SHOULDER MRI SEARCH PATTERN

LINKS

VIDEOS

- Shoulder MRI Anatomy | Radiology anatomy part 1 prep | How to interpret a shoul…

ANATOMY

- UPPER LIMB DRAWING IAMOS
- SHOULDER MRI IAMOS
- SHOULDER MR ARTHROGRAPHY IAMOS

PATHOLOGY

SEARCH PATTERN

Hx, Indications, priors

Check adequacy, techniques, and limitations

Look at localizers

BONE CORTEX/MARROW & AC JOINT

- Assess the following structures (top to bottom, clockwise):
    - Humeral head, greater / lesser tuberosity, bicipital groove (med and lat lips), anatomic / surgical neck
    - Clavicular body, acromial end, clavicular facet
    - Scapula: Acromion, scapular spine, subscapular/supraspinous/infraspinous fossa, neck, spinoglenoid notch, coracoid process, supra/infraglenoid tubercles
- Look for cortical breaks / fx and deformities
    - Look for humeral head deformity (Hill-sachs / trough sign) implying prior impaction injury
    - Look for osteophytes and other abnormal bone signal: loose bodies, old fx fragments, heterotopic ossification
- Check for marrow replacement (signal darker than adjacent muscle)
    - Infxn and neoplasia can also present with marrow replacement.
    - Look for distributions of hematopoietic marrow discordant w patient's age / medical conditions.

- Assess the acromioclavicular joint
    - Look for osteophytes or anatomic variation which could cause impingement.
    - Look for os acromiale on axials
    - Look for subacromial spur
- Assess the coracoacromial and coracoclavicular ligaments
    - Best images are the sagittals
    - Look for discontinuity or surrounding edema, which would indicate AC joint injury

SUBACROMIAL/DELTOID BURSA

- Assess the following structures on all fluid sequences:
    - Subacromial bursa
    - Subdeltoid bursa
- If arthrography is performed, look for abnormal communication b/n the subacromial / subdeltoid bursa and joint space.

TENDONS

- Assess the following structures (identify mm and follow tendon course):
    - Supraspinatus tendon
    - Trapezius
    - Long head biceps tendon
    - Subscapularis tendon
    - Biceps brachii (short head)
    - Coracobrachialis
    - Infraspinatus tendon
    - Teres minor tendon
    - Clavicular / acromial / spinal deltoid mm
    - Pectoralis mj / mnr
- Look for continuity, normal position / size, and normal signal on the PD and fluid sensitive images. Use all 3 imaging planes as needed to assess rotator cuff tendons.
    - Look for tear (fluid signal traversing the tendon) and correlate with any fluid in the subacromial / subdeltoid tear.
        - If partial thickness tear, does it involve the bursal surface, articular surface or intrasubstance (interstitial)?
        - If complete tear, note the degree of retraction.
    - Look for tendinosis (intermed fluid signal/thickening w/n the tendon)
    - Look for other intrasubstance abnormality such as low signal which can be seen w hydroxyapatite deposition disease.
    - Check that it is in the bicipital groove and is of normal signal and size. Subluxation implies a subscapularis tear.

Assess the glenohumeral joint

- Alignment: humerus well situated in the glenoid?
    - Superior displacement can be seen w chronic rotator cuff tears
    - Inferior displacement may be seen w/ atrophy or effusion.

- Assess inferior glenohumeral joint ligament.
    - Look for thickening and intermediate signal (synovitis) on coronal images.
    - Look for loss of fat signal and edematous changes (adhesive capsulitis) at the rotator interval
- Assess the labrum and middle glenohumeral
    - Use sagittals as a map and use coronals and axial to assess pathology
    - Look for tear at the superior labrum (coronals and axials)
    - Differentiate b/n tears and normal sublabral recess.
    - Look closely at the origin of long head of biceps for extension of SLAP tears
- Look at the anterosuperior labrum
    - Note variations in the middle glenohumeral ligament (buford complex or sublabral recess)
    - Look for avulsion injuries
    - Isolated anterosuperior labral tears are extremely rare and more likely extensions of tears involving the rest of the labrum.
- Assess the anterior and anteroinferior labrum for Bankart spectrum injuries.
    - Look for irregularity, tear and avulsion. Any detachment of the anteroinferior labrum is abnormal.
- Assess the posterior labrum for same spectrum of injuries.
    - If you find a lesion of the labrum or humerus, look across the joint for reciprocating lesions.
- Assess the cartilage
    - Use axial and coronal PD and fluid sensitive sequences. IF performed, arthrographic images are best for this.
    - Assess glenoid and humerus separately.
    - Look for subchondral marrow cystic change and edema associated with any findings. Also look for these to clue you into potential areas of cartilage loss.

Assess the SQ tissues and musculature.

- Look at T1 precontrast images. Correlate w fluid sensitive images
- Look at the SQ tissues for edema, inflammation or mass lesions
- Check mm for atrophy, edema, inflammation and mass lesions
- Rotator cuff mm atrophy may not show fatty infiltration. Look at relative size. A good rule of thumb is if the supraspinatus is below the level of the spine on oblique sagittals, there is atrophy.

Check neurovascular structures and incidentally imaged chest.

- Follow the visualized brachial plexus and upper extremity vasculature.
    - Look for mass lesions along the course of the brachial plexus, suprascapular notch, spinoglenoid notch and within the quadrilateral space.
- Check lung field / chest viscera. Look for mass lesions and abnormal signal.

PATHOLOGY

Hill-Sachs fracture
- Impaction fx of the superolateral humeral head

MR SPECIFIC

Changes in osseous contour typically mean changes in soft tissue attachment.

POSTERIOR SHOULDER INSTABILITY

POST GLENOHUMERAL DISLOCATION

Posterior > Anterior shoulder dislocations

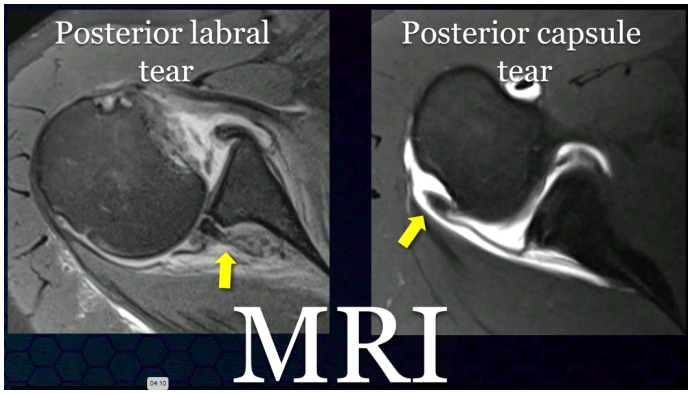
MCC is high energy trauma; forced directed onto shoulder in flexed, adducted and internally rotated shoulder

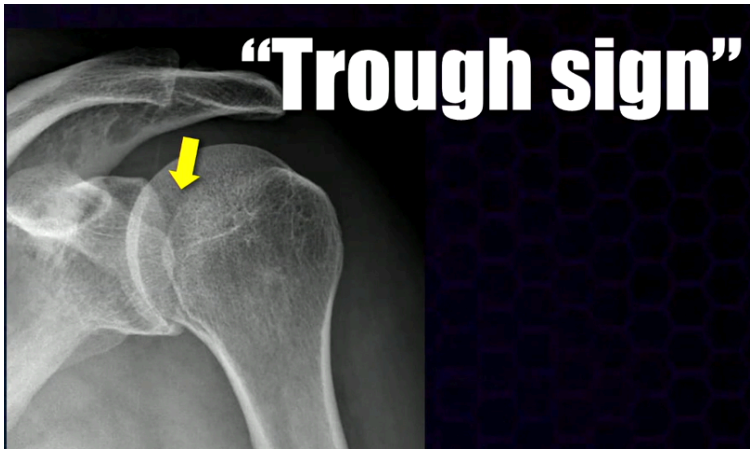
Seizures w asymmetric sustained contraction of internal rotator muscles pulling humeral head posteriorly. Posterior pulling mm of back are stronger than anterior pushing mm

Radiographs
- AP internal and external view, axillary view; alignment difficult in AP views
- Glenohumeral joint best evaluated on alignment view axillary Velpeau or scapular Y.

(1) Look for vertically originated regions of sclerosis along medial anterior half humeral head: trough sign = reverse hill sachs; a posterior traumatic lesion.
- Compare positioning of the humeral head on AP external and internal views for differences. If no difference and fixed in internal rotation = light bulb sign.
- Many are unable to get AP external views bc they cannot externally rotate.

(2) Review alignment views and confirm PGD
(3) CT ordered for better bone evaluation, specifically to quantify injury for surgery.
(4) MRI ordered when concern for posterior labral or capsule tears





Greater tuberosity fracture

19% of all humeral fractures
1st mechanism is direct impaction -> force / position.

- Acromium, superior glenoid, AI glenoid

2nd mechanism: avulsion -> cuff contracts

Radiogrphs: difficult clinically; AP external view is key.
AP external view is great for surgical planning
MRI when radiographs are negative or poor clinical response.
AP and external radiographs are key if minimally displaced. Give good profile of greater tuberosity.