisted wrist extension while the elbow is fully extended.*
  - *Pain with maximum passive wrist flexion.*
  - *(This should be distinguished from the pain with resisted supination while the elbow and wrist in extension which is seen in radial tunnel syndrome).*

How would you manage this condition?

❖***I would start with Non-operative***

- *activity modification*
- *Ice & NSAIDS*
- *physical therapy (stretching of extensors)*
- *Steroids vs PRP injection*
- up to 95% success rate with nonoperative treatment (9-12 months)

How would you manage this condition?

❖***Operative***

- *Release and debridement of ECRB origin*
- *Can be done open or arthroscopic.*
- *85% of patients will have complete relief of their symptoms.*

Viva 3

- What is the diagnosis?
- What is the anatomy of the acromioclavicular (AC) joint?
- What are the causes of AC joint arthritis?
- How do patients with AC joint arthritis present?
- Why pain related to AC joint can be difficult to be differentiated from glenohumeral joint?
- What shoulder radiographic views are typically used to assess the AC joint?
- What is the initial management of AC joint arthritis?
- What are the muscles of the shoulder girdle?
- What is the operative treatment of AC joint arthritis?

What is the diagnosis ?

- *Acromioclavicular joint osteoarthritis, noted by narrowing of the joint space and osteophyte formation. (normal space: 2-4 mm)*

What is the anatomy of the acromioclavicular (AC)joint?

- *It is a diarthrodial joint, contains a fibrocartilaginous disc.*
- *Acromioclavicular ligaments: provide anterior-posterior stability.* (*posterior and superior AC ligaments are most important for stability*)
- *coracoclavicular ligament (conoid & trapezoid): provide superior-inferior stability.*

What are the causes of AC joint arthritis?

- *Primary osteoarthritis.*
- *Post-traumatic.*
- *Inflammatory (rheumatoid).*
- *Distal clavicular osteolysis, due to repetitive trauma or overuse.*

How do patients with AC joint arthritis present?

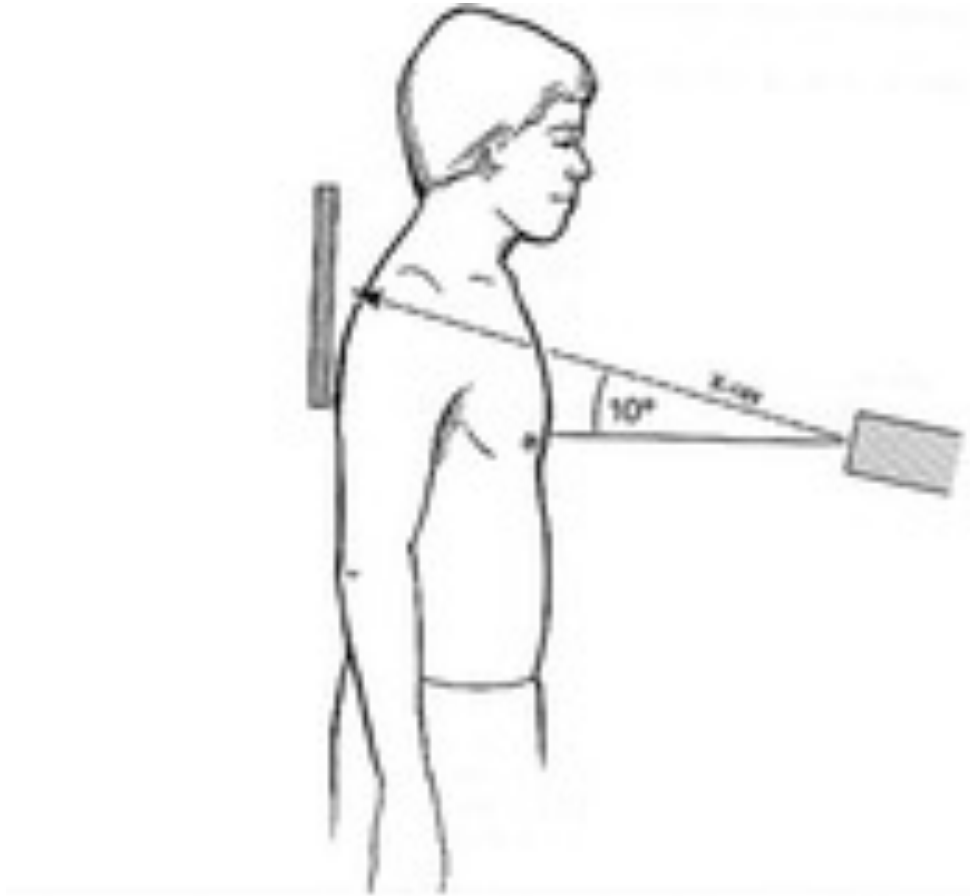
- *commonly associated with individuals who are engaged in constant heavy overhead activities (especially in weight-lifters and overhead throwing athletes).*
- *May be associate with Subacromial impingement due to inferior osteophytes.*
- *The AC joint may be prominent due to osteophytes.*
- *Tenderness with direct palpation over the AC joint.*
- *Provocative test: pain with cross body adduction test.*
- *ROM of shoulder is preserved with possible terminal impingement pain.*

Why pain related to AC joint can be difficult to be differentiated from glenohumeral joint?

- *There is dual innervation of the AC joint by the lateral pectoral nerve and the suprascapular nerve.*

What shoulder radiographic views are typically used to assess the AC joint?

- *The ACJ is seen on standard AP and axillary shoulder radiographs*
- *The best evaluating is Zanca view, which is created by tilting the x-ray beam 15° cephalad .*


10°


L.R.
111 0862

What is the initial management of AC joint arthritis?

- *Activity modification.*
- *NSAIDs*
- *Physical therapy (should focus on strengthening and stretching of shoulder girdle)*
- *Injection with corticosteroid.*

What are the muscles of the shoulder girdle?

- The shoulder girdle consists of five muscles that attach to the clavicle and scapula
- It allows for the motion of the sternoclavicular and acromioclavicular joint .
- Consist of five muscles, the trapezius muscle, levator scapulae, rhomboid (major and minor), serratus anterior, and pectoralis minor.

What is the operative treatment of AC joint arthritis?

- *Surgical treatment involves a distal clavicle resection, which can be done via open (direct superior approach) and arthroscopic (direct or indirect Subacromial).*
- *Arthroscopic resection has the advantage of allowing evaluation of the glenohumeral joint.*
- *Arthroscopic resection may(can) be carried out using a subacromial (indirect) arthroscopic approach, or a superior (direct) approach. The former has the advantage of addressing coexisting subacromial impingement.*

What is the operative treatment of AC joint arthritis?

- *should resect only 0.5-1cm of distal clavicle.*
- *Care should be taken to preserve the **AC ligaments and the superior capsul**e to prevent iatrogenic instability*

Viva 4

40-year-old male patient, left hand dominant, has left elbow pain following lifting of a heavy object?

- *What can you see?*
- *What else would you like to know?*
- *What are common physical examination findings with a distal biceps rupture?*
- *Tell me more about the anatomy of biceps?*
- *what else do you want to do for this patient?*
- *What are you expecting to see?*
- *How can you differentiate between complete and partial tears?*
- *What is the treatment of distal biceps tendon rupture?*
- *Tell me more about the surgical techniques?*

What can you see?

- *This is a clinical photograph demonstrating an ecchymosis over the anterior aspect of the left arm*

What else would you like to know?

- *I would like to get more information from the history:*

➢ *What was the exact mechanism of injury? Unexpected extension force applied to the elbow which was in flexed position.*

➢ *Did the patient hear any 'pop' ? There was a painful pop.*

➢ *Was there any pain before this incident? Yes. Athletes commonly report pre-existing chronic tendinitis.*

What are common physical examination findings with a distal biceps rupture?

- *Proximal retraction of the muscle belly and change of the normal contour of the muscle "**reverse Popeye sign**". An intact lacertus fibrosis may tether the torn biceps tendon and prevent more proximal retraction making the deformity more subtle.*
- ***Ecchymosis** over the antecubital fossa.*
- ***Palpable defect**.*
- ***Weakness** of forearm supination and elbow flexion. Supination 50% > flexion 30%.*
- ***Hook test**: performed by asking the patient to actively flex the elbow to 90° and fully supinate the forearm,* then the examiner uses index finger to hook the lateral edge of the biceps tendon. *with an intact or even partially intact biceps tendon, the finger can be inserted 1 cm beneath the tendon. Sensitivity & specificity is 100%.*

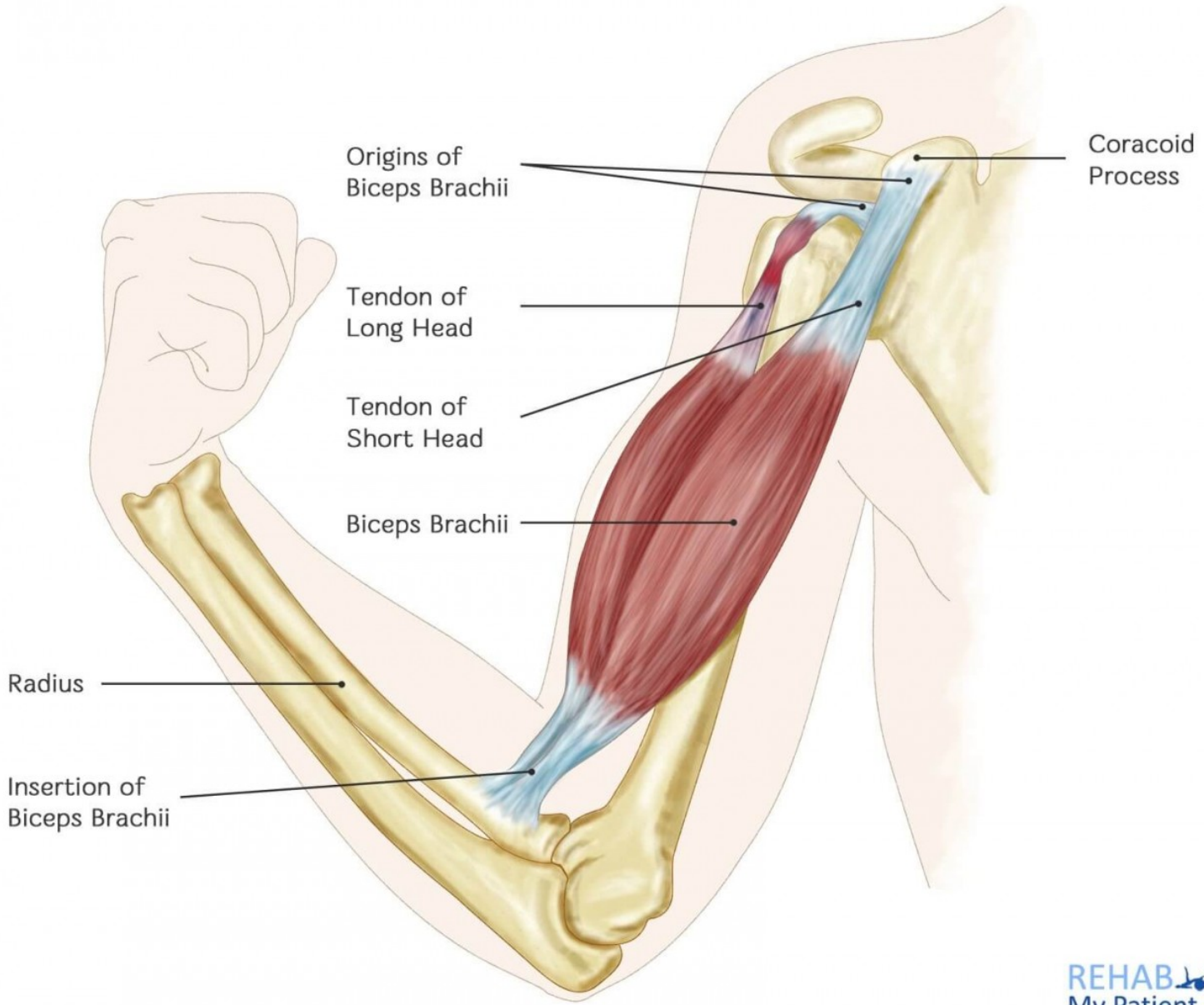
What are common physical examination findings with a distal biceps rupture?

- ***Biceps squeeze test**: elbow is held in 60-80° of flexion with the forearm slightly pronated. The biceps is squeezed to elicit forearm supination*. a positive test is failure to observe forearm supination.

Tell me more about the anatomy of biceps?

- *The biceps brachii muscle has two heads. The short head arises from the tip of coracoid process, and the long head arises from the supraglenoid tubercle of the scapula.*
- *Distal biceps tendon possesses two distinct insertions, the short head* ***attaches*** *distally on the radial tuberosity, and the long head attaches proximally on the radial tuberosity.*
- *Innervated by Musculocutaneous nerve.*
- *Function: Supinates the forearm, and flexes the elbow.*

Biceps Brachii Tendinopathy



what else do you want to do for this patient?

- *X-ray of left elbow*


10 cm

What are you expecting to see?

- *This is an A/P & lateral radiograph of left elbow showing normal elbow with no abnormality.*
- *It may show an Avulsion fracture or enlargement and irregularity of the radial tuberosity.*

How can you differentiate between complete and partial tears?

- *Complete tears:*

➢proximal retraction of the biceps muscle. (reverse popeye sign)

➢non-palpable distal biceps tendon.

➢Positive hook test.

- *Partial tears:*
- *Less deformity.*
- *Palpable distal biceps tendon.*
- *Normal hook test.*

❖An MRI is most appropriate for confirmation of a partial distal biceps tendon rupture and to assess the level(degree) of retraction, while an MRI is not always required for a complete tear if the examination is conclusive.

What is the treatment of distal biceps tendon rupture?

- *Non-operative treatment*
  - *for low demand or sedentary patients who are willing to sacrifice the function.*
  - *Patients will lose 30% of elbow flexion, 40-50% of forearm supination and 15% of grip strength.*
- *Operative treatment*
  - *For active patients to restore strength and function*
  - *For partial tears who failed conservative management.*
  - *surgical treatment should occur within few weeks from the injury, further delay may prevent primary repair.*

Tell me more about the surgical techniques?

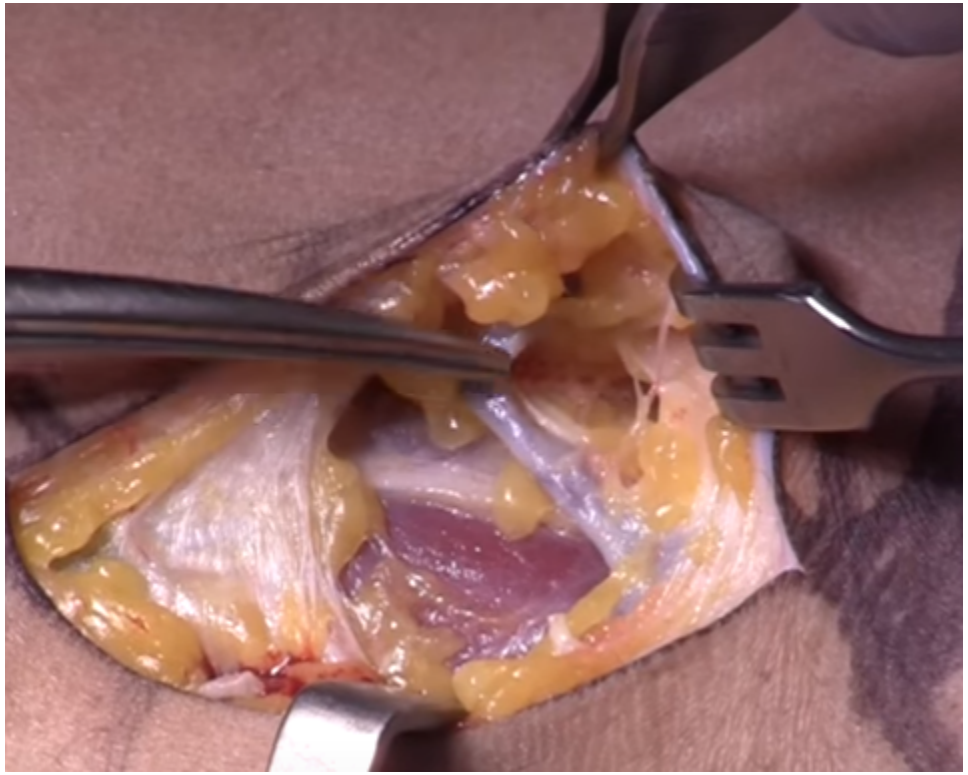
- **Anterior Single Incision Technique (modified Henry approach)**

➢ *reduce the incidence of HO and synostosis seen with the double incision technique.*

➢ *S-shaped incision over the antecubital fossa. Uses interval between the brachioradialis laterally and the pronator teres medially. The LACN is at risk, should be identified and protected. Nonabsorbable sutures passed through the tendon (krackow)*

➢ *The forearm is supinated to expose the radial tuberosity and to protect the PIN*

➢ *Avoid exposing the periosteum of the ulna to decrease the incidence of HO*



Tell me more about the surgical techniques?

- **Dual Incision Technique**

➢ *Recommended by most.*

➢ *Uses anterior transverse incision over the antecubital fossa and a second posterolateral elbow incision.*

➢ *after the biceps is identified, the radial tuberosity is palpated, a blunt, curved hemostat is placed in the interosseous space along the medial border of the tuberosity and palpated on the dorsal proximal forearm. A small dorsolateral skin incision is made over the hemostat.*

➢ *by using two incisions, goal is to avoid deep dissection in the antecubital fossa and minimize the risk of radial nerve injury.*

➢ *Synostosis & HO are more common with this technique. Also there is risk of LACN injury*

Tell me more about the surgical techniques?

- **Anatomic vs Non-anatomic**
- *Anatomic*

➢*reattach to radial tuberosity*

- *Non-anatomic*

➢*Attach to brachialis (salvage procedure for chronic rupture, there is no increase in supination strength, can help with pain)*

➢*Late reconstruction with hamstrings and palmaris longus have been described*

Tell me more about the surgical techniques?

- **Fixation Techniques**

➢*Bone tunnel*.

➢*Anchor Suture*.

➢*Endobutton*.

➢*Interosseous screw fixation*.

Viva 5

A 35-year-old woman reports the insidious onset of shoulder pain for the past several weeks

- *Describe the X-Ray?*
- *What is calcific tendonitis?*
- *Any further investigations?*
- *How are you going to manage this condition?*

Describe the X-Ray?

- *This is an A/P radiograph of the Right shoulder, showing a well defined dense calcification consistent with calcific tendonitis.*
- *Normal glenohumeral joint, acromio-clavicular joint, and acromio-humeral head interval (normal distance is 7-13 mm).*

What is calcific tendonitis?

- *It is deposition of hydroxyapatite into the structure of the rotator cuff, supraspinatus tendon is the most common structure involved in this disease process.*
- *typically affects patients aged 30 to 60*
- *more common in women*

What is calcific tendonitis?

- *The process can be divided into three phases:*

➢ *Formative phase: The calcium deposit is hard. Radiographically it appears well defined and homogenous. +/- pain*

➢ *Resting phase: lacks inflammation or vascular infiltration. +/- pain*

➢ *Resorptive phase: Resorption at the edges of the deposit leads to less defined lesion, clinically this phase is most painful.*

Any further investigations?

- *Plain radiographs remain the gold standard for the diagnosis.*
- *Supraspinatus calcification is clearly seen on standard AP radiographs, while internal and external rotation views may show infraspinatus/teres minor and subscapularis calcification respectively.*
- *U/S may be useful to quantify the extent of the calcification*

How are you going to manage this condition?

- *The majority of patients will settle with conservative management*

➢*Analgesia & NSAIDs*

➢*Physical therapy (strengthening & stretching)*

➢*Steroid injections (commonly used but controversial)*

➢*Extracorporeal shock wave therapy. In formative & resting phases.*

- *Removal, both arthroscopically or by open surgery.*

Viva 6

A 47-year-old female with a past medical history of diabetes mellitus (insulin-controlled) and hypothyroidism presents to the office complaining of 3 months of shoulder pain and progressively worsening stiffness.

- *what is frozen shoulder (adhesive capsulitis)?*
- *what is the Pathoanatomy of adhesive capsulitis?*
- *What are the conditions that associated with primary frozen shoulder?*
- *How do they present?*
- *What are the classical stages described?*
- *What is the treatment for adhesive capsulitis?*

what is frozen shoulder (adhesive capsulitis)?

- *It is a condition characterized by gradually resolving pain and global limitation of glenohumeral motion with no specific underlying cause and normal X-ray.*
- *It is a proliferative disease*

what is the Pathoanatomy of adhesive capsulitis?

- *The cause of frozen shoulder is unknown, it is thought to be due to hyperlipidaemia.*
- *It is a disease of the joint capsule, which is thickened and shows increased vascularity.*
- *The picture is strikingly similar to Dupuytren's disease, with proliferation of fibroblasts, transformation to myofibroblasts and increased collagen deposition,*
- *essential lesion involves the coracohumeral ligament and rotator interval, the synovium is normal, and there is no evidence of inflammation.*

What are the conditions that associated with primary frozen shoulder?

- *Endocrine disorders commonly diabetes mellitus (which is associated with a poorer prognosis and greater resistance to treatment), hyperthyroidism and hypothyroidism.*
- *Metabolic conditions such as hyperlipidaemia.*
- *Dupuytren's disease.*
- *Prolonged immobilization.*
- *Cardiovascular disease.*

How do they present?

- *It is more common in middle-aged females.*
- *The non-dominant shoulder is often affected.*
- *Painful range of motion.*
- *Limitation of range of motion (Active & Passive) particularly external rotation.*
- *Capsular contraction may cause the humeral head to ride high leading to secondary impingement symptoms*

What are the classical stages described?

- *Painful: gradual diffuse pain (6 wks to 9 months).*
- *Stiff: decreased range of motion; affects daily activities.*
- *Thawing: gradual return of motion.*

What is the treatment for adhesive capsulitis?

- *Non-operative treatment is generally effective if initiated in the first 4–6 months, it involves:*

➢ *NSAIDs.*

➢ *Physical therapy: program of gentle, pain-free stretching exercise and moist heat.* for 3-6 months

What is the treatment for adhesive capsulitis?

- *Operative treatment is generally reserved for cases that are unresponsive to nonoperative treatment, includes:*

➢ **Manipulation under anesthesia (MUA)(** *forward flexion in the sagittal plane, followed by ER with 0 abduction and then ER with 90 abduction then IR with shoulder 90 abduction and finally cross body adduction* **)**

➢ **Arthroscopic surgical release.** *Release of the anterior capsule, and particularly the rotator interval, is usually sufficient, although the posterior capsule can be released if required*

Viva 7

65-year-old lady, complains of 10 years of progressively left shoulder pain

- *What can you see?*
- *What are the types of glenohumeral joint arthritis ?*
- *How can you differentiate between osteoarthritis and inflammatory arthritis?*
- *What is the common history and physical examination noted with glenohumeral arthritis?*
- *what other investigations would you like to do and why?*
- *What is the classification system for glenoid wear in osteoarthritis?*
- *how are you going to treat this patient?*
- *What is the technique for shoulder steroid injection?*
- *what are the outcomes of shoulder arthroplasty?*

What can you see?

- *This is an A/P radiograph of left glenohumeral joint shows narrowing of the joint space, inferior osteophytes formation, & subchondral sclerosis.*
- *Features are consistent with glenohumeral arthritis.*
- *The inferior osteophytes also known as goat's beard.*

What are the types of glenohumeral joint arthritis ?

- *Primary degenerative*
- *Secondary degenerative: secondary to trauma, septic arthritis, AVN.*
- *Inflammatory arthritis.*
- *Rotator cuff arthropathy.*
- *Capsulorrhaphy arthropathy: glenohumeral arthritic condition that results from previous shoulder capsular surgery. The posterior glenoid is eroded with anterior capsular tightening and the anterior glenoid is eroded with posterior capsulorrhaphy.*
- *Neuropathic arthritis.*

What is *Capsulorrhaphy* ?

How can you differentiate between osteoarthritis and inflammatory arthritis?

- ***Osteoarthritis***

➢*Posterior glenoid erosion (on axillary view) due to anterior capsular contracture.*

➢*Posterior humeral subluxation.*

➢*Peripheral (inferior) osteophytes formation.*

- ***Inflammatory arthritis***

➢*Central glenoid erosion with medialization of the GH joint.*

➢*Lack of osteophytes*

➢*osteopenia*

Central erosion and lack of osteophytes

Axillary view with posterior glenoid erosion

What is the common history and physical examination noted with glenohumeral arthritis?

- ***History***

➢*Shoulder pain and stiffness are the primary presenting complaints.*

➢*Shoulder pain at rest and at night.*

➢*The history will often determine the etiology of glenohumeral arthritis trauma-infection-AVN-inflammatory.*

➢*Objective assessment of the patient's functional impairment: difficulty getting dressed-brushing teeth-washing face-combing the hair-washing the perineum-turning a key.*

What is the common history and physical examination noted with glenohumeral arthritis?

- ***Physical examination***

➢*Range of motion is often limited by pain and/or osteophytes.*

➢*Passive external rotation is most often limited as a result of arthritis. This is because the anterior and inferior capsular ligaments become contracted.*

Why the anterior and inferior capsule of the GH becomes contracted

what other investigations would you like to do and why?

- *Axillary view: shows the posterior glenoid erosion and the posterior subluxation of the humerus.*
- *CT: to assess glenoid bone stock, the zone of wear and orientation.*
- *MRI is used to evaluate the quality of rotator cuff for preoperative planning. Should be obtained when there is a concern for a rotator cuff tear.*

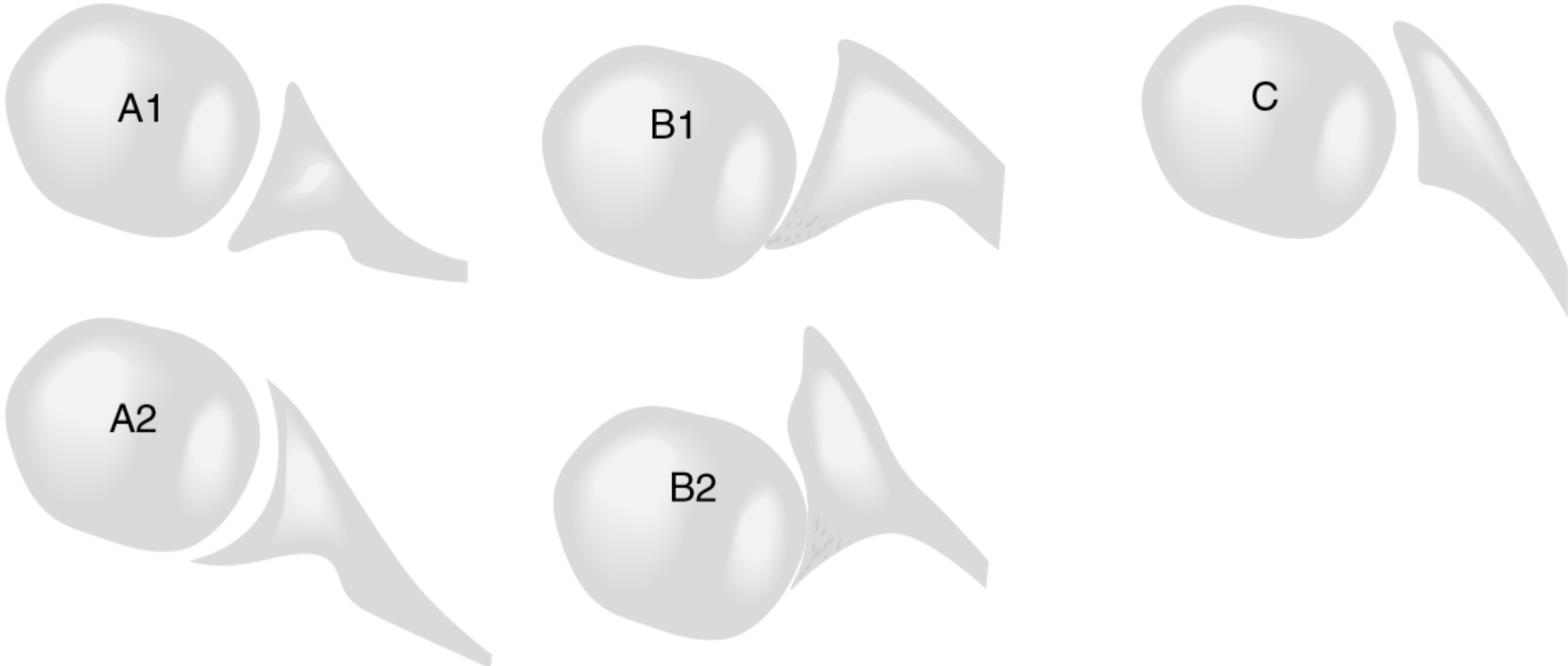
What is the classification system for glenoid wear in osteoarthritis?

- ***Walch classification***

➢ *A: central erosion. A1 : minor erosion. A2 : deep erosion*

➢ *B: asymmetric glenoid erosion (biconcave glenoid). B1: posterior humeral subluxation without posterior glenoid erosion. B2: posterior humeral subluxation with posterior erosion.*

➢ *C: posterior humeral subluxation with increased retroversion.*


A1
B1
C
A2
B2

how are you going to treat this patient?

❖*I will start with* ***non-operative management****:*

➢*Analgesics and NSAIDs*

➢*Physical therapy : range of movements and strengthening exercises.*

➢*Steroid injection.*

What is the technique for shoulder steroid injection?

- patient sitting, the patient's arm resting comfortably at the side,
- the shoulder externally rotated.
- Landmarks include the head of the humerus, the coracoid process, and the acromion.

- Anterior Approach
- The needle (Figure 1) should be placed just medial to the head of the humerus and 1 cm lateral to the coracoid process. The needle is directed posteriorly, slightly superiorly and laterally. If the needle hits against bone, it should be pulled back and redirected at a slightly different angle.

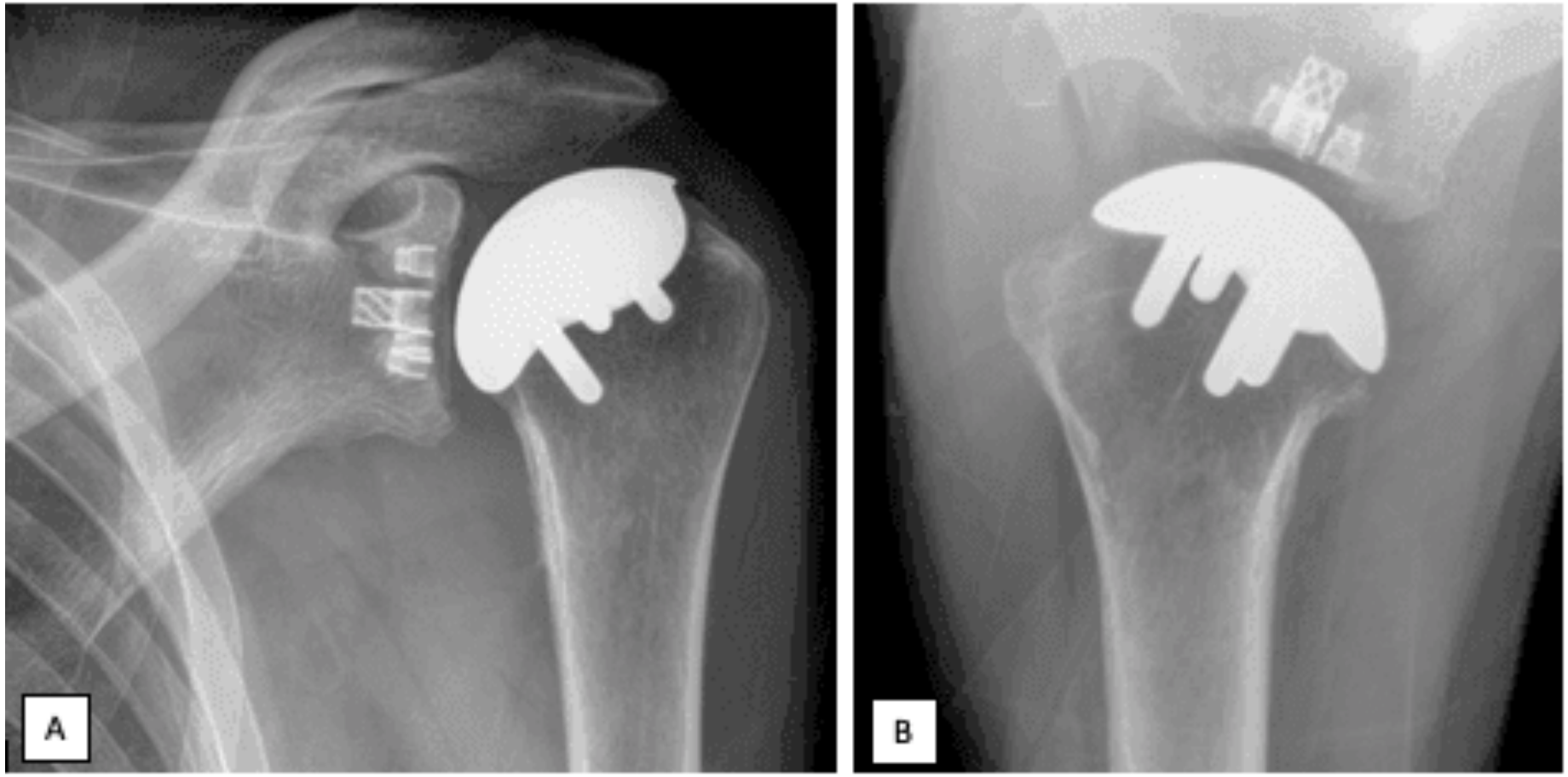
- Posterior Approach
- The needle (Figure 1) should be inserted 2 to 3 cm inferior to the posterolateral corner of the acromion and directed anteriorly in the direction of the coracoid process.

discuss all the operative options

❖***Total shoulder arthroplasty***

- *Replacement of the humeral head + glenoid resurfacing.*
- *Standard: all cemented, polyethylene glenoid resurfacing, glenoid component is not visualized on radiograph (dd from hemiarthroplasty by: 1- cement used to fix the glenoid PE. 2-good joint space. Uncemented metal-backed glenoid components also exist.*
- ***What are the factors required for success of TSA?***
- *Intact rotator cuff.*
- *Appropriate glenoid bone stock*

Uncemented metal backed glenoid PE



discuss all the operative options

❖***Total shoulder arthroplasty***

➢***What are the contraindications of TSA?***

➢*Insufficient glenoid bone stock (means glenoid wear to the level of the coracoid).*

➢*Rotator cuff arthropathy.*

➢*Irreparable rotator cuff tear.*

➢*Active infection.*

➢*Brachial plexus palsy.*

discuss all the operative options

❖ ***Total shoulder arthroplasty***

- *Approach: deltopectoral approach*
- *Position: Beech chair position*
- *Interscalene regional block provides good postoperative pain control.*

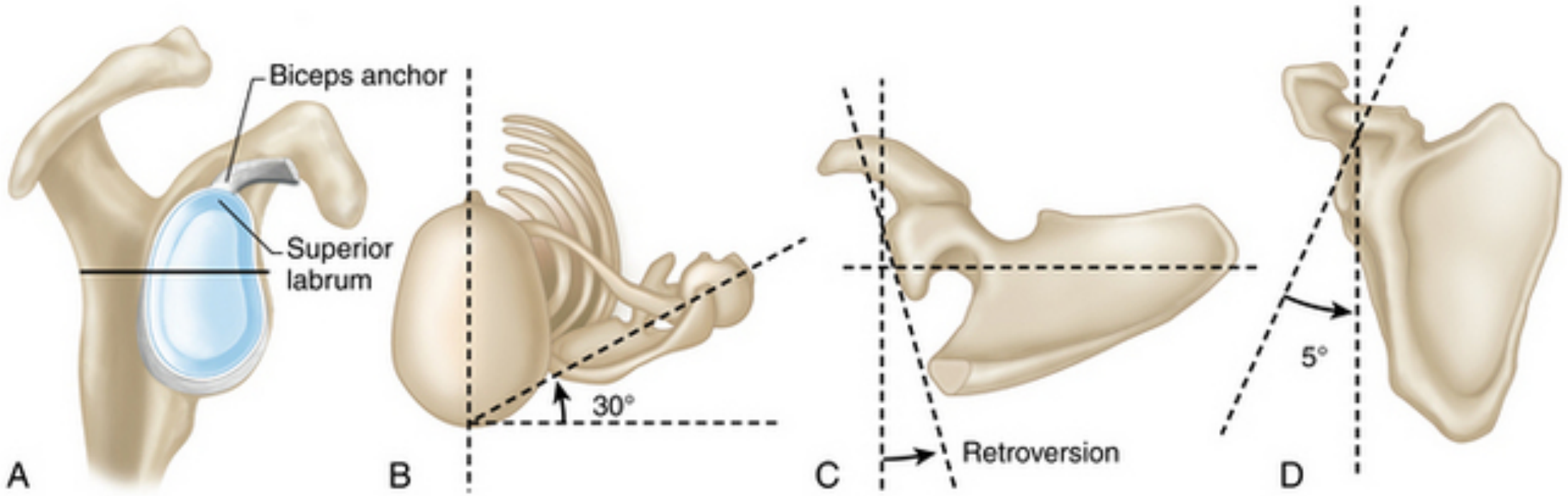
discuss all the operative options

❖***Total shoulder arthroplasty***

➢***What are the technical considerations of TSA in GH osteoarthritis?***

- *anterior capsule contracture (passive ER < 40°) : treated with release and lengthening.*
- *Glenoid retroversion: Normal version of the glenoid is 0-3 degrees of retroversion to scapular plane, 30° anteverted to coronal plane, but when doing a total shoulder **the goal** should be to place the glenoid component in neutral to slight anteversion by eccentric reaming the anterior glenoid. If reaming down the anterior glenoid will take away too much bone stock (down to the coracoid process), bone grafting the posterior glenoid should be considered.*
- *Glenoid deficiency: use bone graft (iliac or part of the resected head)*

Version to coronal *version with scapula plane*



discuss all the operative options

❖***Total shoulder arthroplasty***

➢***What are the complications of TSA?***

➢*Glenoid component loosening: the most common complication, more common in RA > OA. Risk factors: insufficient glenoid bone stock-rotator cuff deficiency.*

➢*Humeral stem loosening.*

➢*Malposition of the components.*

➢*Subscap failure: surgical approach for TSA involves detaching the subscap from the anterior humerus.*

➢*Infection: the most common organism is Propionibacterium acnes.*

➢*Neurological injury: axillary nerve is the most common. Musculocutaneous nerve can be injured by placing the retractor under(medial) the conjoined tendon.*

discuss all the operative options

❖***Total shoulder arthroplasty***

➢***What is the rocking horse phenomenon?***

➢*Eccentric loading of the glenoid component leads to lift off the opposite side.*

discuss all the operative options

❖***Hemiarthroplasty***

- ***When is hemiarthroplasty considered as a treatment option for glenohumeral arthritis?***
- *When there is insufficient gelnoid bone stock to support glenoid prosthesis.*
- *when large, irreparable Rotator Cuff tears are present.*
- ***What are the contraindications?***
- *Infection*
- *Neuropathic joint*
- *Coracoacromial ligament deficiency which prevents proximal migration*

Why coracoacromial ligament deficiency is contraindicated fro hemi?

discuss all the operative options

❖***Hemiarthroplasty***

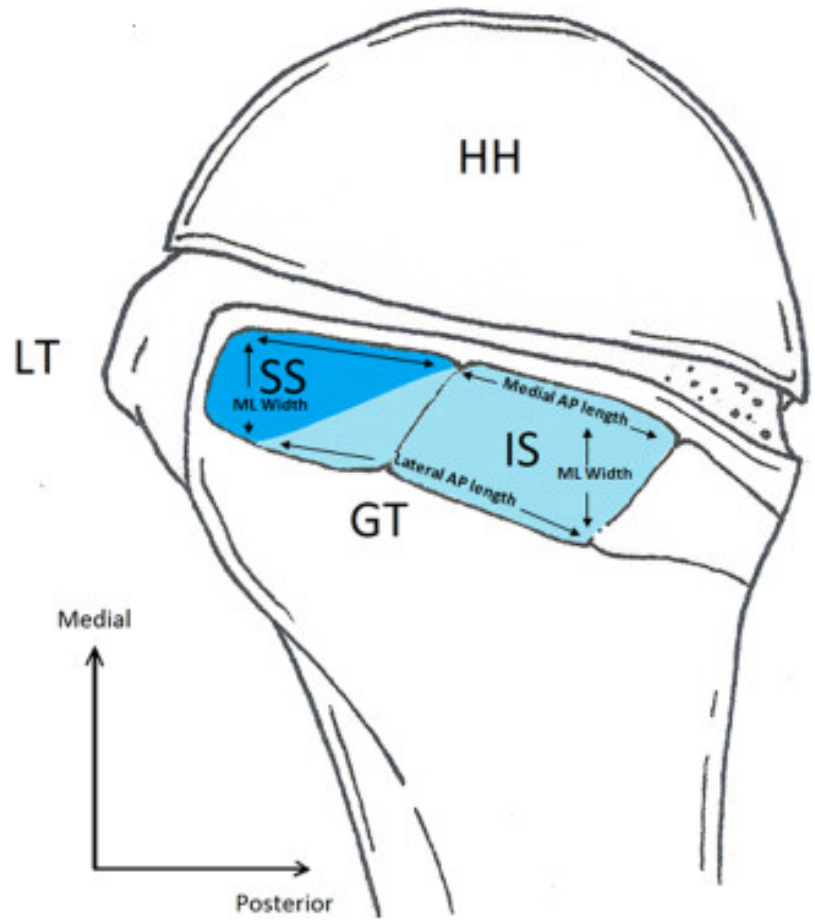
➢***What are the critical issues for successful hemiarthroplasty?***

➢*Humeral head resection: start osteotomy to the medial insertion line of supraspinatus.*

➢*Humeral head version:*

✓*Should be placed between 20-30 degrees of retroversion (humerus).*

✓*Anatomic landmarks to determine retroversion: a) lateral fin of the humeral prosthesis should be placed slightly posterior to the posterior margin of bicipital groove. b) 20-30 degree retroverted to the trans-epicondylar axis of the distal humerus.*


HH
LT
SS
ML Width
Medial AP length
IS
ML Width
Lateral AP length
GT
Medial
Posterior

discuss all the operative options

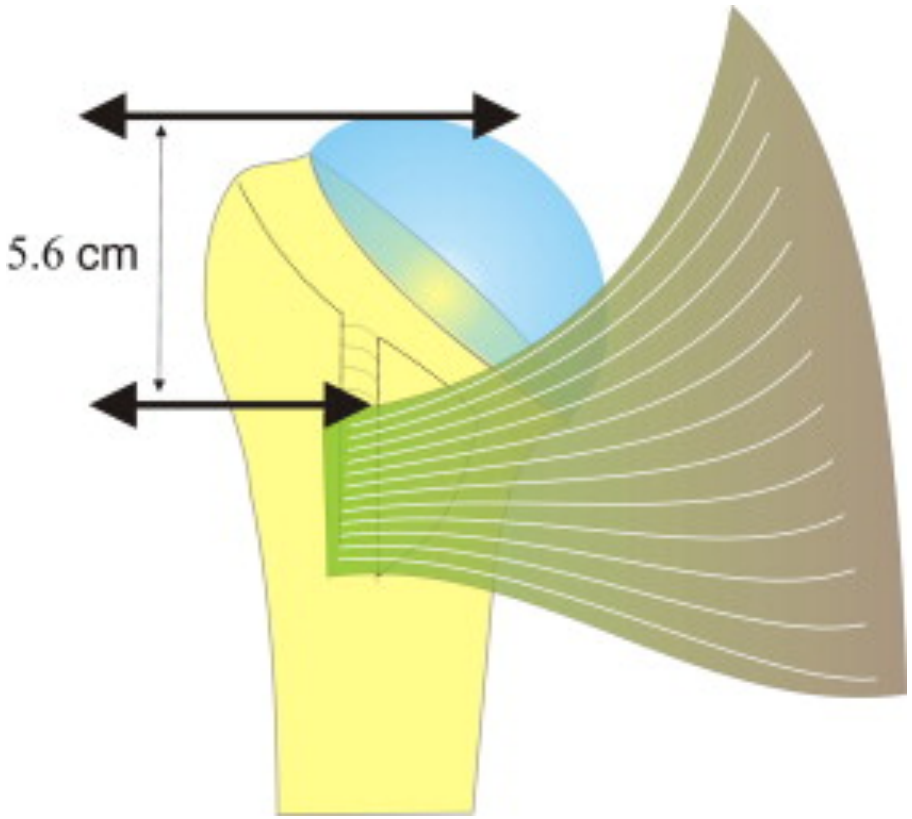
❖*Hemiarthroplasty*

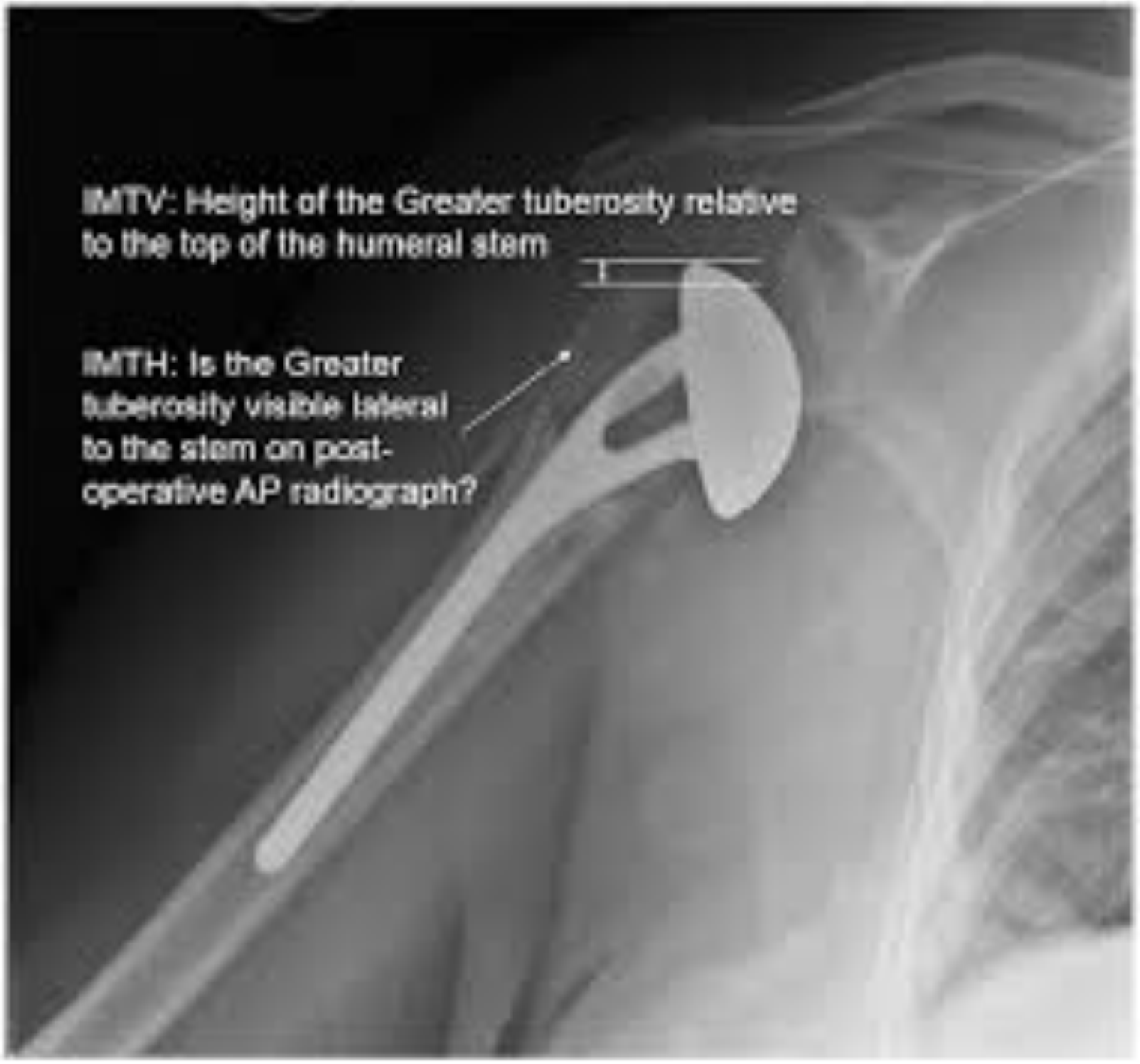
➢***What are the critical issues for successful hemiarthroplasty?***

➢*Implant height: when the tuberosities are anatomically reduced, the prosthetic head should be 5-8 mm above the top of GT. To prevent impingement. Placing the prosthesis too high will lead to excessive tensioning on supraspinatus, which may lead to detachment of the GT and proximal migration of the prosthesis. Placing the prosthesis too low will lead to excessive tensioning on the deltoid (weakness on elevation).* ***Intraoperative technique to achieve proper height:***

✓*Distance from the top of prosthesis to the upper border of the pectoralis major should be 5.6 cm.*

✓*Cement fixation helps to maintain proper humeral height.*


5.6 cm


IMTV: Height of the Greater tuberosity relative to the top of the humeral stem
IMTH: Is the Greater tuberosity visible lateral to the stem on post-operative AP radiograph?

discuss all the operative options

❖***Hemiarthroplasty***

➢***What are the critical issues for successful hemiarthroplasty?***

➢*Head size: determined by*

✓*Using radiograph of the contralateral shoulder*

✓*Measuring the size of the removed native head*

✓*Avoid overstuff joint.*

➢*Fixation: cemented prosthesis provides better quality of life-ROM-strength compared to uncemented*

discuss all the operative options

❖***Hemiarthroplasty***

➢***What consideration should be given to the glenoid?***

➢*The glenoid should be assessed for concentricity.*

discuss all the operative options

❖***Hemiarthroplasty with biologic glenoid resurfacing***

- *Biologic resurfacing provides an interposition between the native glenoid and the humerus to decree risk of violating the native glenoid bone stock.*
- *Techniques have been described using autograft anterior capsule, autograft fascia lata, tendo Achilles allograft, lateral meniscal allograft.*
- *To date, there are no comparative studies of hemiarthroplasty alone and hemiarthroplasty with biologic glenoid resurfacing*

what are the outcomes of shoulder arthroplasty?

- *The results of total shoulder arthroplasty (TSA) are better than those of hemiarthroplasty with respect to pain relief and function.*
- *literature shows decreased rate of revision surgery when compared to hemiarthroplasty*

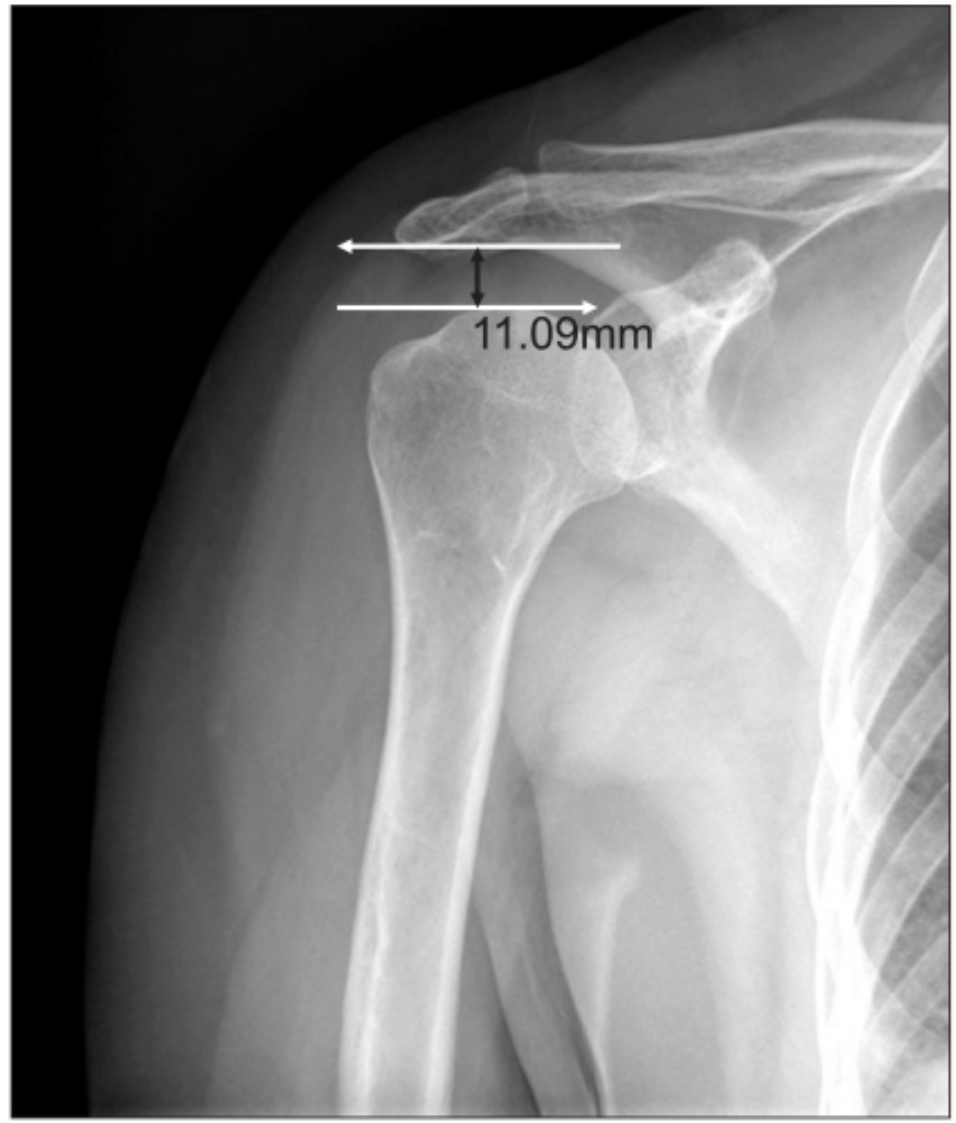
Viva 8

82-year-old woman who reports a 1-month history of shoulder pain.

- *Describe the X-ray?*
- *What is rotator cuff arthropathy?*
- *What is rotator cuff disease?*
- *What is the pathophysiology of RCA?*
- *What classifications of rotator cuff tear do you know?*
- *What four muscles make up the rotator cuff?What nerve innervates each muscle? What is the function of each muscle? Where does it insert?*
- *What is the anatomy of supraspinatus footprint?*
- *What is prevalence of asymptomatic rotator cuff tears seen in asymptomatic patients?*
- *How do they present? And what are the provocative tests?*
- *Do you know any classification for RCA?*
- *How are you going to manage this patient?*
- *What are the surgical options?*

Describe the X-ray?

- *This an anteroposterior X-ray of left shoulder, which was taken on (X date), shows proximal migration of humeral head, acromial acetabularization, femoralization of humeral head, glenohumeral arthritis, with osteopenia, subchondral sclerosis, lack of osteophytes.*
- *Features are suggestive of rotator cuff arthropathy.*
- The normal distance between the humerus head and the acromion lies between 7 and 13 mm, A distance less than 7 mm is considered proof of a full-thickness RCT and is associated with poor prognosis for rotator cuff repair


11.09mm

What is rotator cuff arthropathy?

- *shoulder arthritis in setting of rotator cuff dysfunction.*
- *Approximately 4% of patients with massive rotator cuff tears(>5cm) develop aggressive destruction of the glenohumeral joint.*

What is rotator cuff disease?

- *It is a continuum of disease that including: Subacromial/Subcoracoid impingement >> tendonitis >> partial thickness tear >> full thickness tear >> rotator cuff arthropathy.*

What is the pathophysiology of RCA?

- *It is found in conjunction with a massive tear of the supraspinatus, infraspinatus and long head of biceps tendons, with or without subscapularis and teres minor ruptures.*
- *Typically, the patient is an elderly female, and the dominant arm is more commonly affected.*
- *The humeral head is deformed(distorted) and has migrated superiorly.*

What is the pathophysiology of RCA?

- *Factors contributing to the development of cuff tear arthropathy:*

➢ *Mechanical:*

  ➢ *Rotator cuff loss leads to superior migration of the humeral head and direct wear of the head on the underside of the acromion*

➢ *Nutritional:*

  ➢ *Leak of synovial fluid due to the deficient cuff may impair cartilage nutrition*

➢ *Inflammatory:*

  ➢ *Possibly a crystal arthropathy (young patients, e.g. Milwaukee shoulder: destructive **shoulder** arthropathy due to deposition of hydroxyapatite crystals)*

Milwaukee shoulder

What classifications of rotator cuff tear do you know?

- ***Anatomic classification:***

➢ *SIT tears: represent majority of the tears, associated with Subacromial impingement, mechanism is a degenerative tear in elderly or shoulder dislocation in patients > 40 years. >90% of partial tears occurs in the articular side*

➢ *Subscap tear: associated with subcoracoid impingement, mechanism is avulsion in younger patients with abduction and external rotation or iatrogenic due to failure of repair.*

What classifications of rotator cuff tear do you know?

- ***Tears can be classified according to size into:***

➢ *small (<1 cm)*

➢*moderate (1–3 cm)*

➢*large (3–5 cm)*

➢*massive (>5 cm).*

What classifications of rotator cuff tear do you know?

- ***Tears can be classified according to the site into:***

➢ *Articular.*

  - ➢ *More common, rarely heal (possibly because of the inhibitory factors in the synovial fluid).*

➢ *Bursal.*

  - ➢ *More symptomatic, probably sometimes heal.*

➢ *Intersubstance.*

What classifications of rotator cuff tear do you know?

- ***Tears can be classified according to the fatty degeneration into(***Goutallier classification)***:***

➢*0 >> normal muscle.*

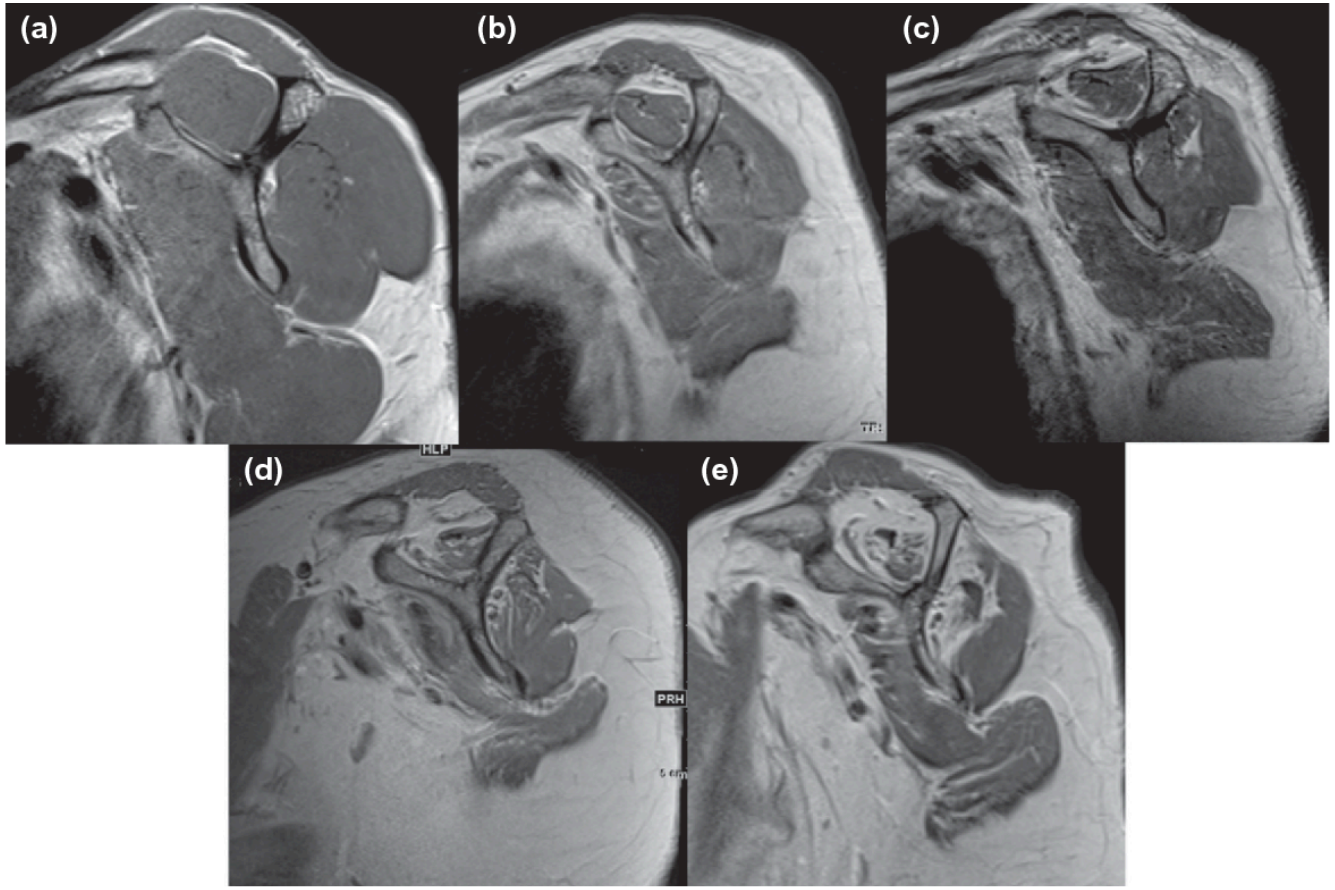
➢*1 >> fatty streaks.*

➢*2 >> fat <50%.*

➢*Fat = muscles.*

➢*Fat > muscles.*

Goutallier classification



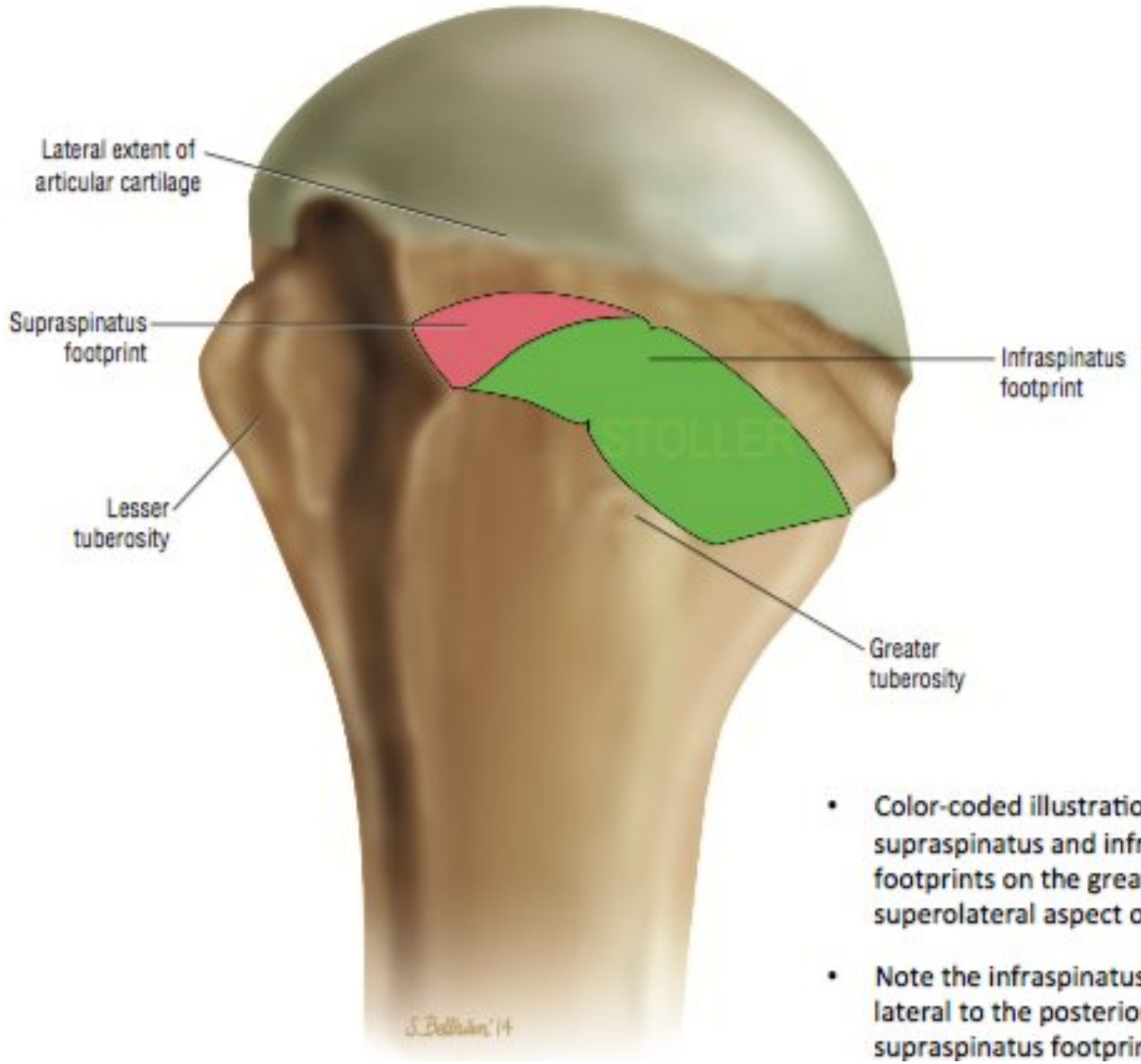
How to calculate the atrophy of the supraspinatous muscles

What four muscles make up the rotator cuff? What nerve innervates each muscle? What is the function of each muscle? Where does it insert?

MUSCLE	NERVE	SHOULDER FUNCTION	INSERTION
Supraspinatus	Suprascapular	Primary initiator of elevation	Greater tuberosity
Infraspinatus	Suprascapular	External rotation	Greater tuberosity
Teres minor	Axillary	External rotation	Greater tuberosity
Subscapularis	Upper and lower subscapular	Internal rotation	Lesser tuberosity

What is the anatomy of supraspinatus footprint?

- Triangular in shape, with an average maximum medial-to-lateral length of 12.1 to 12.6mm



- Color-coded illustration of the supraspinatus and infraspinatus footprints on the greater tuberosity superolateral aspect of the humerus.
- Note the infraspinatus footprint extends lateral to the posterior aspect of the supraspinatus footprint.

What is prevalence of asymptomatic rotator cuff tears seen in asymptomatic patients?

- *30-54% of patients over the age of 60.*
- *22% progress in asymptomatic over 5 years.*
- *50% progress in symptomatic over 5 years.*
- *There is a 50% likelihood of a bilateral tear after the age of 66 years*

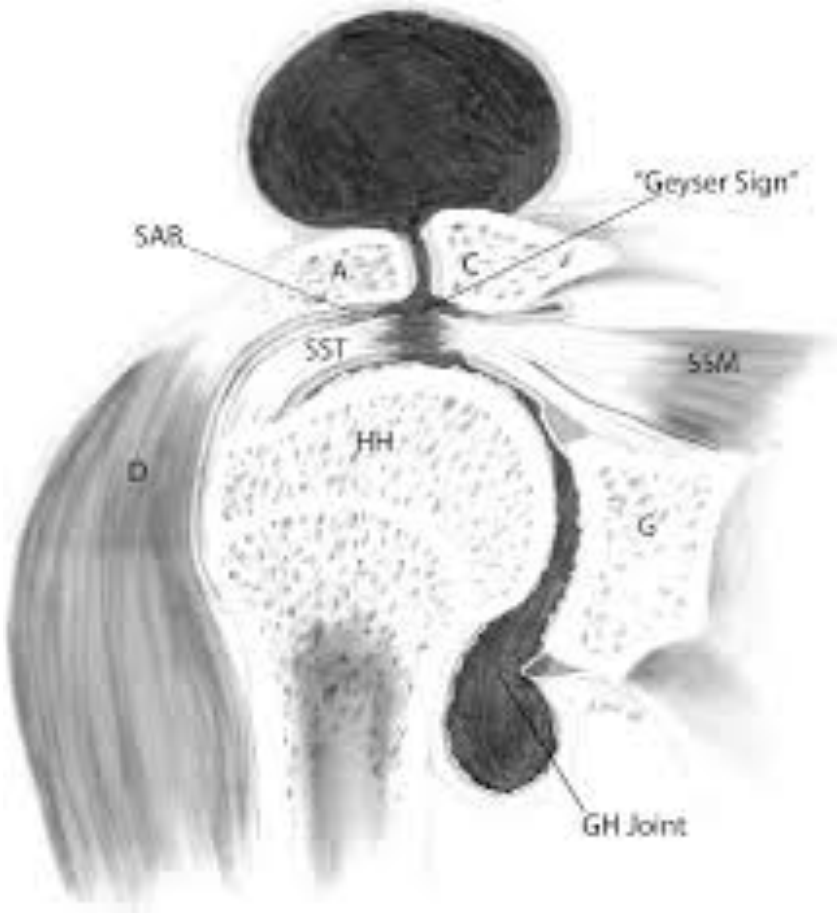
How do they present? And what are the provocative tests?

- *insidious onset of pain exacerbated by overhead activities*
- *night pain, which is a poor indicator for nonoperative management.*

How do they present? And what are the provocative tests?

- *geyser sign indicating recurrent effusions with the synovial fluid free to communicate between the glenohumeral joint and subacromial bursa resulting from rotator cuff arthropathy*
- *Pseudoparalysis (inability to abduct the shoulder)*
- *supraspinatus/infraspinatus atrophy*
- *crepitus in glenohumeral and/or subacromial joints with ROM*

geyser sign



How do they present? And what are the provocative tests?

- *Provocative tests:*

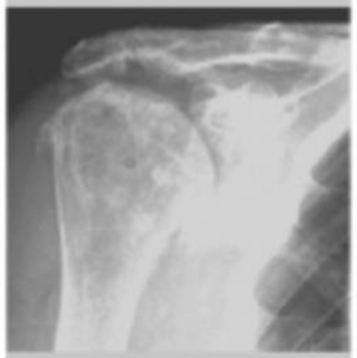
➢*Supraspinatus : drop arm test-pain with Jobe test.*

➢*Infraspinatus: ER lag sign.*

➢*Teres minor: Hornblowers.*

➢*Subscapularis: belly press – lift off – IR lag sign*

Do you know any classification for RCA?

Type IA- Centered stable	Type IB- Centered medialized	Type IIA- Decentered limited stable	Type IIB- Decentered unstable
			
• Intact anterior restraints	• Intact anterior restraints - Force couple intact/compensated	• Compromised anterior restraints - Compromised force couple	• Incompetent anterior structures
• Minimal superior migration	• Minimal superior migration	• Superior translation	• Anterior superior escape
• Dynamic joint stabilization	• Compromised dynamic joint stabilization	• Insufficient dynamic joint stabilization	• Absent dynamic joint stabilization
• Acetabularization of CA arch and femoralization of humeral head	• Medial erosion of the glenoid, acetabularization of CA arch and femoralization of humeral head	• Minimum stabilization by CA arch, erosion and extensive acetabularization of CA arch and femoralization of humeral head	• No stabilization by CA arch–deficient anterior structures

How are you going to manage this patient?

- *I would start with non-surgical management in term of :*

➢*Pain control (*non-steroidal anti-inflammatories)

➢*Activity modification*

➢physical therapy with a periscapular and rotator cuff strengthening exercise

➢subacromial steroid injections.

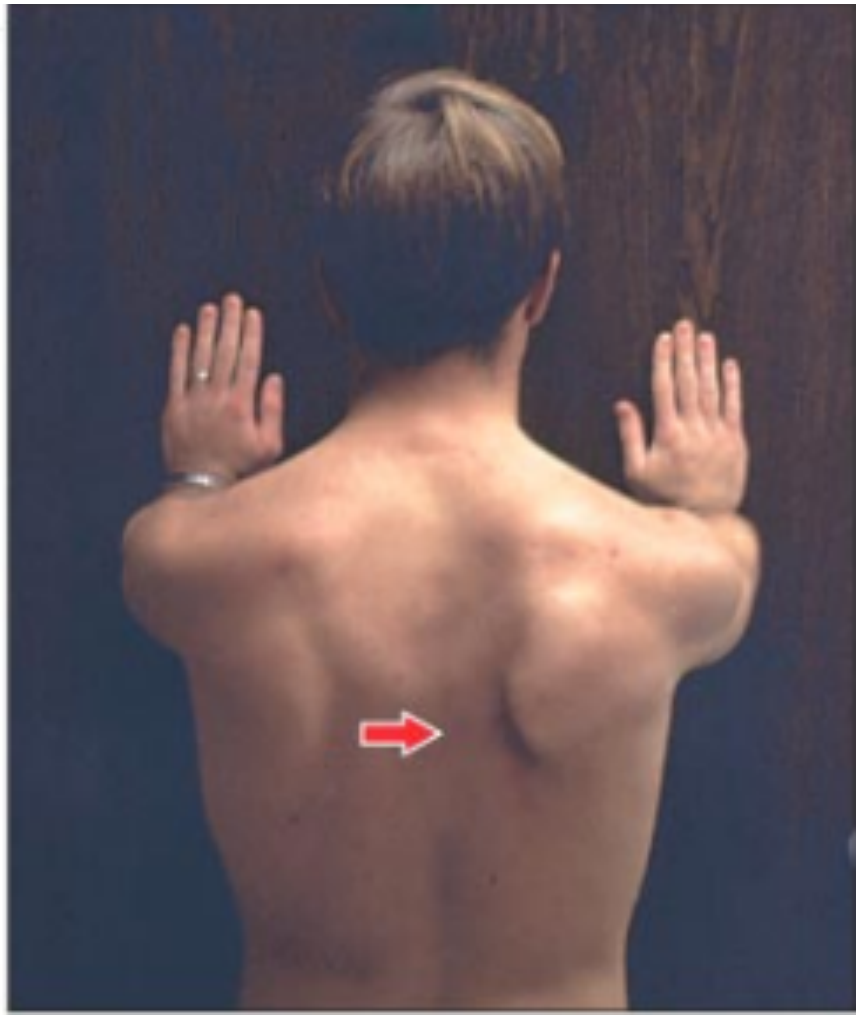
- Proceeding to the operating room without a trial of nonsurgical management is not indicated in these patients. Surgical procedures may be necessary in the future if nonsurgical measures fail.

What are the surgical options?

- *Hemiarthroplasty*
- *Reverse shoulder arthroplasty*
  - *The best two surgical options for RCA, prerequisites: functioning deltoid & adequate glenoid bone stock- R-TSA has better outcomes and early results are promising for improved elevation, but may not improve ER or IR.*
- Total shoulder arthroplasty: contraindicated in shoulders with severe rotator cuff deficiency.
- *Arthrodesis: indicated in salvage situations*

Viva 9

What can you see?



What are the types and causes of scapular winging?

❖***Medial scapular winging***

- *More common*
- *Common in young athletes.*
- *Caused by deficit in serratus anterior due to injury of long thoracic nerve (5-6-7).*
- *Causes:*
  - *Repetitive stretch. Most common cause (weight lifter-volleyball players)*
  - *Iatrogenic from anaesthesia*
  - *Compression injury. direct compression of nerve at any site, including the lateral chest wall seen with contact sports and trauma.*
  - *Scapula fracture.*

What are the types and causes of scapular winging?

❖***Medial scapular winging***

- ***Serratus anterior muscle***

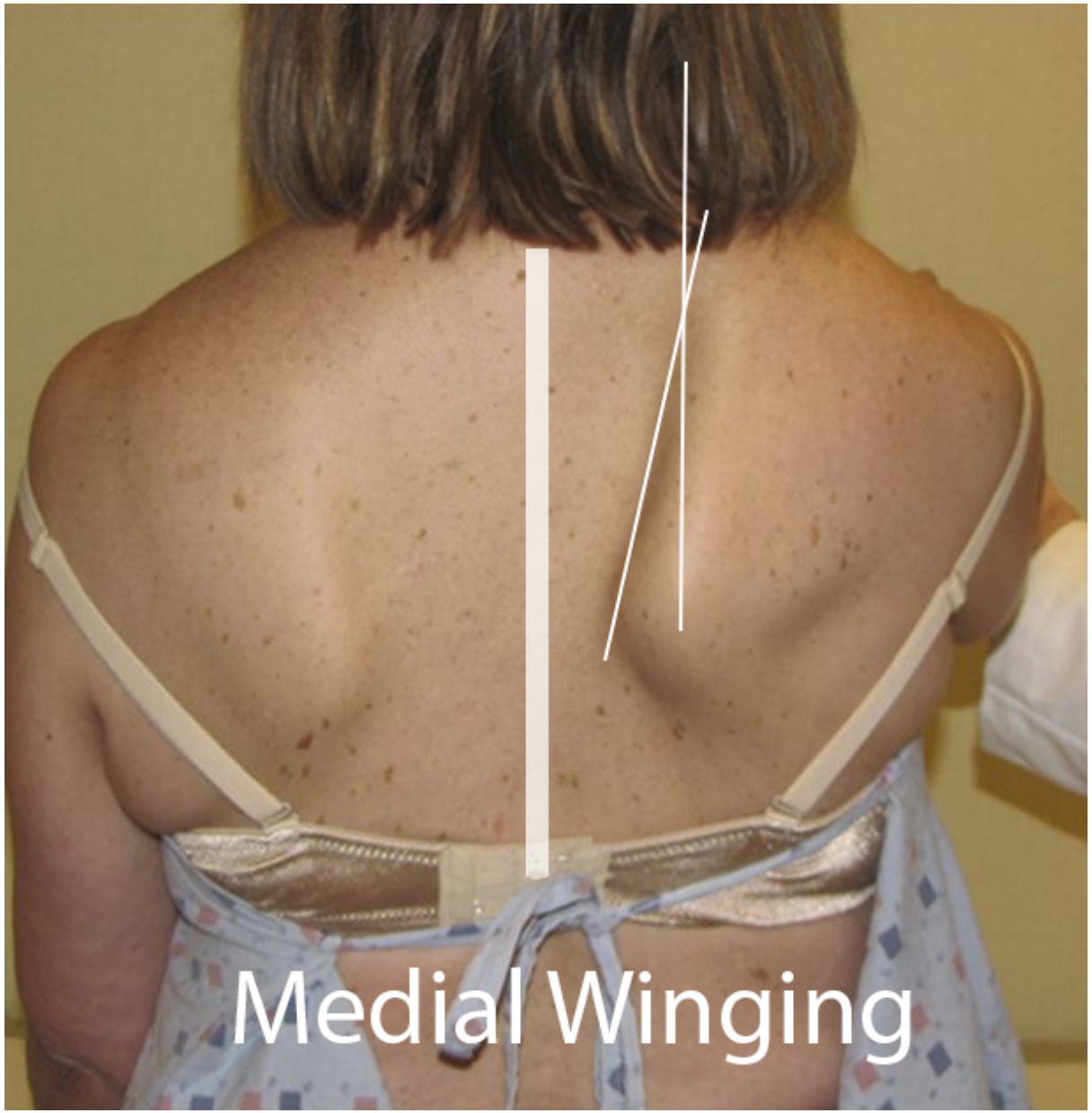
➢*Origin: from the outer surface of upper 8 or 9 ribs*

➢*Insertion : medial border of the scapula*

➢*Innervation: long thoracic nerve*

➢*Function: protraction of the scapula and upward elevation*

➢*Antagonist muscles: Rhomboid major, Rhomboid minor, Trapezius*


Medial Winging

What are the types and causes of scapular winging?

❖***Lateral scapular winging***

- *Caused by deficit in Trapezius (spinal accessory nerve XI) or Rhumboid (Dorsal scapular nerve).*
- *Causes:*
  - *Iatrogenic injury by general surgery or neurosurgery for LNs in posterior neck.*

What are the types and causes of scapular winging?

- ***Rhomboid muscles***

➢*Origin: major: SP T2 – T5. minor: C7 – T1*

➢*Insertion : medial border of the scapula at the level of scapular spine*

➢*Innervation: dorsal scapular nerve*

➢*Function: retract the scapula*

➢*Antagonist muscles: serratus anterior*


Lateral Winging

What are the types and causes of scapular winging?

- ***Fascio-scapular-humeral dystrophy (FSHD)***
  - *Autosomal dominant*
  - *Unilateral presentation in teens, progressing to bilateral involvement*
  - *Surgery: scapulothoracic fusion*

How do you treat this condition?

❖***Medial scapular winging***

- *Start with non-operative management*

➢*observation for a minimal of 6 months- wait for nerve to recover*

➢*Serratus anterior strengthening exercises.*

- *Most cases resolve within 12-24 months.*
- *Operative treatment is indicated after failure of conservative management*

➢*Transfer the sternal head of pectoralis major to the inferior angle of scapula*

How do you treat this condition?

❖***Lateral scapular winging***

- *Conservative management is less likely to succeed*
- *Surgical treatment (Eden-Lange procedure)*

What is Eden-Lange procedure?

- *The Eden–Lange procedure involves lateral transfer of the levator scapulae, rhomboid major, and rhomboid minor to substitute for the deficient parts (superior, middle, and inferior) of the trapezius.*
- *The transfer allows for stabilization of the scapula and improved biomechanics at the scapulothoracic articulation.*

Viva 10

45-year-old lady presented with Rt shoulder pain?

Describe the X-ray?

What would you like to do for her?

- I want to get history ...then to examine the patient

➢ *Symptoms include diffuse pain radiating distally to the mid-arm level, made worse on working with the arms raised.*

➢ *Examination reveals a painful abduction arc.*

➢ *Positive Neer's sign consists of pain on elevation of the arm.*

➢ *Hawkins' sign is pain on internal rotation of the arm in 90° of forward elevation: this brings the greater tuberosity under the acromion, and further exacerbates any compression of the supraspinatus tendon.*

What are the types of shoulder impingement?

❖**Subacromial (Outlet) impingement**

- *Described by Neer in 1972*
- *It is an overuse phenomenon (lacks acute inflammatory cells)*
- *Occurs due to intrinsic & extrinsic causes.*
  - *Intrinsic: degenerative tendenopathy (the swollen tendon has less space under the acromion).*
  - *Extrinsic: Subacromial spurring (enthesophyte formation under coracoacromial arch)- acromial fracture- os acromiale.*

What are the types of shoulder impingement?

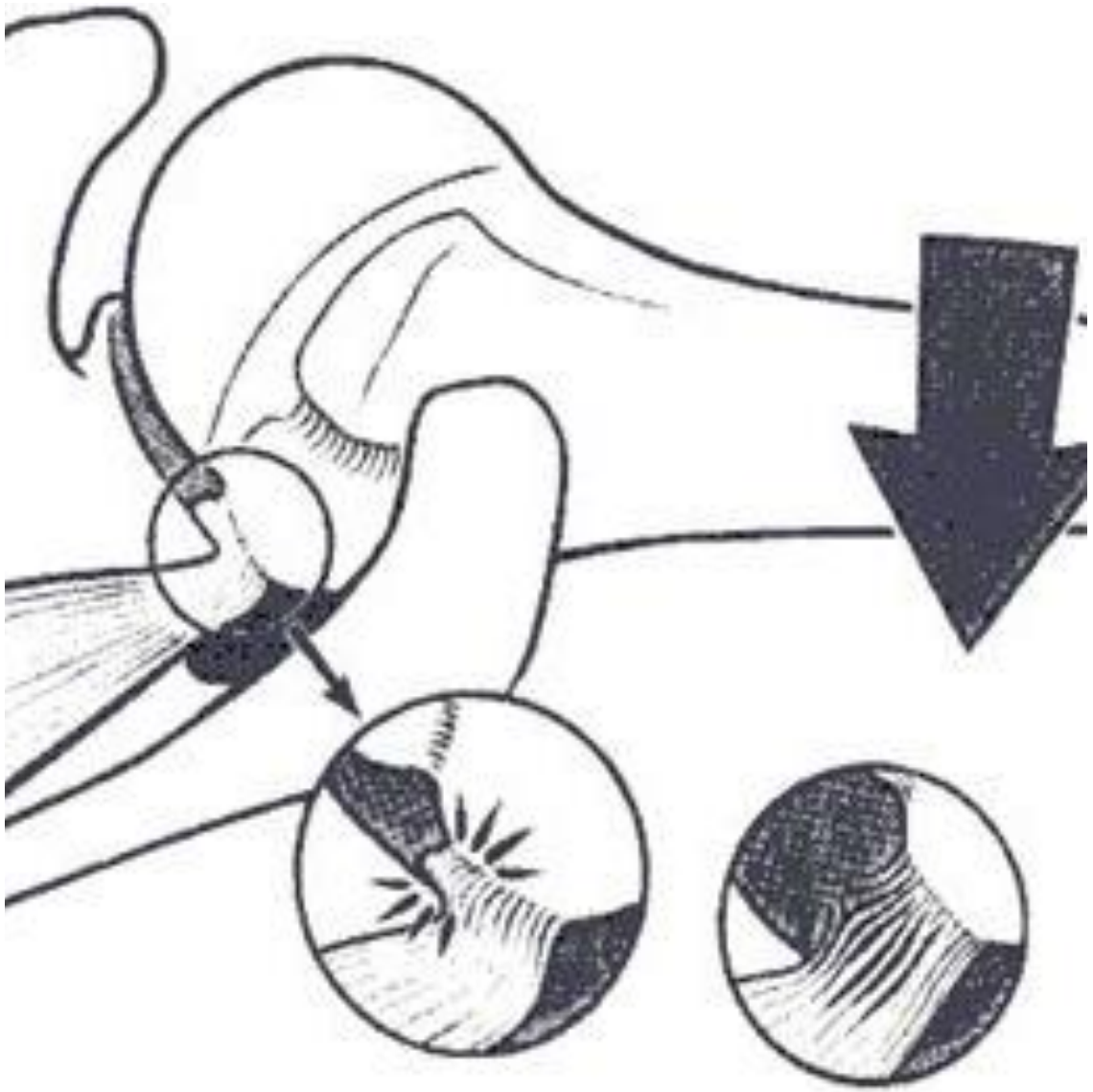
❖**Subacromial (Outlet) impingement**

- *It is the first stage of rotator cuff disease.*
- *Patients have pain with overhead activity*
- *Positive Neer impingement sign- Hawkin test- Jobe test*

What are the types of shoulder impingement?

❖Internal impingement

- *The position of abduction & external rotation compress the supraspinatus & infraspinatus muscles between the posterosuperior glenoid rim & the humeral head and the greater tuberosity causing fraying of the posterior rotator cuff.*
- *It is characterized by articular-sided partial-thickness rotator cuff tears and superior glenoid labral tears (in contrast to subacromial or "external" impingement which occurs on bursal side of rotator cuff).*
- *The capsule is characterized by laxity anteriorly and tightness posteriorly.*
- *Pain with abduction and external rotation with decreased internal rotation and increased external rotation.*




External Impingement
Internal Impingement

What are the types of shoulder impingement?

❖Subcoracoid impingement

- *subscapularis impingement between the coracoid and lesser tuberosity*
- *Pain with flexion, adduction and internal rotation.*

What are the causes of Subacromial impingement?

- *Intrinsic factors such as hypovascularity of supraspinatus (particularly at the so-called watershed area approximately 1 cm from its insertion)*
- *extrinsic factors (compression by an abnormally shaped acromion- Os acromiale and to a lesser extent ACJ osteophytes)*

What are the different types of acromial morphology and how do they relate to rotator cuff disease?

- *Bigliani classification of acromion morphology (based on a supraspinatus outlet view)*
  - *Type I - flat*
  - *Type II - curved*
  - *Type III – hooked*
- *Hooked shaped has been associated with rotator cuff degeneration and tears.*

Type 1: Flat 17%

Type 2: Curved 43%

Type 3: Hooked 40%

Bigliani et al,
Orthop Trans,
10:228 1986

What radiographic views would you like to request for this condition?

- *Standard shoulder A/P radiograph will help to exclude coexisting pathology such as ACJ arthritis.*
- *An anteroposterior film with 30° caudal tilt will visualize pathology on the undersurface of the ACJ, e.g. Subacromial spurring-osteophytes.*
- *Acromial morphology is best shown by a lateral outlet view (taken as for a scapular lateral, with 10° inferior angulation of the tube).*
- *An axillary view will exclude the presence of an os acromiale*

How would you manage this condition?

- *I would start with non-operative management:*

➢*NSAIDs*

➢*Physical therapy (*rotator cuff strengthening and periscapular stabilizing exercises)

➢*Subacromial injection*

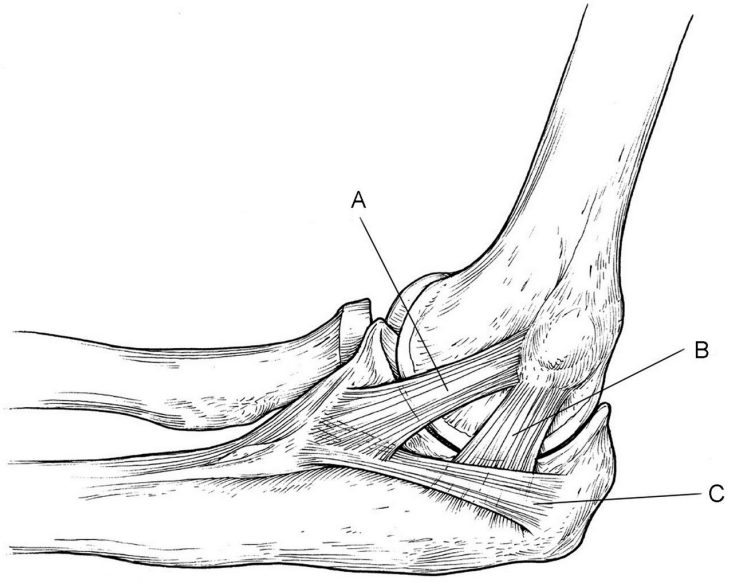
- *Subacromial decompression +/- acromioplasty is indicated when impingement failed a minimum of 4-6 months of nonoperative treatment*
- In case of Os acromiale, the os acromiale is first fused with bone graft and allowed to heal, then an acromioplasty is then performed as a separate second procedure

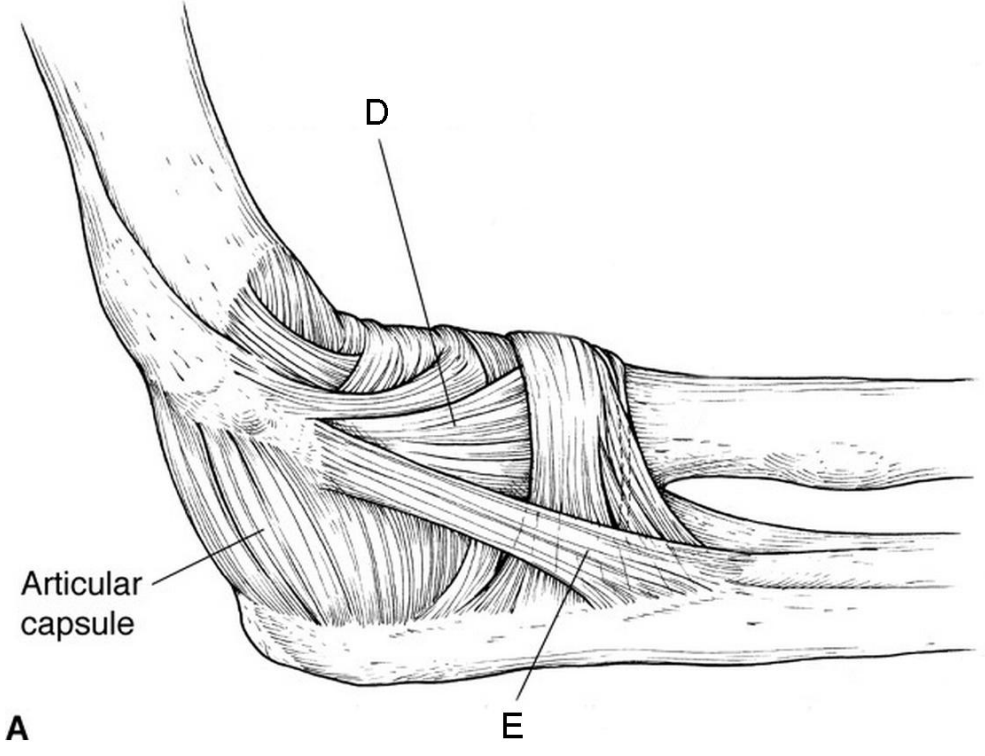
Tell me more about acromioplasty?

- two-step procedure performed open or arthroscopically (modified Neer acromioplasty)
- *an anterior acromionectomy is performed first, the anterior deltoid origin determines the extent of the acromionectomy when performed arthroscopically and must remain intact.*
- *An anteroinferior acromioplasty to smooth the under surface of the acromion follows as the second step of the procedure*

Viva 11

- On the diagram, name the structures of the elbow
- What are the causes of elbow stiffness and contracture?
- How would you evaluate a patient with elbow stiffness?
- What are the treatment options?





On the diagram, name the structures of the elbow

- *A: this is the anterior band of the medial collateral ligament. It is the primary stabilizer of valgus stress, originates from the medial epicondyle to the sublime tubercle, maintains a constant length (isometric) throughout the entire arc of movement*
- *B: the posterior band of the medial collateral ligament (MCL). It forms the floor of the cubital tunnel, has greater variation in length. It increases in length by 9 mm between 60° and 120° of flexion*.
- *C: This is the transverse band of the medial collateral ligament.*
- *D: This is the radial collateral ligament.*
- *E: This is the lateral ulnar collateral ligament (LUCL): from lateral epicondyle to crista supinator.*

What are the causes of elbow stiffness and contracture?

- *trauma*
- *surgery*
- *arthritis*
- *cerebral palsy*
- *traumatic brain injury*
- *burns*
- *congenital conditions*
  - *arthrogryposis*
  - *congenital radial head dislocation*

What are the causes of elbow stiffness and contracture?

- ***intrinsic causes***
  - *joint incongruity*
  - *synovitis*
  - *loose bodies*
  - *intra-articular fractures*
  - *osteochondritis dissecans*
  - *post-traumatic arthritis*
- ***extrinsic causes***
  - *formation of eschar following a burn*
  - *heterotopic ossification*
  - *adhesions/contraction of the capsule (anterior and posterior)*
  - *Muscles- myositis ossificans*
  - *ligament contractures*
    - *scarring of posterior oblique portion of medial ulnar collateral*

How would you evaluate a patient with elbow stiffness?

❖ ***History:***

- *Duration of elbow contracture*
- *Trials of splinting therapy*
- *Involvement of other joints*
- *History of trauma- burns*
- *Medical problem (CP)*
- *Previous surgical procedures*
- *Impact on ADLs*
- *Patient's work, life demand and goals*

How would you evaluate a patient with elbow stiffness?

❖ ***Examination:***

- *Assess function of upper extremity (shoulder-elbow-hand)*
- *Inspection of the soft tissue surrounding the elbow for previous skin incision- eschar- inflammation*
- *Assess ROM- functional motion 30° to 130 flexion/extension, most activities require a 100 degree arc of motion at the elbow to be functional, a 30 degree loss of extension is well tolerated by most patients, 50° supination, 50° pronation.*
- *assess ulnar nerve function because of its anatomic proximity to the elbow.*

How would you evaluate a patient with elbow stiffness?

❖ ***Imaging:***

- *Radiographs should always be obtained (A/P-lateral-oblique)*
- *CT scan, indications*

✓*loose bodies in joint*

✓*non-unions*

✓*joint incongruity*

✓*abnormal bony anatomy*

How would you evaluate a patient with elbow stiffness?

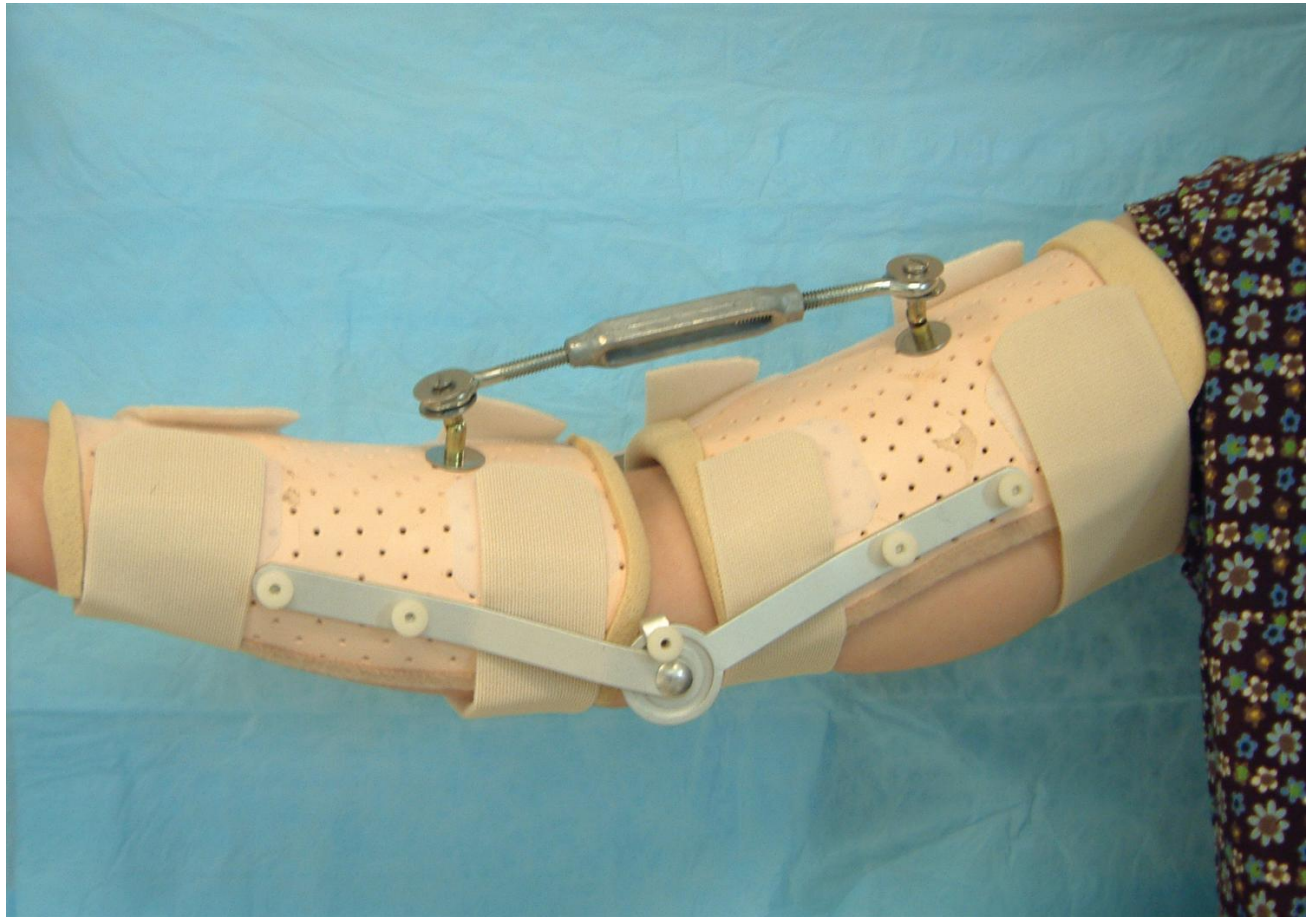
❖**Physical therapy with active and passive range of motion exercises**

- *first line of treatment in most cases when contractures <40 degrees*

❖***Static progressive elbow splinting (turnbuckle)***

- *Generalized accepted indications are flexion contractures greater than 30 degrees, or flexion less than 130 degrees after a failed trial of physical therapy.*

static progressive turnbuckle elbow splint (adjustable splint)



How would you evaluate a patient with elbow stiffness?

❖**Surgical release:**

❖**Arthroscopic release**

- *Technically demanding procedure because of small joints. (posterior compartment-debride olecranon osteophytes/fossa, posterior capsular release. Anterior compartment-debride coronoid osteophyte/fossa, central trochlear ridge, capsular release)*

❖***Open lateral column approach (Morrey)***

- *triceps-reflecting approach is performed by releasing the triceps tendon, forearm fascia, and periosteum as one unit from medial to lateral off the olecranon. At the end of the procedure, the triceps tendon is repaired back to the olecranon by means of two transosseous drill holes placed in a cruciate configuration*

How would you evaluate a patient with elbow stiffness?

❖**Surgical release:**

❖***Open medial over the top approach (Hotchkiss)***

- *Indicated in patients with extrinsic contractures, associated MCL calcification and ulnar neuropathy*

How would you evaluate a patient with elbow stiffness?

❖**Total elbow arthroplasty:**

- *Indicated in intrinsic contractures with diffuse arthritis in low demand elderly patients*