The Shoulder and its Instability

Dr. Wael Husain
Shoulder Considerations:
- greatest range of motion
- most frequently dislocated joint
- with increased ROM sacrifice stability

Static and Dynamic mechanisms contribute to glenohumeral stability
STATIC CONTRIBUTORS TO STABILITY

- Humeral version
- Glenoid version
- Articular conformity
- Labrum
- Intra-articular pressure
- Gleno-humeral Ligaments
HUMERAL VERSION

130°

30°-40°
Scapula position: 30-45 degrees anterior to coronal plane.
Version is 7 degrees retroverted to plane of scapula
5 degree superior tilt
Role in AP stability unclear
The glenoid prevents the humerus from moving medially.
Behind the humeral head for most forward uses of the arm.

Acromion: posterosuperior
Coracoid: anterosuperior
Coracoacromial ligament: superior
LABRUM

- Deepens socket
- 9mm in sup/inf direction
- 5mm in A/P direction.
- Accounts for 50% depth glenoid cavity

Producing:
- Increase S.A. contact with Head
- buttress limiting translation
- attachment of the Glenohumeral ligaments

Speer et al, 1994. Created Bankart lesions in cadavers did not alone produce significant instability.

Other factors e.g., Capsular stretching necessary for instability.
Slightly negative pressure
effect small in ER & Abduction
GLENO-HUMERAL LIGAMENTS

- Superior G/H Ligaments
  - found in rotator interval
  - in 90% people.

- Primary constraint to
  - ER in adducted arm.

- Inferior translation
Coracohumeral Ligament
- no true ligamentous structure
- 2 bands across rotator interval
- Primary Constraint to:
  - Inferior Translation
  - ER in adducted arm
Absent in up to 30% shoulders
variable anatomy
Primary stabilizer to anterior translation in 45 deg Abduction
limits ER in Abduction.
INFERIOR G/H LIGAMENT

- Triangular structure
- In Abducted shoulder:
  - ER place anteriorly prevent anterior instability
  - IR place post preventing post instability.
- Ligament fail at glenoid > midsubs > Humeral insertion.
DYNAMIC CONTRIBUTORS

- Muscles of the Rotator cuff
- Long Head of Biceps
- Proprioception
- Scapula Rotators
ROTATOR CUFF MUSCLES

- Muscular contraction compresses humeral head into glenoid.
- Contraction more important than static capsular constraints
- Blaiser et al, 1997. “If tension in one component of the cuff is removed, results increased anterior translation with less force regardless of which component.”
ROTATOR CUFF

- **Subscapularis**
  - most resistant to post subluxation
- **Supraspinatus**
  - restraint to inferior translation
- **Subscapularis + E.Rotators**
  - initial destabilizes
These nerve endings provide proprioception study: Pts with clinical laxity far less proprioceptive skills c.f. normal shown more sensitive to proprioception at limits of motion & during ER. Injection of L.A. into shoulder - increased passive translation.
BICEPS TENDON

- Increase joint compression
- In ER - limits posterior translation
- In IR - limits anterior translation
Abnormal scapulothoracic motion related to G/H instability.

Scapulothoracic dysfunction common in pts with anterior instability.
EXAMINATION OF THE SHOULDER

PRINCIPLES

LOOK

FEEL

MOVE

SPECIAL TESTS
FROM FRONT

- **Contour**
  - swelling - SC and AC joints, clavicle, biceps rupture
  - wasting - deltoid, trapezius, arm as a whole

- **Deformity**
  - head and neck alignment
  - shoulder height and arm rotation

- **Skin**
  - incisions, sinuses, wounds including axilla, “Regimental badge” sensation
Deformity
- scapular symmetry including height eg Sprengel, Klippel-Feil syndrome or winging with paralysis of serratus anterior
- webbing of skin in K-F

Contour
- wasting - Supraspinatus and Infraspinatus in their fossae, trapezius, triceps
Feel

- Ask “where is it painful?”
- From front - bony prominences
  - SC and AC joints, clavicle and scapular spine
- Soft tissue
  - supraspinous fossa - ganglion, osteochondroma
  - infraspinous fossa
  - lateral subacromial - tenderness, cuff defect
  - anterior - anterior capsule, biceps tendon
  - axilla - proximal exostoses
FROM THE FRONT - Active, Passive, Power

Abduction

active - elevate both arms in the coronal plane
comment on initiation, range, rhythm and arc of pain

passive - comment on active vs passive
observe arm lowering and comment on arc of pain, drop arm
Move

**Power**
- deltoid - arm by side, resisted elevation
- supraspinatus stress test - 30 degrees forward from coronal, humerus internally rotated, flex elbow, resisted elevation at 90
- biceps - Speed’s test
  - resisted elevation with forearm supinated
  - assess pain at long head of biceps
Move

**Forward elevation**
- active - both arms raised forwards
- comment on range, ability (trick movements)

**External rotation**
- active - elbows flexed to 90, start with arms forward, rotate outwards (75 degrees)
- passive - if not full ROM
- power - patient’s arm forward, stabilise elbow with hand, resist external rotation
Move

**From behind**
- **Extension**
  - active, both arms raised backwards

**Internal rotation**
- active - ask to run thumb up spine, mark good and compare bad
  - spine T2, blade T4, angle T7
- power - GERBER’S lift off test, put dorsum of patient’s hand on buttock, resisted lift off
- trapezius power - resisted shoulder shrug
SPECIAL TESTS

**IMPINGEMENT**
- Stand to side of patient to see expression
- NEER’S impingement sign
  - Push down on scapula with one hand
  - Passively elevate arm with other hand
- NEER’S impingement test - comment on how to perform
- HAWKIN’S impingement sign
  - Forward flex elbow to 90
  - Internally rotate and adduct arm
SPECIAL TESTS

- Sit patient down
- Instability
  - SULCUS SIGN - in front of patient with hand in lap, pull down on elbow (one at a time), look for sulcus
  - ANTERIOR DRAWER - behind patient, stabilise shoulder girdle with one hand, thumb on spine of scapula and forefinger, translate humeral head forward with other hand
  - POSTERIOR DRAWER - translate humeral head backward
SPECIAL TESTS

- Lie supine
- Apprehension
- Jobe test
  - push proximal humerus backwards
  - note increased ER without apprehension
- Anterior apprehension
  - shoulder abducted and elbow flexed to 90
  - externally rotate shoulder, look for apprehension
Others

- Circulation
  - radial pulse
- Cephalad joint
  - neck ROM
- Concealed
  - axilla
- Collagen
Stryker notch view

Fig. 31-29 Roentgenographic technique for Stryker notch view of humerus.
Special Views for Hill Sachs Lesions

Variety of views in internal rotation have been described.

Sharp dense spine of bony impaction
Figure 6. CT scan radiograph demonstrating an anterior labral tear.
ANTERIOR LABRAL TEAR (Bankart lesion)
Multidirectional Instability of the Shoulder Classification

Chronology
- Congenital
- Acute
- Chronic
- Locked (fixed)
- Recurrent

Degree of Stability
Dislocation
Subluxation

Force (Rowe 1956)
Traumatic
Atraumatic
Multidirectional Instability of the Shoulder
Mechanism of Injury

- With lax shoulders, instability can develop with minimal or no injury.
- The normal shoulder can become unstable as a result of trauma.
- Combination of abduction, extension, and external rotation forces.
- Indirectly transfers the force to the anterior capsule and ligaments.
- Bankart lesion present in up to 85% of patients.
Was the initial event traumatic or atraumatic?
Evidence of voluntary dislocation?
The position in which the dislocation or subluxation occurs?
Ease of relocation?
Resultant disability?
With recurrent subluxation of the shoulder.
Symptoms are vague with no history of actual dislocation.
Sensation of the shoulder sliding in and out of place.
May complain of pain only.
May complain of numbness or paresthesia in the limb.
Recurrence

The age of the patient at the time of the initial dislocation has a major effect on the incidence of re-dislocation. McLaughlin and MacLellan 1967

95% 1\textsuperscript{st} traumatic dislocations in teenagers recurred.

Various authors report 80 - 92%.

After the age of 40, the incidence drops sharply to 10% to 15%.
The majority of recurrences occur within 2 years of the first traumatic dislocation. 

Simonet and Cofield 1982 

Overall incidence of recurrence 33% over 4 years 

- 66% in patients < 20 years 
- 17% in patients 20 - 40 years 
- Zero in patients > 40 years 

Athletes younger than 20 years was 80% but only 30% in nonathletes.
Cuff Tears

- Frequency increases with age
  - >40 years = 30%
  - >60 years = 80%

- Sonnabend
  - J shoulder ’94
  - Pain / weakness >3 weeks = likely cuff tear
Axillary Nerve Injury

- 20 yr: 5% recover, 90% recover
- 80 yr: 90% recover, 10% recover
Reduction
Surgical Procedures

Over 150 described procedures for recurrent anterior instability
1. Bony procedures.
3. Capsulo-labral procedures.
Bristow Procedure

- Described by 1958 by J A Helfet
- Transfer of coracoid process through suscapularis as bony block.
  - Conjoined tendon acts as dynamic sling.
  - Loss of ER 12-20°
  - Screw problems 2-14%
  - Instability 1-20%
- Doesn’t address the primary pathology with the risks of hardware and bone blocks.
Putti-Platt

Described 1948 Osmond-Clarke.
- Subscapularis and shoulder capsule are incised vertically.
- The lateral leaf of the capsule is sutured to the capsule and labrum.
- The medial leaf is imbricated, and the subscapularis is advanced laterally.

3% failure

Loss of ER and early OA
- Failure to return to throwing sports.
- O^0 ER reported to be associated with OA

Angelo and Hawkins 1988
Open Bankart Procedure

First done by Perthes in 1906.
- Repair of the anterior capsule and avulsed labrum (if present) to the anterior glenoid rim.
- Vertical incision in capsule
- Sutures through glenoid bone.
- The subscapularis muscle is repaired without any overlap.

Bankart reported 27 cases with "full movements of the joint and no recurrence of the dislocation."
Anatomic repair.
“Gold Standard”
Redislocation 0-3.5%.
Good or excellent results in 94%.
Similar results if bone anchors used.
Rowe reported on shoulders with fractures of the anterior rim.
Failure was 2% even with some fractures involving ~1/3rd glenoid.
Open Bankart Procedure

Gill et al 1997

- 60 shoulder followed minimum of 8 years
- Mean loss ER 12°
- 98% returned to original occupation without alteration
- 3 patients had a dislocation 2° to a new traumatic event
- 93% rated good or excellent
A/S Bankart Procedure

- First performed by Johnson in 1980.
- Caspari in 1989 claimed good to excellent results were obtained in 86%.
- Failure 12-40% in subsequent series.
- Bioabsorbable or metallic devices.
- Technique continues to advance.
Capsular Shift

- Described by Neer 1980
- Involuntary inferior and multidirectional instability.
- Aim is to obliterate the inferior pouch and reduce laxity of the capsule.
- “Gold Standard” for atraumatic instability.
Summary

- Stability
  - Active vs Passive.
  -IGHL/ Bankart Lesion.
- Recurrence
  - Young athletes with traumatic onset.
- History
  - Spectrum of frank recurrent dislocation to “Dead Arm Syndrome” with no history of subluxation.
- Rotator Cuff tears increase with age.
- Examination
  - Apprehension
  - Draw test
  - Relocation tests
  - Sulcus sign and generalized lig laxity.
- Radiology
  - Standard views and special views.
Summary

TUBS
- Traumatic, Unilateral, Bankart, often need Surgery

AMBRI
- Atraumatic, Multidirectional, Bilateral, often responds to Rehab and sometimes Inferior capsular shift required

Rehabilitation
- 12% traumatic vs 80% atraumatic response.

Bankart Procedure
- Gold standard and anatomic
- 93-95% good/excellent result
THANK YOU