CHRONIC SHOULDER DISORDERS

Lecture objectives:

1. Specify the symptoms, signs and potential immediate complications of common shoulder disorders.
2. Outline the assessment and appropriate investigation and to outline the immediate and long-term management of patients common shoulder disorders.
3. Demonstrate knowledge of indications for nonoperative and operative treatment and to know the most common non-operative and operative measurements used for common shoulder disorders.

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References: slides + Toronto notes, 436 team

SHOULDER ANATOMY

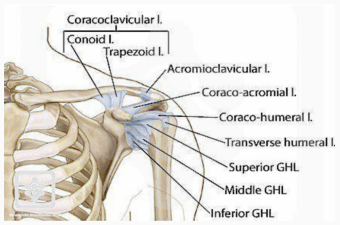
The anatomy in the shoulder is very special. In joints we have two things to consider: Range of motion and Stability you have to sacrifice one to gain the other. E.g. the **ROM** in the knee is limited only in one axis: flexion and extension (although it's not very accurate to say one axis), but the shoulder has many axes: abduction, adduction, forward flexion, extension, internal rotation, external rotation and circumduction (basically all kind of ROM).

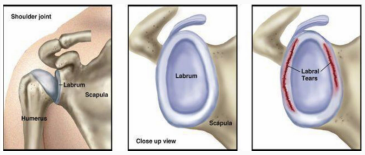
Stability is either by static structure (always there, always acting the same way) or dynamic:
Stability by static structures can be due to:
Bony structures:

- Humerus: humeral head is big, glenoid is wide (humerus head is much bigger than glenoid) which can give you some stability but not the best, unlike the femoral head which is more like spherical in shape and the acetabulum is covering most of it (Ball in socket) → more stability, It typically takes a major force or trauma to dislocate the hip (It's a big issue to have someone with hip dislocation!)
- Scapula (Glenoid, Acromion, Coracoid, scapular body)
- Clavicle.
- Sternum.

Shoulder injury caused by low energy; certain movements can get your shoulder out.

Ligaments:
The shoulders' ligaments are not as big and strong as the knees' ligaments, why? The ligaments in the shoulder are just thickening of the capsule. There are 3 anterior ligaments which prevent anterior dislocations: superior,
middle and inferior Glenohumeral ligaments. You have to keep in mind! 95 % of the dislocations are anterior (commonly anterior- inferior), while the posterior is extremely rare and only certain traumas will cause the inferior, posterior or superior dislocations.
The anterior dislocation happens when the shoulder is abducted in 90 degree and externally rotated, So in this position Which one of the three ligaments has more chance to get strained and also affected in the anterior dislocation? inferior glenohumeral ligaments

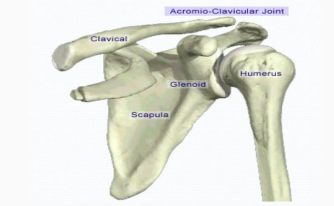
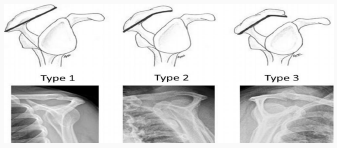
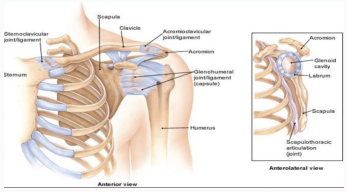
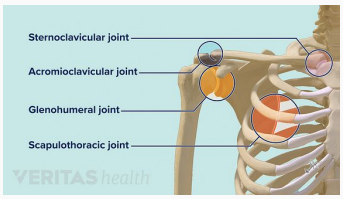
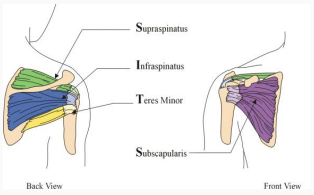
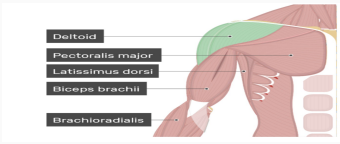
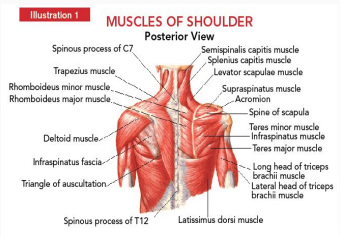
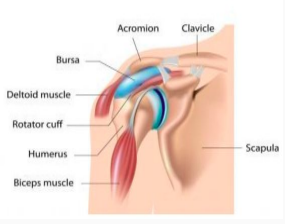




↪ How? While abducting and externally rotating the shoulder → the inferior ligament will be more stretched, but the ligaments are stronger than any structures although they are only thickening but still they are the strongest → they will not tear but they will detach the labrum from the bone when there is dislocation. **Very IMP I WILL ASK YOU ABOUT IT!!** (What is called? What will you see in MRI? **BANKART LESION** (anterior inferior part of the labrum is detached and (instability causing Labrum is fibrocartilage that gives the depth for accommodating the head also the ligaments attach to it.

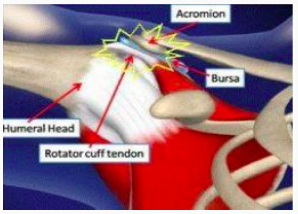
○ Acromion is very important, it's a landmark for almost everything you do around the shoulder, and it's supporting the rotator cuff and acts like a roof over the glenohumeral joint. In case of abduction if there was a proximal migration what will happen? The GT will hit the acromion → the supraspinatus impinge. 4 will
○ Coracoid is attached to the conjoint tendon (tendons of short head of biceps and coracobrachialis)
○ Long head of biceps is a trouble maker passes through the bicipital groove and attached to superior labrum (doesn't attach to bone which is unusual) with age there will be pulling out and detachment of labrum which is called (SLAP lesion superior labrum anterior posterior lesion) or becomes inflamed in old people, very common problem in the West (white ethnicity) but here it is not bad as in the West, what do we do for them? (Shoulder arthroscopy). In women base of thumb is usually affected by instability then arthritis in the West, here is not that common.

SHOULDER JOINT ANATOMY

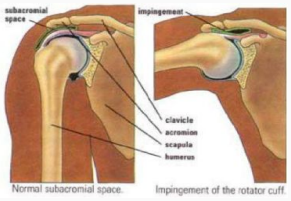
Bones	**Bony structures:** ➢ Humeru. ➢ Scapula (Glenoid, Acromion [Type I = Flat, Type II = curved, Type III = hooked its normal variation], Coracoid, scapular body) ➢ Clavicle. ➢ Sternum.	 
Joints (all of them called the shoulder girdle) but when we say shoulder joint we mean GHJ)	1- Glenohumeral joint: The main joint, most commonly dislocated joint why?Because it has the widest range of motion among all the joints. and it lacks bony stability. Composed of: • Fibrous capsule • Ligaments • Surrounding muscles • Glenoid labrum (anterior and posterior labrum which plays a very critical role and stability issue glenohumeral joint) 2- Acromioclavicular (AC) joint. 3- Sternoclavicular (SC) joint. 4- Scapulothoracic joint is in the back.	 
Muscles	- Rotator Cuff Muscles (SITS): depress humeral head against glenoid 1. Supraspinatus: Initiation of abduction + external rotation 2. Infraspinatus: External rotation 3. Teres Minor not very important: External rotation 4. Subscapularis: Internal rotation - Deltoid: largest & strongest muscle of the shoulder, and has three attachments from clavicle, acromion, scapular spine and attaches to the lateral aspect of the proximal humerus. - Pectoralis major - Biceps - Posterior scapular muscles: 1. Trapezius 2. Rhomboids 3. Levator scapulae 4. Latissimus dorsi 5. Serratus anterior	  
Subacromial bursa	- Between the acromion and the rotator cuff tendons. - Bursa is structure to make grinding between muscles and bone less; protects rotator cuff tendons from grinding against acromion. - Pathology → irritation → thickening → subacromial space narrowing → further impingement.	

IMPINGEMENT SYNDROM متلازمة الانحسار

★ Mechanism:

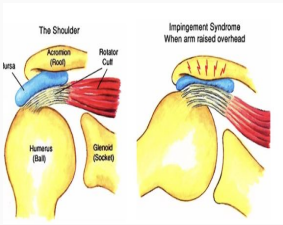


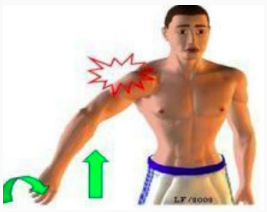
a condition in which the supraspinatus and bursa are pinched as they pass between the head of humerus (greater tuberosity) and the lateral aspect of the acromion usually happens with the proximal migration. It is the most common disorder of shoulder, accounting for 44– 65 % of all complaints of shoulder pain during a physician's office visit. Normally there is enough space, but sometimes the muscle gets bigger when it inflamed so it will impinge or with time some people develop spurs and greater tuberosity hypertrophy so the space become narrower but most cases are combination of both.



★ Risk Factors:

1. Age (over 40y).
2. Overhead activity e.g. lifting, swimming, tennis, combing hair, wearing.
3. Bursitis and supraspinatus tendinitis. It makes the space even smaller
4. Acromial shape: type II & III acromion (but keep in mind! Not all people with type two have the impingement syndrome, why? Basically it could be due to two reasons: first their muscles are strong so there is no proximal migration, the second thing is their tendons are stronger when they are young, fresher, healthy, it has water content and healthy collagen, the older you get changes happen.)
5. AC (Acromioclavicular joint) arthritis or AC joint osteophytes may result in impingement and mechanical irritation to the rotator cuff tendons.





★ Symptoms:

- **Pain in the acromial area** when the arm is flexed and internally rotated → Inability to use the **overhead position**.
- Pain could be due to Subacromial bursitis or rotator cuff tendinitis.
- Worse at night as the subacromial bursa becomes hyperemic after a day of activit.
- Pain when sleeping on the affected side.
- Decrease ROM especially abduction. After time the pain limited ROM in particular abduction and forward flexion.
- Weakness.

★ Differential diagnosis:

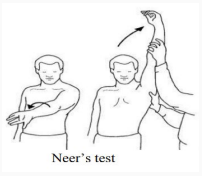
- Rotator cuff tear similar presentation. Impingement with time becomes rotator cuff tear.
- Calcific tendinitis. Calcifications around the insertion of Supraspinatus due to trauma or otherwise reasons, they present with impingement like symptoms.
- Biceps tendinitis.
- Cervical radiculopathy.
- Acromioclavicular arthritis
- Glenohumeral instability usually present as vague pain
- Glenohumeral osteoarthritis.
- Brachial plexus compression syndrome (الابهر) can't raise his arm due to rotator cuff impingement, so compensating by sliding the scapula forward (protraction) that causes contraction of the neck muscles and spasm which causes pressure in Brachial Plexus, so patients with impingement can develop BPCS.

★ **Diagnosis**: Accurate diagnosis of impingement requires:

- History : pt comes with pain with overhead activities and pain in lateral aspect of arm.
- Physical Examination.
- Imaging.

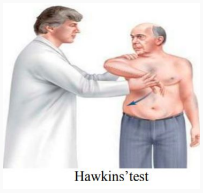
★ **Physical Examination:**

- Pain on "Impingement tests".
- ↓ ROM → IR & A**b**duction.
- Weakness in flexion and external rotation.
- Pain on resisted abduction and external rotation.


Neer's test

➔ ***Impingement tests:***

- **Neer's impingement test**: (not specific because it can be positive with other) passive elevation of the internally rotated arm in the sagittal plane (shoulder forward flexion). Internal rotation and forward flexion (to bring GT forward and cause it to hit the Anterior part of acromion) positive if he felt pain.
- **Hawkins' impingement test:** with the elbow flexed to 90 degrees, the shoulder passively flexed to 90 degrees and internally rotated. Positive test when there is limited abduction and weakness, more sensitive.


Hawkins'test

★ **Radiological Findings**:

✓ Plain x-ray: (Mostly it's normal)

- Acromial spurs (small osteophytes)
- AC joint osteophytes
- Subacromial sclerosis
- Greater tuberosity cyst is common

Supraspinatus outlet view

There is a special view called <u>supraspinatus outlet view</u> to give exactly the shape of acromion but we don't use it very often with the presence of MRI

✓ MRI:
To confirm dx and rule out rotator cuff tear.

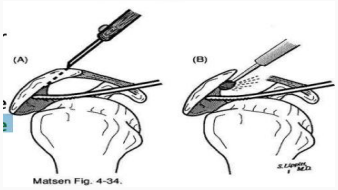
★ **Management**:

→ **Conservative treatment**: Always Start with it.

- ○ Avoid painful activities → especially overhead activities.
- ○ Physiotherapy:
  - 1- Stretching and range of motion exercises.
  - 2- Strengthening exercises.
- ○ NSAIDs.
- ○ Subacromial space steroid injection.

→ **Operative treatment**: Indicated when conservative measures <u>fail after 6 months</u>.

- ○ Goal → remove the impingement and create more subacromial space for rotator cuff.
- ○ The anterolateral edge of the acromion is removed.
- ○ Open (Called: Acromioplasty) نعدل شكله وتكون العملية اوبن or arthroscopic technique (Called: subacromial decompression يحكونه عشان تزيد المساحة) and at the same time we do bursectomy.
- ○ Success rate 70-90%.



Matsen Fig. 4-34.

ROTATOR CUFF PATHOLOGY
تمزق الكفة المدورة

★ Function of rotator cuff muscles:
- Keep the humeral head centered on the glenoid regardless of the arm's position in space.
- Generally work to depress the humeral head while powerful deltoid contracts.

★ Causes of rotator cuff tear:
(Generally traumatic, 'less common' Degenerative / overuse)
Mostly it's caused by two reason, either trauma like falling or pulling something heavy, or degenerative which is made worse by existent of impingement.

Intrinsic factors	Extrinsic factors	Traumatic
- Vascular: muscleotendino junction is poor vascularity 15:15 - Degenerative (Age-related and so active (overuse))	- Impingement: not treated > chronic impingement >cuff tear 1-Acromial spurs 2-AC joint osteophytes - Repetitive use	e.g. a simple fall or trying to catch or lift a heavy object or after a shoulder dislocation in age >40 and muscle is weak which lead to tear when you have pt. over 40 with dislocation don't reduce and discharge you must do MRI to check for rotator cuff tear _Hx of trauma + not able to move >> high suspicion of rotator cuff injury

★ Diagnosis:
- History and Physical Exam. Do first impingement tests then test rotator cuff muscle [Empty can test/ jobe for supraspinatus test, Lift-off test for subscapularis, Resisted external rotation for Infraspinatus and teres minor]
- X-rays may it is norma.
- MRI (Sensitivity of 84% and a specificity of 96%, Best for RC evaluation, MODALITY of choice).
- Ultrasound (Highly operator dependent, Does not provide information regarding concomitant pathologies).

★ Wide Spectrum:
- Partial thickness may 3mm.
- Full thickness:
  - Small may 1cm.
  - Large may 4cm.
  - Massive will come to the level of glenoid (Irreparable= you can't pull it and be attached why? Muscle retracts and if doesn't treat it urgently with time the muscle will shrink and you can't pull it back also with time there will be fatty infiltration).


Full thickness tear


Partial tear

White spot means nothing so there's tear

★ Treatment:
➢ Non-Operative treatment (Start):

Indication:
- All partial thickness tears.
- Full thickness tear esp small type:
  - Chronic + degenerative
  - Elderly low demanding + not active. Degenerative & Young ??? **OR**

Modalities of treatment:

- Activity modification.
- NSAIDs.
- Physical Therapy:
  - Range of motion.
  - Strengthening of the rotator cuff and periscapular musculature.
- Steroid injections.

➢ Surgical treatment:

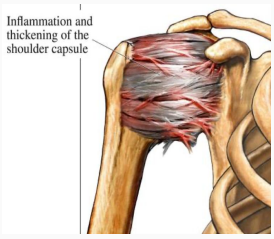
- **Indications:**
  - **Acute** traumatic tear. with any age even if he is old and did not complain of pain before (acute on chronic)
  - Failed non-operative treatment within 6m.
  - Full thickness tear:
    - Active, young, painful. if young regardless of the cause do surgery.
    - Old but active.
- **Options**:
  - Rotator cuff repair (Arthroscopic or open)
  - +/- Subacromial decompression (SAD)

★ **Natural History:**

- **If not treated** → chronic pain and loss of motion and with time becomes irreparable → rotator cuff arthropathy. If not treated the rotator cuff will retract, then becomes very far from the attachment, after that the deltoid will pull the humerus up, thus lead to proximal migration of humerus, then happens arthritis between humeral head and acromion which we called that rotator cuff arthropathy and treat by reverse shoulder replacement الكتف الصناعي المقلوب.
- Complications of surgery: not improving, stiffness, and re-rupture esp if repair retracted muscle or pt lifting heavy object within recovery period .

ADHESIVE CAPSULITIS

الكتف المتجمدة أو التهاب المحفظة اللاصق



Scenario: DM pt with severe pain and limited range of motion in all directions.

➢ Inflammation of capsules with adhesion

➢ Also called "frozen shoulder" which is not specific term and should not be used

➢ It is characterized by pain and restriction of **all** movements "active and passive " of the shoulder (global stiffness) due to fibrosis and contracture of the capsule.

➢ Usually self-limiting (typically begins gradually, worsens over time and then resolves but may take >2 years to resolve)

➢ 10 % is bilateral

➢ more common in females

★ **Risk Factors** :

1. **DM** (esp. insulin dependent).
2. Hypo and Hyperthyroidism
3. Following injury or surgery to the shoulder (Called secondary adhesive capsulitis) eg: had a trauma before→ develops the pain (this does not mean rotator cuff tear), patient had an impingement → underwent surgery → they get worse → develop frozen shoulder (surgery is considered as trauma).
4. High cholesterol (Hyperlipidemia)

★ Mechanism:

➢ Primary adhesive capsulitis
- Idiopathic, usually associated with DM
- Usually resolves spontaneously in 9-18 months

➢ Secondary adhesive capsulitis → poorer outcomes
- Due to prolonged immobilization

shoulder-hand syndrome: CRPS/RSD14 characterized by arm and shoulder pain, decreased motion, and diffuse swelling → following MI, stroke, shoulder trauma

★ Symptoms:

- Pain so severe, worse at night and often prevents sleeping on affected side.
- Restriction of **all** movements of the shoulder (global stiffness) (decreased active AND passive ROM), Not like impingement syndrome IR (internal rotation) and ABD (abduction)

★ Stages:

1. Pain (freezing stage) the hardest stage because it's very painful

Pain+++/ Hot++, ROM mildly limited, 3-9 Ms

2. Stiffness (frozen stage)

Pain decrease, ROM more restricted, 4-12 Ms

3. Resolution (thawing stage)

Slow improvement in ROM, 12-42 Ms

★ Investigations:

- **Mainly clinical diagnosis** all movements are restricted either active and even passively.
- To rule out other pathologies.
- Most of the time **normal investigations**
- X-rays: b/c pt can't use shoulder there will be disuse osteopenia or mainly no findings.
- MRI: thickening of the joint capsule and diminished filling of the axillary pouch. There are the findings of adhesive capsulitis. However, not always seen

    - The diagnosis of adhesive capsulitis is often one of **exclusion.**

★ Treatment:

- Resolves if untreated over 2-4 years.
- **Aggressive Physiotherapy**
- Pain relief and anti-inflammatory medications it breaks the adhesions.
- Steroid injections.

If not improved:

- Manipulation under anesthesia you break the adhesions by manipulation , but there's risk of bone fractures.
- Arthroscopic capsular release (if 6 months of physiotherapy and steroid injection failed).

Physiotherapy for 3m if not improved give steroids injection not improved so go to surgery

ACROMIOCLAVICULAR PATHOLOGY

★ Anatomy:

➢ Arthritis between acromion and clavicle

➢ Not very common it's just a Relatively common

➢ Easy to pick: Diagnosed clinically + X-Ray (by examination: AC joint tenderness + by X-Ray: might show **proximal migration** due to inflammation and tear of rotator cuff).
if you treat the rotator cuff only the patient will not get better because you didn't address the problem, **you have to examine the patient** even if the MRI shows impingement, tear, arthritis ..

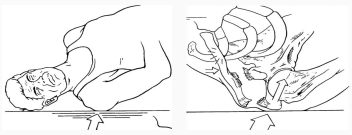
➢ The AC joint is different from joints like the knee or ankle, because it doesn't need to move very much. The AC joint only needs to be flexible enough for the shoulder to move freely. The AC joint just shifts a bit as the shoulder moves. The joint is stabilized by three ligaments AC ligament and CC ligament which consists of two ligaments, the conoid and the trapezoid ligaments. .

★ AC joint common condition:

- Traumatic AC joint separation/dislocation
- Osteoarthritis
- Osteolysis of distal clavicle)

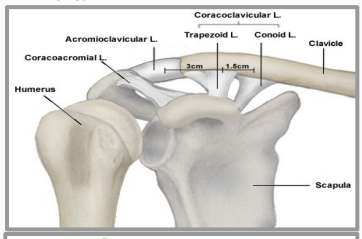
★ Traumatic AC joint separation/dislocation: الكتف المنفصل/إصابة المفصل الأخرمي الترقوي

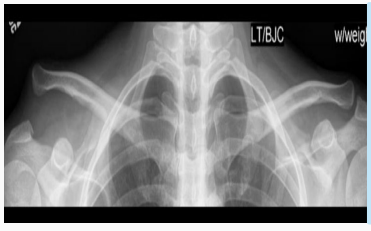
- Happens when you fall on your shoulder, happens a lot if person falls from a motorcycle because they usually fall on their shoulder which the force will push the clavicle away from the acromion and coracoid, and when it gets pushed it will tear the ligaments (acromioclavicular ligament, coracoclavicular ligament (CC Ligaments))
- Almost always a direct blow or fall onto acromion.
- The joint is stabilized by three ligaments:



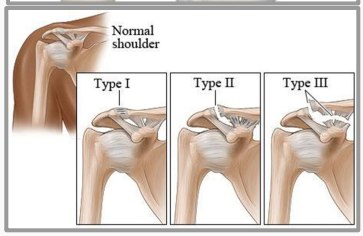
1. Acromioclavicular ligament.
2. Coracoclavicular ligaments (CC Ligaments) they are two ligaments:
   - Conoid ligament.
   - Trapezoid ligament.

Extra





Dislocation in right side, it's called type 3 (it's totally off) which means all ligaments are torn.



★ Treatment:

- Conservative: partial dislocation immobilize the shoulder for weeks then start physiotherapy
- Surgery : complete dislocation we have many techniques to fix it and plating is one of them

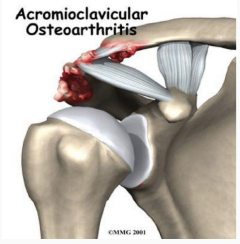
How to treat this according to the grade:

Type 1 and 2: don't need any surgery..

type three: depends on patient if young and active do surgery, if old and not active no need for surgery just do physiotherapy

★ AC arthritis:

- Arthritis is a condition characterized by loss of cartilage in the joint, which is essentially wear and tear of: the smooth cartilage which allows the bones to move smoothly.
- Motions which aggravate arthritis at the AC joint include reaching across the body toward the other arm.



★ Causes of AC arthritis:

- Degenerative osteoarthritis.(wear and tear in old aged people) the commonest.
- Rheumatoid Arthritis التهاب المفاصل الروماتويدي .
- Gouty Arthritis or pseudogout النقرس الكاذب.
- Septic Arthritis.
- Atraumatic distal clavicle osteolysis in weight lifters. (result of repeated movements that wear away the cartilage) weight lifting causes stress on AC joint which will either lead to osteophyte formation, or it starts to resolve which is called distal clavicular osteolysis in which the space between the clavicle and acromion becomes bigger, best treatment for this case by quitting weight lifting if no response do excising.
- Post-traumatic osteolysis of lateral end of clavicle. (like dislocation or a fracture)

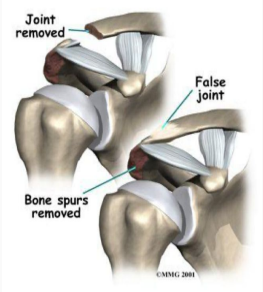
★ Signs and Symptoms:

- Pain, which worsens with movement and progressively worsens. (The patient may suffer a night pain which is a sign of arthritis)
- It is commonly associated with impingement syndrome.

★ Diagnosis:

- Clinical (Patient will point to his AC joint saying there is where he's feeling pain, when you press on it it will be very tender)
- X-rays (after hx and PE, sometimes we do MRI to rule out other diseases. Since it is rare to have isolated AC joint arthritis except in the distal clavicle osteolysis will be isolated); X-ray or MRI will show a very arthritic AC joint.

★ Treatment:



➢ Non-Surgical Treatment (partial dislocation):

- Rest, avoid weightlifting and push-up Activity modification.
- Pain medications and NSAID to reduce pain and inflammation.
- Physiotherapy, steroid injection in the joint.

➢ Surgical (complete dislocation):

- If non-surgical tx fails.
- Done by excising around 1 cm, not taking too much because if you excised a lot it might affect ligaments leading to clavicular instability and dislocation. Can be done by open or arthroscopic techniques.
- Number of different approaches involving AC/CC ligament reconstruction or screw/hook plate insertion.
- Distal clavicle resection.
- In case of glenohumeral osteoarthritis do total shoulder replacement نشيل الجزء المتآكل ونحط ميتالك هيد

SHOULDER DISLOCATION

Acute dislocation is a surgical emergency and demands urgent relocation Because if you leave the joint dislocated it might affect the neurovascular status

- The shoulder joint has the greatest ROM of any joint in the body.
- It relies on soft-tissue restraints, including the capsule, ligaments, and musculature, for stability.
- Therefore, this joint is at the highest risk for dislocation, most frequently dislocated joint of the body.

Classification:	
Atraumatic (AMBRI)	**Traumatic (TUBS)**
- Multidirectional instability. - Generalized ligamentous laxity. (more common in girls) - Bilateral. - Responds well to nonsurgical management. - Habitual.	- 96%. - Unidirectional. - Further classified by the direction of the humeral head dislocation: ● Anterior (commonest) > 95%. ● Posterior < 4%, 3Es (Epilepsy, Electric shock, Ethanol (drunk)). ● Inferior < 1% Rare, it's called statue of liberty because patient comes lifting his arm.

★ Mechanism of acute anterior shoulder dislocation:

- Usually indirect fall on abducted and extended shoulder (external rotation) common, you fall and you use your hand to support yourself
- May be direct when there is a blow on the shoulder from behind humerus pushed anteriorly you get hit from behind, or in a car accident something pushes your shoulder anteriorly.
- Avulsion anterior labrum (the Bankart's lesion seen on MRI) and sometimes anterior rim of the glenoid (Bony Bankart lesion).

★ Anterior Shoulder dislocation:

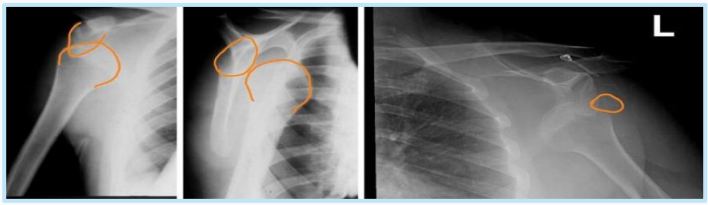
- It is anterior inferior not pure anterior.
- Bankart's Lesion is detachment of inferior labrum (fibrocartilage) from the glenoid if it was posterior shoulder dislocation we call it reverse bankart. Most of acute anterior shoulder dislocations will have bankart lesion.

★ Clinical picture:

- Patient is in severe pain they come screaming.
- Holds the injured limb with other hand close to the trunk.
- The shoulder is abducted and the elbow is kept flexed.
- There is loss of the normal contour of the shoulder (Deltoid).
- Loss of the contour of the shoulder may appear as a step expose the pt it is very clear.
- Anterior bulge of head of humerus may be visible or palpable If pt thin.
- A gap can be palpated above the dislocated head of the humerus.

★Anterior Shoulder dislocation:

- Diagnosis is by history and clinical examination. In clinical examination you have to examine the neurovascular status.
- You must obtain AP, Lateral (called Y scapular view) & most imp axillary view.
- It is hard to do PE when the patient in pain.
  - AP tells you it's dislocated.
  - Lateral tells you if it's anterior or posterior.



★ Associated injuries of anterior Shoulder Dislocation:

- Injury to the neurovascular bundle in axilla.
- Injury of the Axillary Nerve (Usually stretching leading to temporary neuropraxia) no cut of nerve only stretching.
- Associated fracture.

Axillary Nerve Injury: "neuropraxia" usually resolves with time.

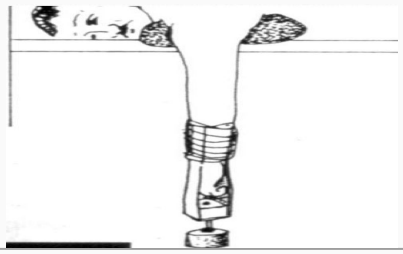
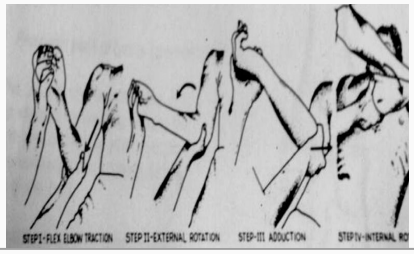
1. It is a branch from posterior cord of brachial plexus, It is sensory and motor so, you have to examine both,it supplies the skin on top of deltoid so we examine sensation and pain in that area, and we ask patient to abduct examining his deltoid. sometimes only the sensory part is affected or only the motor part is !!!!
2. It hooks close round neck of humerus from posterior to anterior.
3. It pierces the deep surface of **deltoid** (abduct the shoulder) and supply it and the part of **skin** over it.

This is where we do sensory examination

★ Management of Anterior Shoulder Dislocation:

- Is an Emergency (Examine neurovascular → reduce → NVE → surgery → NVE).
- It should be reduced (As fast as possible to reduce further risk to the neurovascular structures and to minimize risk of vascular necrosis of humeral head) in less than 24 hours or there may be Avascular Necrosis of head of humerus If you try in the ER and you cannot do it, take the patient to OR under GA
- Following reduction the shoulder should be immobilized strapped (sling) to the trunk for 3-4 weeks and rested in a collar and cuff. (sling then physiotherapy) there is chance for recurrent dislocation could be because of detachment of anterior labrum may not work again because may the detachment be so far and treat that by BANKART REPAIR SURGERY by using scope we bring labrum and suture it.
- You have to do an X-ray after reduction to make sure that the shoulder is reduced

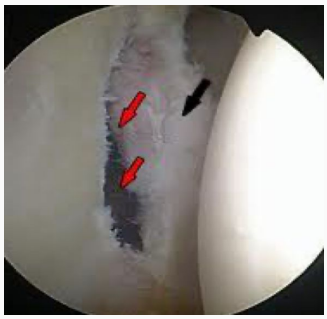
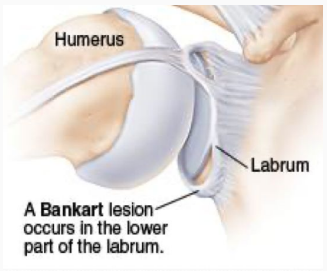
★ Methods of reduction of Anterior Shoulder Dislocation:

Hippocrates Method	Stimpson's technique	Kocher's technique
A form of anesthesia or pain abolishing is required	Some sedation and analgesia are used but No anesthesia is required For muscular patients, they lie in prone position and you hang weight and it will reduce	It is the method used in hospitals under general anesthesia and muscle relaxation. This is what we nowadays do with conscious sedation. Traction countertraction, in which a towel is placed around the trunk with someone resisting and you pull, initially with flexed elbow then external rotation then adduct
		
- Put your foot in axilla to counteract and pull the elbow. - An old way used now by soldiers in wars.	- There is a lot of spasm in muscles after dislocation bc of pain which makes the reduction harder. - This technique need strong analgesia (midazolam..) - Put pt in Prone position and put Axillary pad to prevent brachial plexus strain put traction (3-4 kg or less) leave him (15-20 min) until muscles relaxes, most of the time it reduces by itself.	- Efficient and quick technique. - The dislocation in this case is inferior internal. - We need good muscle relaxation and good analgesia. **How to reduce?** Exaggerate the deformity by: Apply traction 'pull the arm down', hold arm and do external rotation then push up and internal rotation. (Need someone to support the axilla)

★ Complications of anterior Shoulder Dislocation:

Early	late
- Neurovascular injury (rare). - Axillary nerve injury (brachial plexus). - Associated Fracture of neck of humerus or greater commonly or lesser tuberosities. - Rotator Cuff Tear: most common over age 40.	- Avascular necrosis of the head of the humerus (high risk with delayed reduction) appears months later. After 24h AVN (Anterior humeral circumference artery runs around the head of humerus so if there is anterior dislocation it will get kinked and thus resulting in decreased the blood supply to the humeral head) **- Recurrent shoulder dislocations/instability.** The younger the pt the more common. Scenario: 20y old pt, first dislocation from trauma there will be 90% chance of dislocate it again but the older they get the less likely they dislocate. Dislocates the inferior glenohumeral ligament pulls the labrum causing Bankart's lesion. The younger the pt is the higher chance to have it.

★ Associated Injuries:

Bankart's lesions	Hill-Sachs lesion
Detachments of the anterior labrum from the glenoid rim 85%. We Pull it back and reattach it with surgery (called Bankart repair surgery).	An impaction fracture the posterolateral humeral head on the glenoid rim 40-90%
  Rx: Surgery = Bankart's (we do reattachment)	When head dislocated it gets pressed against glenoid causing it to be depressed (Depression fracture "انطعاج") It's like when you press on a bottle of water so it will not be circular. Mainly we can't by x ray, see it with mri and ct scan  
RCT or fracture of the greater tuberosity 33%	**Neurological injury 13%**
Dislocation + Patients > 40 years high risk of RCT (20-54%) If dislocation happened in older patient you must rule out rotator cuff tear by doing MRI urgently because it might become irreparable as elderly go into retraction and fat infiltration rapidly.	Axillary nerve most common.

★ Post-reduction rehabilitation:

- The goal of rehabilitation is to regain maximum ROM while retaining stability.
- The affected arm can be immobilized for 3 weeks, and limited physical rehabilitation is recommended.

Important questions read them!

45y lady with Shoulder Pain with overhead activity and limited abduction = rotator cuff and impingement

Q: a 20y old male who was involved in car accident and was unable to abduct- MRI shows tear of supraspinatus? SURGERY
Q: What is the treatment for 50y old have chronic pain for long time and unable to abduct? Conservative
Q: Overhead activity? limited abduction? think about impingement and rotator cuff tear

Rotator Cuff Disease

- rotator cuff consists of 4 muscles that act to stabilize the humeral head within the glenoid fossa

Table 9. Rotator Cuff Muscles (SITS)

Muscle	Muscle Attachments		Nerve Supply	Muscle Function
	Proximal	Distal		
Supraspinatus	Scapula	Greater tuberosity of humerus	Suprascapular nerve	Abduction
Infraspinatus	Scapula	Greater tuberosity of humerus	Suprascapular nerve	External rotation
Teres Minor	Scapula	Greater tuberosity of humerus	Axillary nerve	External rotation
Subscapularis	Scapula	Lesser tuberosity of humerus	Subscapular nerve	Internal rotation and adduction

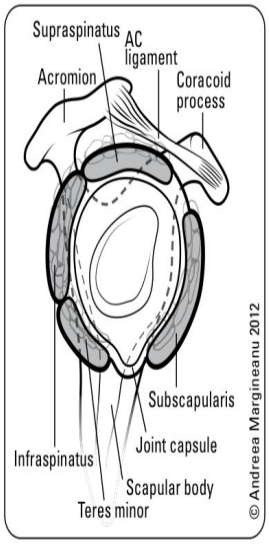


Figure 13. Muscles of the rotator cuff

SPECTRUM OF DISEASE: IMPINGEMENT, TENDONITIS, MICRO OR MACRO TEARS

Etiology

- anything that leads to a narrow subacromial space
- most commonly, a relative imbalance of rotator cuff and larger shoulder muscles, allowing for superior translation and subsequent wear of the rotator cuff muscle tendons
  - glenohumeral muscle weakness leading to abnormal motion of humeral head
  - scapular muscle weakness leading to abnormal motion of acromion
- acromial abnormalities, such as congenital narrow space or osteophyte formation or Type III acromion morphology
  1. outlet/subacromial impingement: "painful arc syndrome", compression of rotator cuff tendons (primarily supraspinatus) and subacromial bursa between the head of the humerus and the undersurface of acromion, AC joint, and CA ligament
  2. bursitis and tendonitis
  3. rotator cuff thinning and tear if left untreated

Bigliani Classification of Acromion Morphology
- Type I – flat
- Type II – curved
- Type III – hooked

Clinical Features

- insidious onset, but may present as an acute exacerbation of chronic disease, night pain, and difficulty sleeping on affected side
- pain worsens with active motion (especially overhead); passive movement generally permitted
- weakness and loss of ROM, especially between 90°-130° (e.g. trouble with overhead activities)
- tenderness to palpation over greater tuberosity
- rule out bicep tendinosis: Speed's test; SLAP lesion: O'Brien's test

Screening Out Rotator Cuff Tears*
- No night pain (SN 87.7%)
- No painful arc (SN 97.5%)
- No impingement signs (SN 97.2%)
- No weakness

*Returning to the bedside: Using the history and physical examination to identify rotator cuff tears
JAM Geri Soc 2000;48:1633-7

Investigations

- X-ray: AP view may show high riding humerus relative to glenoid, indicating large tear, evidence of chronic tendonitis
- MRI: coronal/sagittal, oblique and axial orientations are useful for assessing full/partial tears and tendinopathy ± arthrogram: geyser sign (injected dye leaks out of joint through rotator cuff tear)
- arthrogram: can assess full thickness tears, difficult to assess partial tears

Treatment

- non-operative
  - mild or moderate cases
  - physiotherapy, NSAIDs ± steroid injection
  - all rotator cuff injury treatment begins with physiotherapy (regardless of severity on MRI findings), with progression to surgery if necessary
- operative
  - severe tear or impingement that is refractory to 2-3 mo physiotherapy and 1-2 corticosteroid injections
  - arthroscopic or open surgical repair (i.e. acromioplasty, rotator cuff repair)

Ruling in Rotator Cuff Tears – 98% probability of rotator cuff tear if all
3 of the following are present:
- Supraspinatus weakness
- External rotation weakness
- Positive impingement sign(s)

Diagnosis of rotator cuff tears.
Lancet 2001; 357:769-70

Does this Patient with Shoulder Pain have Rotator Cuff Disease? The Rational Clinical Examination Systematic Review
JAMA 2013;310:837-847
Study: 5 studies of sufficient quality including 30-203 shoulders and a prevalence of RCD ranging from 33-81%.
Results/Conclusions: Among pain provocation tests, a positive painful arc test had the greatest specificity and sensitivity (SP 81%, SN 71%). Among strength tests, a positive external rotation lag test and internal rotation lag test were the most accurate for full-thickness tears (SP 47%, SN 94%; SP 97%, SN 83% respectively). The internal rotation lag test was therefore also the most accurate for identifying patients without a full-thickness tear.
A positive drop arm test is helpful to identify patients with RCD (SN 24%, SP 93%).

Table 10. Rotator Cuff Special Tests

Test	Examination	Positive Test
Jobe's Test (i.e. Empty Can Test)	Supraspinatus: place the shoulder in 90° of abduction and 30° of forward flexion and internally rotate the arm so that the thumb is pointing toward the floor	Weakness with active resistance suggests a supraspinatus tear
Lift-off Test	Subscapularis: internally rotate arm so dorsal surface of hand rests on lower back; patient instructed to actively lift hand away from back against examiner resistance (use Belly Press Test if too painful)	Inability to actively lift hand away from back suggests a subscapularis tear
Posterior-Cuff Test	Infraspinatus and teres minor: arm positioned at patient's side in 90° of flexion; patient instructed to externally rotate arm against the resistance of the examiner	Weakness with active resistance suggests posterior cuff tear
Neer's Test	Rotator cuff impingement: passive shoulder flexion	Pain elicited between 130-170° suggests impingement
Hawkins-Kennedy Test	Rotator cuff impingement: shoulder flexion to 90° and passive internal rotation	Pain with internal rotation suggests impingement
Painful Arc Test	Rotator cuff tendinopathy: patient instructed to actively abduct the shoulder	Pain with abduction >90° suggests tendinopathy
Speed's Test	Apply resistance to the forearm when the arm is in forward flexion with the elbows fully extended.	Pain in the bicipital groove
O'Brien's Test	SLAP lesion: forward flexion of the arm to 90 degrees while keeping the arm extended. Arm is adducted 10-15 degrees. Internally rotate the arm so thumb is facing down and apply a downward force. Repeat the test with arm externally rotated	Pain or clicking in the glenohumoral joint in internal rotation but not external rotation

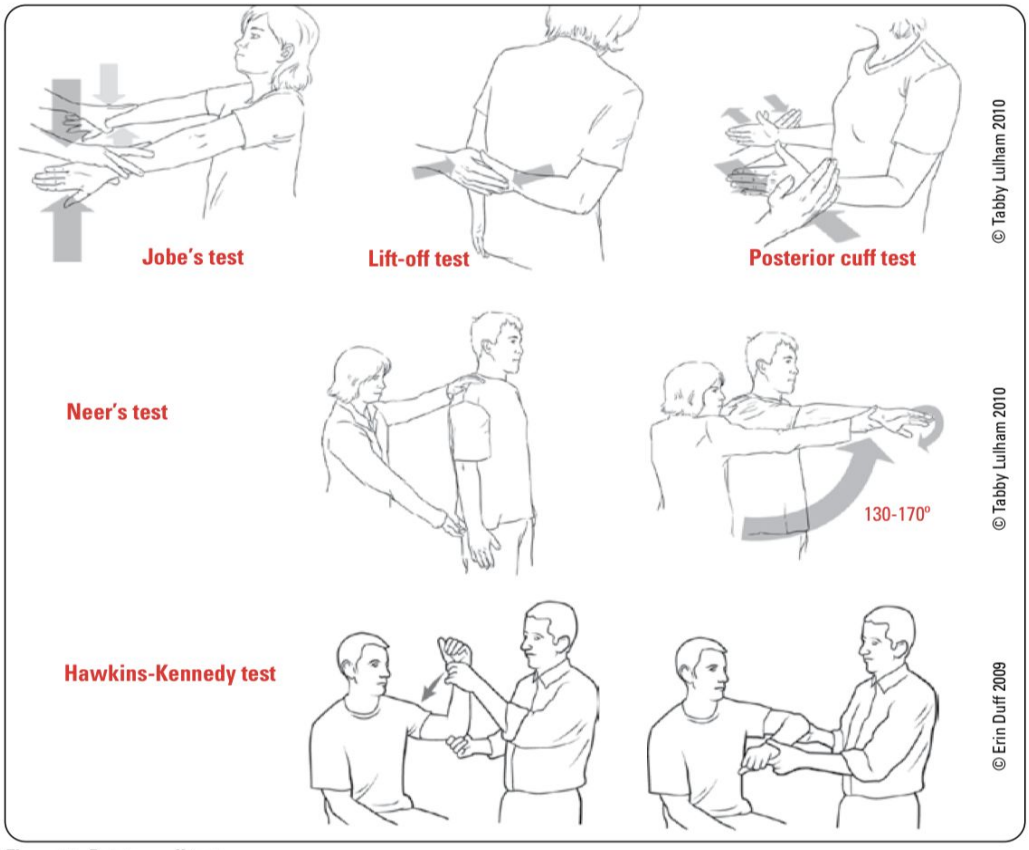


Figure 14. Rotator cuff tests

Frozen Shoulder (Adhesive Capsulitis)

- disorder characterized by progressive pain and stiffness of the shoulder, usually resolving spontaneously after 18 mo

Mechanism

- primary adhesive capsulitis
  - idiopathic, often associated with DM
  - usually resolves spontaneously in 9-18 mo
- secondary adhesive capsulitis
  - due to prolonged immobilization
  - shoulder-hand syndrome: CRPS/RSD characterized by arm and shoulder pain, decreased motion, and diffuse swelling
  - following MI, stroke, shoulder trauma
  - poorer outcomes

Conditions Associated with an Increased Incidence of Adhesive Capsulitis

- Prolonged immobilization (most significant)
- Female gender
- Age >49 yr
- DM (5x)
- Cervical disc disease
- Hyperthyroidism
- Stroke
- MI
- Trauma and surgery
- Autoimmune disease

Clinical Features

- gradual onset (weeks to months) of diffuse shoulder pain with:
  - decreased active AND passive ROM
  - pain worse at night and often prevents sleeping on affected side
  - increased stiffness as pain subsides: continues for 6-12 mo after pain has disappeared

Stages of Adhesive Capsulitis

1. Freezing phase: gradual onset, diffuse pain (lasts 6-9 mo)
2. Frozen phase: decreased ROM impacts function (lasts 4-9 mo)
3. Thawing phase: gradual return of motion (lasts 5-26 mo)

Investigations

- X-ray: AP (neutral, internal/external rotation), scapular Y, and axillary views of the shoulder
  - may be normal, or may show demineralization from disease

Treatment

- freezing phase
  - active and passive ROM (physiotherapy)
    - NSAIDs and steroid injections if limited by pain
- thawing phase
  - manipulation under anesthesia and early physiotherapy
    - arthroscopy for debridement/decompression

Acromioclavicular Joint Pathology

- subluxation or dislocation of AC joint
- 2 main ligaments attach clavicle to scapula: AC and CC ligaments

Mechanism

- fall onto shoulder with adducted arm or direct trauma to point of shoulder

Pneumothorax or pulmonary contusion are potential complications of severe clavicle fracture, and rarely severe AC joint dislocation

Clinical Features

- pain with adduction of shoulder and/or palpation over AC joint
- palpable step deformity between distal clavicle and acromion (with dislocation) i.e. piano key sign
- limited ROM

Investigations

- X-rays: bilateral AP, Zanca view (10-15° cephalic tilt), axillary

Treatment

- non-operative
  - sling 1-3 wk, ice, analgesia, early ROM and rehabilitation
- operative
  - indication: Rockwood Class IV-VI (III if labourer or high level athlete)
  - number of different approaches involving AC/CC ligament reconstruction or screw/hook plate insertion

Table 11. Rockwood Classification of Acromioclavicular Joint Separation

Grade	Features	Treatment
I	Joint sprain, absence of complete tear of either ligament	Non-operative
II	Complete tear of AC ligament, incomplete tear of CC ligament, without marked elevation of lateral clavicular head	Non-operative
III	Complete tear of AC and CC ligaments, >5 mm elevation at AC joint, superior aspect of acromion is below the inferior aspect of the clavicle	Most non-operative, operative if labourer or high level athlete Will heal with step deformity, although most fully functional in 4-6 mo
IV-VI	Based on the anatomical structure the displaced clavicle is in proximity to	Operative in most cases

Grade	AC Ligament	CC Ligament	Reducible	Treatment
I	Sprained	Normal	N/A	Non-operative
II	Torn	Sprained	Yes	Non-operative
III	Torn	Torn	Yes	Most non-operative, operative if labourer or high-level athlete Will heal with step deformity, although most fully functional in 4-6 mo
IV-VI	Torn	Torn	No	Operative in most cases

Rockwood separations IV-VI are determined based on direction of displacement:
IV: Distal clavicle displaced posteriorly into trapezius (seen on axillary XR)
V: Distal clavicle herniated through deltotrapezial fascia into subcutaneous tissue
VI: Distal clavicle displaced inferior to acromion or coracoid under conjoined tendon (rare)

Non-Operative Treatment Compared with Plate Fixation of Displaced Mid-Shaft Clavicular Fractures. A Multicentre, Randomized Clinical Trial
J Bone Joint Surg. Am. 2007; 89(1),1-10

Shoulder Dislocation

- complete loss of continuity between the two articular surfaces of the glenohumeral joint; may be anterior or posterior

Investigations
- anterior dislocation X-rays: AP, trans-scapular, and axillary views of the shoulder
- posterior dislocation X-rays: AP, trans-scapular, and axillary views of the shoulder; or CT scan

have septic arthritis. Laboratory findings from an arthrocentesis are also required and helpful prior to Gram stain and culture. The presence of increased WBC increases the likelihood ratio (for counts <25 000/μL: LR, 0.32; 95% CI, 0.23-0.43; for counts ≥25 000/μL: LR, 2.9; 95% CI, 2.5-3.4; for counts ≥100 000/μL: LR, 28.0; 95% CI, 12.0-66.0). A polymorphonuclear cell count of ≥90% increases the LR of septic arthritis by 3.4, while a PMN cell count of <90% reduces the LR by 0.34.

Posterior Shoulder Dislocation
Up to 60-80% are missed on initial presentation due to poor physical exam and radiographs

There are 4 Joints in the Shoulder
Glenohumeral, AC, sternoclavicular (SC), scapulothoracic

Table 8. Anterior and Posterior Shoulder Dislocation

	Anterior Shoulder Dislocation (>90%)	Posterior Shoulder Dislocation (5%)
MECHANISM		
	Abducted arm is externally rotated/hyperextended Blow to posterior shoulder Involuntary, usually traumatic; voluntary, atraumatic	Adducted, internally rotated, flexed arm FOOSH 3 Es (epileptic seizure, EtOH, electrocution) Blow to anterior shoulder
CLINICAL FEATURES		
Symptoms	Pain, arm slightly abducted and externally rotated with inability to internally rotate	Pain, arm is held in adduction and internal rotation; external rotation is blocked
Shoulder Exam	**"Squared off" shoulder** **Positive apprehension test**: patient looks apprehensive with gentle shoulder abduction and external rotation to 90° as humeral head is pushed anteriorly and recreates feeling of anterior dislocation **Positive relocation test**: a posteriorly directed force applied during the apprehension test relieves apprehension since anterior subluxation is prevented **Positive sulcus sign**: presence of subacromial indentation with distal traction on humerus indicates inferior shoulder instability	**Anterior shoulder flattening**, prominent coracoid, palpable mass posterior to shoulder **Positive posterior apprehension ("jerk") test**: with patient supine, flex elbow 90° and adduct, internally rotate the arm while applying a posterior force to the shoulder; patient will "jerk" back with the sensation of subluxation Note: the posterior apprehension test is used to test for recurrent posterior instability, NOT for acute injury
Neurovascular Exam Including	Axillary nerve: sensory patch over deltoid and deltoid contraction Musculocutaneous nerve: sensory patch on lateral forearm and biceps contraction	Full neurovascular exam as per anterior shoulder dislocation
RADIOGRAPHIC FINDINGS		
Axillary View	Humeral head is anterior	Humeral head is posterior
Trans-scapular 'Y' View	Humeral head is anterior to the centre of the "Mercedes-Benz" sign	Humeral head is posterior to centre of "Mercedes-Benz" sign
AP View	Sub-coracoid lie of the humeral head is most common	Partial vacancy of glenoid fossa (vacant glenoid sign) and >6 mm space between anterior glenoid rim and humeral head (positive rim sign), humeral head may resemble a lightbulb due to internal rotation (lightbulb sign)
Hill-Sachs and Bony Bankart Lesions	± Hill-Sachs lesion: compression fracture of posterior humeral head due to forceful impaction of an anteriorly dislocated humeral head against the glenoid rim ± bony Bankart lesion: avulsion of the anterior glenoid labrum (with attached bone fragments) from the glenoid rim	± **Reverse Hill-Sachs lesion** (75% of cases): divot in anterior humeral head ± **Reverse bony Bankart lesion**: avulsion of the posterior glenoid labrum from the bony glenoid rim
TREATMENT		
	Closed reduction with IV sedation and muscle relaxation **Traction-countertraction**: assistant stabilizes torso with a folded sheet wrapped across the chest while the surgeon applies gentle steady traction **Stimson:** while patient lies prone with arm hanging over table edge, hang a 5 lb weight on wrist for 15-20 min **Hippocratic method**: place heel into patient's axilla and apply traction to arm **Cunningham's method**: low risk, low pain; if not successful try above methods Obtain post-reduction x-rays Check post-reduction NVS Sling x 3 wk (avoid abduction and external rotation), followed by shoulder rehabilitation (dynamic stabilizer strengthening)	Closed reduction with sedation and muscle relaxation Inferior traction on a flexed elbow with pressure on the back of the humeral head Obtain post-reduction x-rays Check post-reduction NVS Sling in abduction and external rotation x 3 wk, followed by shoulder rehabilitation (dynamic stabilizer strengthening)

Prognosis
- recurrence rate depends on age of first dislocation
- <20 yr = 65-95%; 20-40 yr = 60-70%; >40 yr = 2-4%

Specific Complications
- recurrent/unreduced dislocation (most common complication)
- rotator cuff or capsular or labral tear (Bankart/SLAP lesion), shoulder stiffness
- injury to axillary nerve/artery, brachial plexus

Shoulder passive ROM: abduction – 180°, adduction – 45°, flexion – 180°, extension – 45°, int. rotation – level of T4, ext. rotation – 40-45°

Factors Causing Shoulder Instability
- Shallow glenoid
- Loose capsule
- Ligamentous laxity

Frequency of Dislocations
- Anterior shoulder > Posterior shoulder
- Posterior hip > Anterior hip

The glenohumeral joint is the most commonly dislocated joint in the body since stability is sacrificed for motion

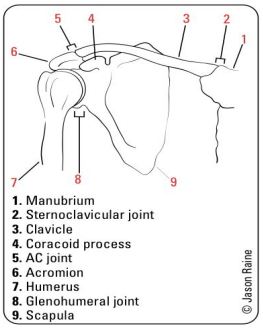


Figure 9. Shoulder joints

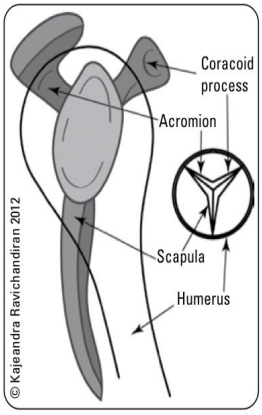


Figure 10. Mercedes-Benz

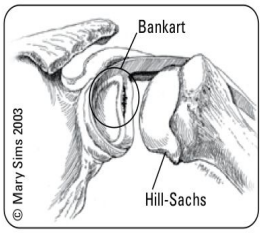


Figure 11. Posterior view of anterior dislocation causing Hill-Sachs and Bankart lesions

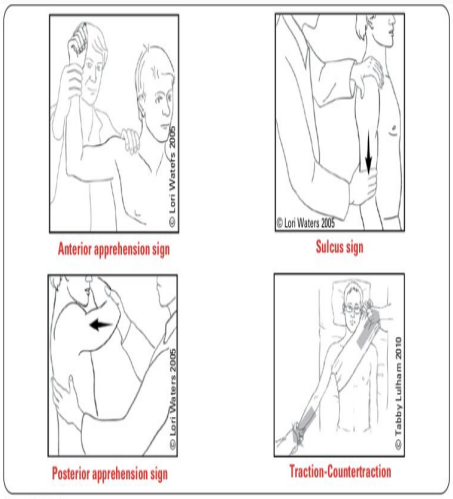


Figure 12. Shoulder maneuvers

MCQS

Q1 - 22-year-old came to the ER after a direct hit to his shoulder during a volleyball match his shoulder was abducted and his arms are flexed he mentioned that it has happened 4 times during this year -An x-ray was provided of shoulder dislocation What is the most likely diagnosis:

A. adhesive capsulitis.
B. shoulder dislocation.
C. impingement syndrome
D. Rotator cuff tear

Q2 - 32 y/o banker went to the gym and he hears a "pop" sound in his shoulder after lifting very heavy dump before 3 weeks. It's painful and the abduction was restricted and positive empty can and job test no NV problems. The question about the treatment he wants to reduce his pain regain Rom, back to his work and back to strenuous training. What is the best treatment?

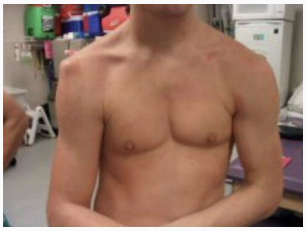
A. Open or arthroscopic fix.
B. Physiotherapy.
C. reassurance and discharge.
D. control his pain by NSAID.

Q3 - Which nerve is the most likely to be injured in anterior shoulder dislocation?

A. Axillary.
B. Ulnar.
C. Median.
D. Anterior interosseous.

Q4 - Young male presented to the ER after falling on his outstretched hand. What is the most likely diagnosis?

A. Shoulder dislocation.
B. Clavicle fracture.
C. Glenoid fracture.
D. Sternoclavicular joint dislocation



Q5-A 55-year-old woman comes to the clinic because of chronic right shoulder pain that has persisted for 3 years. She says the pain is especially bothersome at night because she is unable to sleep on her side. Her temperature is 36.7°C (98.2°F), pulse is 60/min, respirations are 16/min, and blood pressure is 136/88 mm Hg. Physical examination shows pain to palpation just inferior to the acromion, and unilateral pain with 2/5 strength when the arm is abducted to 90°, pronated and internally rotated. Which of the following is the most likely diagnosis?

A. deltoid tear
B. infraspinatus tear
C. supraspinatus tear
D. subscapularis tear

SAQ: Mention 4 tests you do to diagnose impingement syndrome:

I. Empty can Test.
II. Belly lift off Test.
III. Hawkins Test
IV. Neers Test.

Answers:
1. B
2. A
3. A
4. A
5. D