

CAOM Shoulder Review

Jonathan Chow DC MD CCFP, February 2024

Anatomy

- *Glenohumeral joint (GHJ)* - Multiaxial ball and socket joint lined with hyaline cartilage with a cartilaginous labrum and ligamentous capsule.
- *Scapulothoracic joint* – Physiologic, not a true joint, made up of muscle and fascial layers.
- *Acromioclavicular joint (AC Joint)* – Diarthrodial joint with articular fibrocartilage surrounded by the acromioclavicular ligament supported by the coracoacromial ligament and coracoclavicular ligament.
- *Rotator Cuff* – Controls the glenohumeral joint with both scapular and humeral attachments.

Biomechanics

- The scapula and the humerus move in a 1:2 ratio to equal the total movement.
- *Glenohumeral joint capsular ligaments (Burkart, 2002)*.
 - Coracohumeral ligament reinforces the rotator cuff interval. Originates at the dorsolateral base of the coracoid process. It plays a role in inferior stability of the glenohumeral joint and stabilization of external rotation below 50 degrees.
 - Superior glenohumeral ligament becomes part of the rotator cuff interval and forms a sleeve over the bicep longhead tendon. Originates at 1' on the labrum. Stabilizes the shoulder with adduction inferiorly and stabilization of external rotation below 50 degrees.
 - Middle glenohumeral ligament blends into the subscapularis tendon. Originates at 1-3' on the labrum. It stabilizes the shoulder between 45 to 60 degrees of abduction when externally rotated, otherwise it is primarily involved in anterior loading most significantly at 60 degrees abduction.
 - Inferior glenohumeral ligament complex is a hammock like structure with both anterior and posterior fibers. The anterior fibers blend into the anterior labrum at 3' as well as interweave into the periosteum of the glenoid at 5'. The posterior band stabilizes the shoulder posteriorly. The anterior band stabilizes the glenohumeral joint between 60 to 90 degrees of abduction and external rotation preventing anterior inferior translation.
- The acromioclavicular joint is stabilized resisting vertical clavicular displacement by the coracoclavicular ligaments and anteriorly-posteriorly by the acromioclavicular capsular ligaments.

Injury Patterns

- *Throwing athletes and Swimmers*
 - Multidirectional instability – Repetitive end range of motion loading causing a predictable pattern of biomechanical faults leading to instability then subluxation then impingement then rotator cuff and labral tearing.
 - Internal impingement – at 90/90 posterior superior rotator cuff presses on posterior superior labrum and can become impinged between the labrum and greater tuberosity.
 - GIRD – Loss of >20 degrees internal rotation compared to the contralateral side.
 - SICK Scapula – Scapular malposition, Inferior medial border prominence, Coracoid pain, and dyskinesia of scapular movement.
- *Golfers/Weight lifters*
 - Acromioclavicular joint – Compression forces with cross body adduction.
 - Subacromial Impingement and Rotator Cuff injuries- Injuries occur during backswing and follow through or with overhead lifts.
 - Posterior instability – Pain and instability of lead arm at the top of backswing.
- *Collision Sports*
 - Anterior instability – Due to traumatic contact with the glenohumeral joint.

Examination

- *Inspection* – Anteriorly, posteriorly, laterally looking for deformity, step-off defects, rounded shoulders, scapular malpositioning, muscle wasting.
- *Palpation* – Tenderness along the AC joint, glenohumeral joint line, rotator cuff insertions, periscapular muscle insertions, costotransverse joints, quadrangular space tenderness.
- *AROM/PROM* – Glenohumeral joint and scapulothoracic joint in all cardinal movements.
- *Neuro/Vascular* – Sensation (deltoid patch – Axillary N)/Pulses/Pain in quadrangular space?
- *Special tests based on suspected pathology:*
 - Rotator cuff tear/tendinopathy – Muscle testing, Empty Can.
 - AC joint – Paxino's Squeeze, Cross Arm Adduction, O'Brien's test.
 - Video
 - Anterior Instability – Anterior Load & Shift (0' SGHL, 45' MGHL, and 90' IGHL, Sn 71, Sp 89), Apprehension test (Sn 98, Sp 71), and Relocation Manoeuvre.
 - Video

- Posterior Instability – Posterior Load & Shift (90'), Posterior Jerk test.
 - Video
- Multidirectional Instability – Sulcus test, Beighton Score (General laxity).
- Labrum/SLAP – O'Brien's (Sn 61, Sp 84), Relocation, Bicep Load, Crank (Sn 47-78, Sp 56-83), Clunk.
- Impingement – Neer's (An 85%, NPV 96% when combined with Hawkins), Hawkins (Sn 88), Painful Arc.

Management options

- *Conservative Care* – Physiotherapy, Athletic Therapy, Manual Therapy.
- *Surgical Indications* – Gross instability, recurrent dislocations, locking, catching, high grade full thickness/complete rotator cuff tears.
- *Regenerative injection sites based on suspected pathology*
 - Rotator cuff tear/tendinopathy – Supraspinatous, Infraspinatous, Subscapularis, Teres Minor, consider treating the glenohumeral joint and capsule.
 - AC joint – Acromioclavicular ligament and joint, Coracoacromial ligament, Coracoclavicular ligament.
 - Anterior Instability – Inferior glenohumeral ligament, Middle glenohumeral ligament, Superior glenohumeral ligament.
 - Posterior Instability – Inferior glenohumeral ligament.
 - Multidirectional Instability – Treat broadly if beneficial, consider surgical consult.
 - SLAP Tear – Superior labrum, Bicep longhead origin, Inferior glenohumeral ligament, Middle glenohumeral ligament, Superior glenohumeral ligament.
 - Impingement – Supraspinatous, AC Joint, IGHL.

Marking for Landmark Guided Injections

See Regenerative Injections: The Art of Healing 7th ed. J. Baumgartner. 2017.

US Guided Injections

Attend CAOM Cadaver Course

References

Miniaci, A. et al. Disorders of the Shoulder: Diagnosis and Management 3rd ed. 2014.

Burkart, A. et al. Anatomy and function of the glenohumeral ligaments in anterior shoulder instability. Clinical Orthopaedics and Related Research. 400:32-39, 2002.

Baumgartner, J. Regenerative Injections. The Art of Healing: Injection Manual 6th ed. 2011.

Brukner, P. et al. Clinical Sports Medicine. Volume 1: Injuries. 5th ed. 2017:389.