

Imaging Upper Extremity Injuries 1



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HELPING ATHLETES ACHIEVE THEIR OPTIMAL PERFORMANCE NATURALLY

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Shoulder Girdle Injuries



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Shoulder MRI Overview

- DICOM Demo 00



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Clavicle Injuries

- Sternoclavicular injuries: rare
 - Best visualized with CT or MRI
- Clavicle Fractures
 - Medial, middle, or distal 1/3
- AC Joint Injuries
 - Grades 1-3
 - Grades 4-6 rare (not covered)



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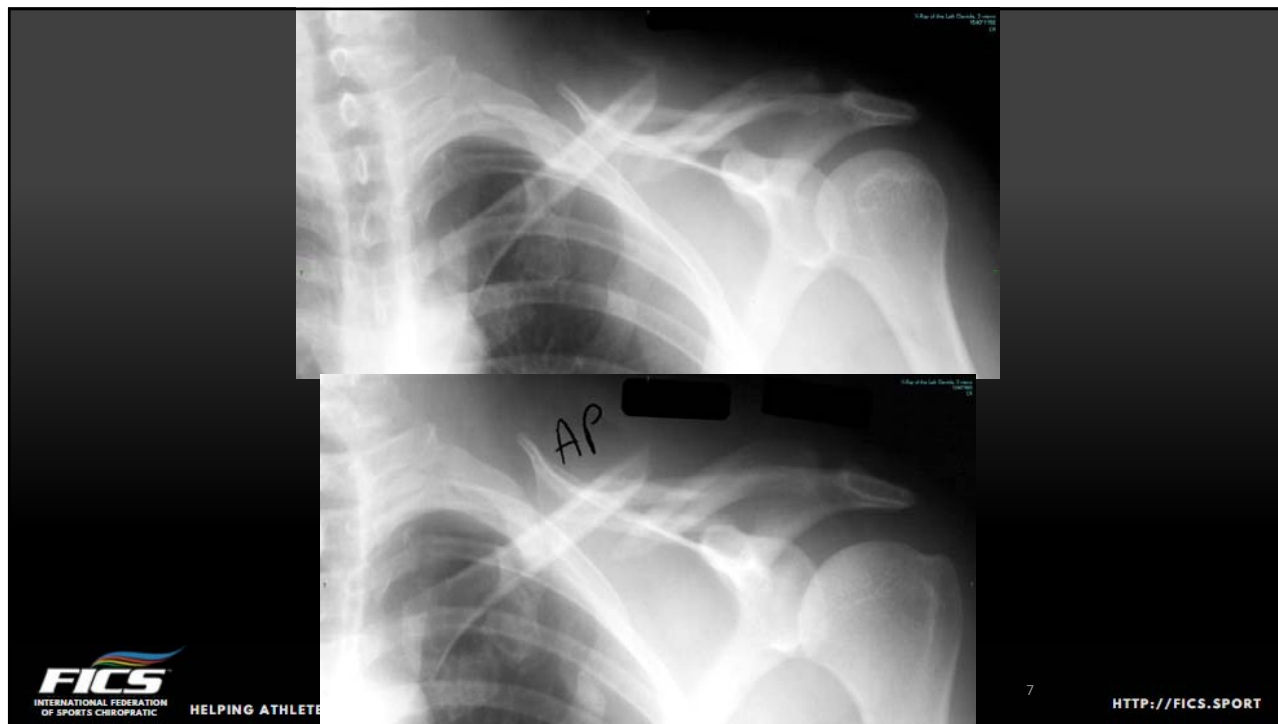
Clavicle Fractures

- The middle 1/3 is rare to fracture (5%)
- The middle 1/3 is at a mechanical disadvantage, so is the most common site of fracture (80%)
 - FOOSH, Shoulder pointers
 - Bayonet apposition
 - TOS?
- The lateral 1/3 is uncommon to fracture, AC injures instead (15%)

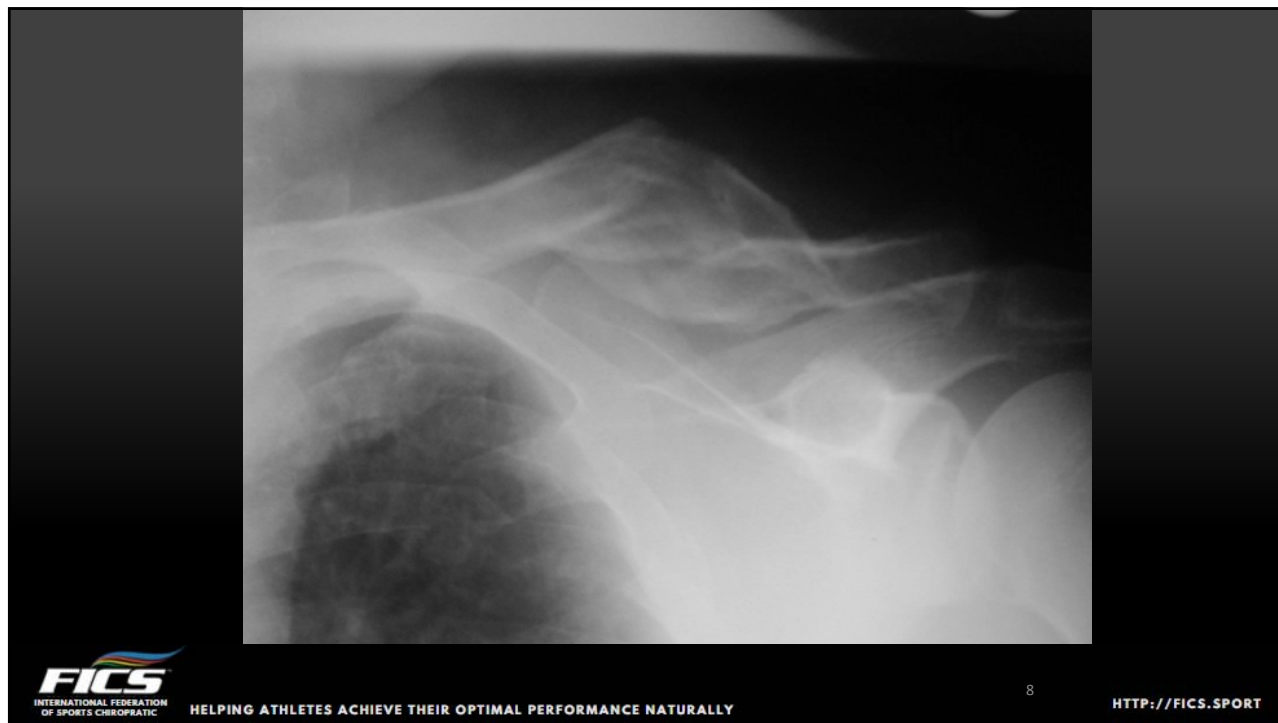
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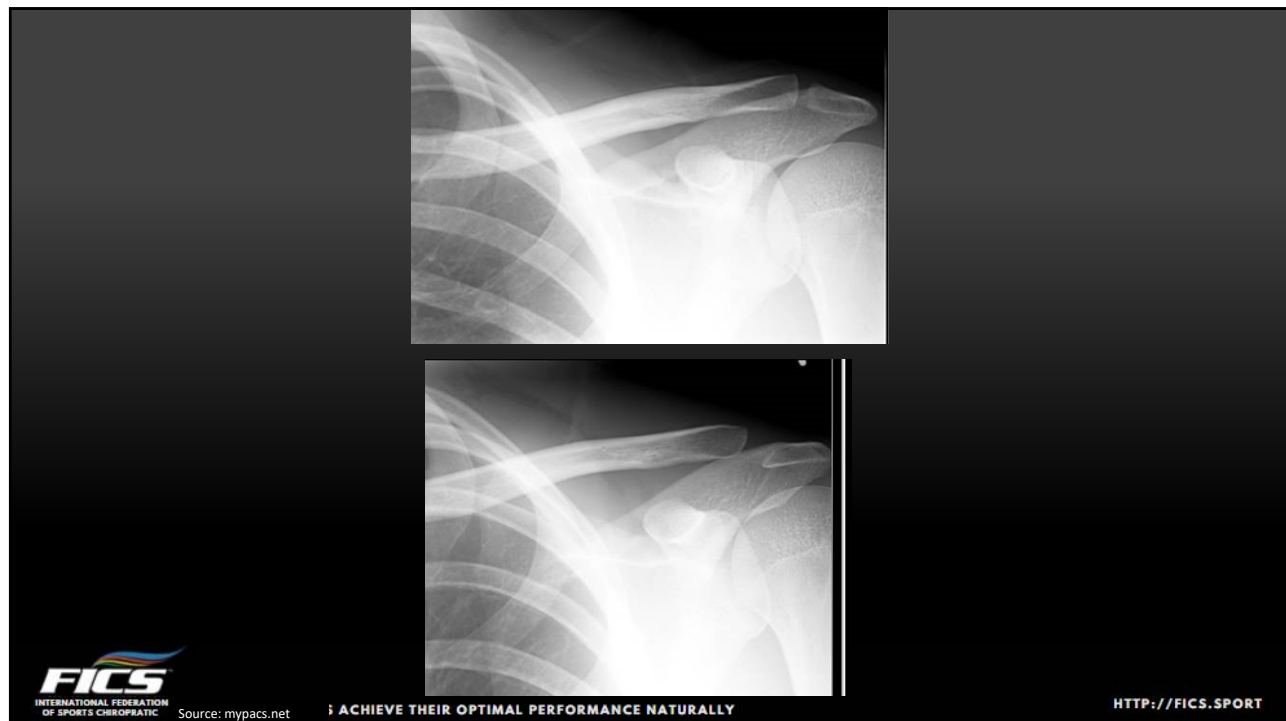


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AC Joint Injuries

- Mechanism: FOOSH, shoulder pointer
- Grades 1-3
 - Varying injury to the acromioclavicular and coracoclavicular ligaments
 - Grade 1: AC sprain, CC intact
 - Grade 2: AC rupture, CC sprain
 - Grade 3: AC rupture, CC rupture
- Grades 4-6 are rare

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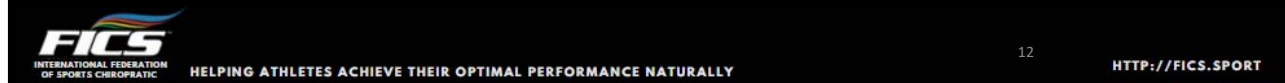
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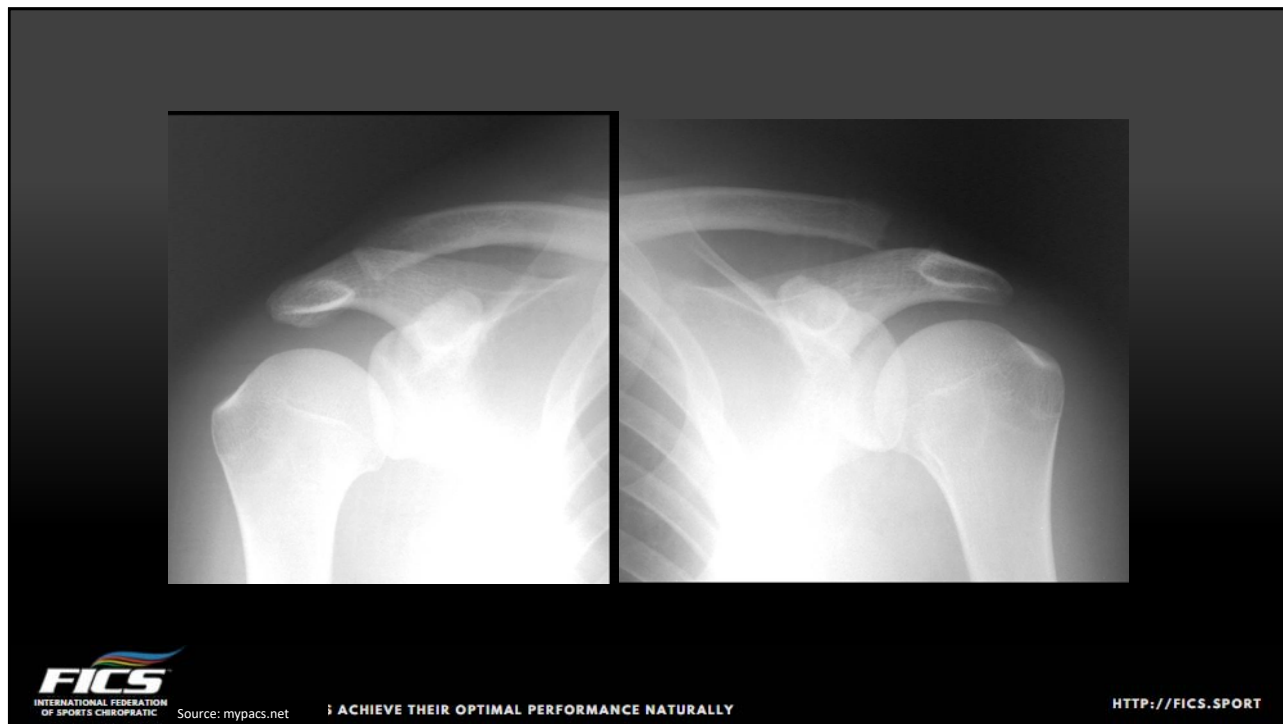
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PTOC

- Either directly post-traumatic or cumulative trauma
 - AC joint injuries
 - Powerlifting
- Osteolysis is insidious, or 2-3 weeks post injury
- Can take 6 months to resolve
- DICOM Case 01 after XR



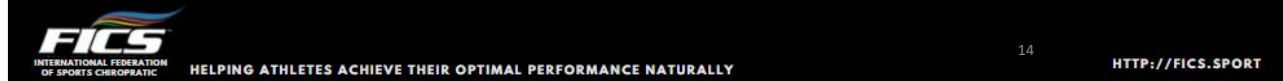
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Shoulder Dislocation Mechanisms

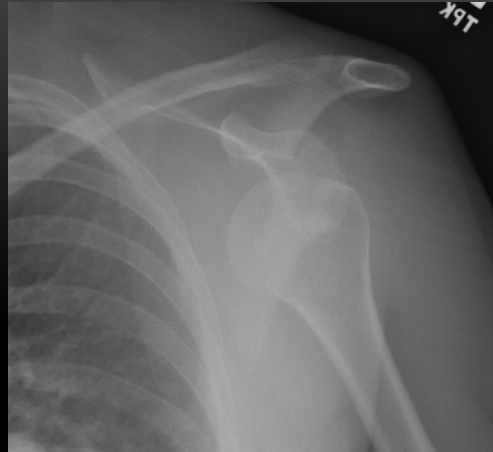
- Anterior: 95%
 - Mechanism: FOOSH, forced ext. rot., P-A force
 - Subcoracoid location
 - Decreased ROM with fixation in ext. rot.
- Posterior: 2-4%
 - FOOSH, seizure, electric shock
 - Fixed in internal rotation
- Inferior: rare
 - Abducted arm with trauma
 - Arm fixed in complete abduction
- Superior: rare
 - Typically requires fracture of spine of scapula



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Anterior Glenohumeral Dislocation

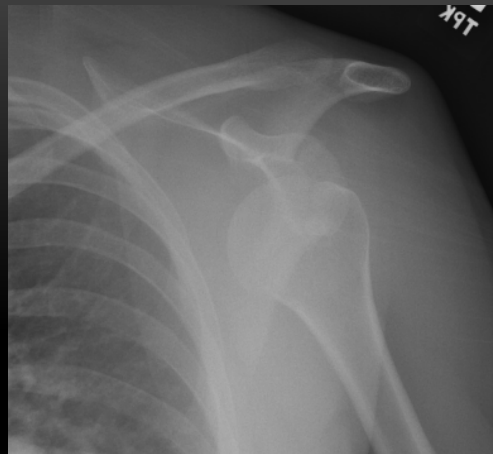
- Most common GH dislocation
 - Positive sulcus sign clinically
- Frequent associated injuries
 - Hill-Sachs: 60-80%%
 - Bankart: 15%
 - Flap fracture: 5%
 - Glenoid labrum
- Frequently has subsequent dislocations



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Anterior Glenohumeral Dislocation

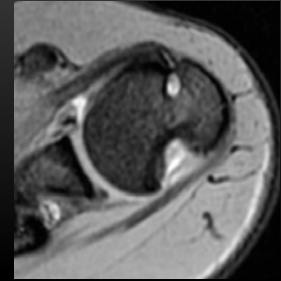
- Neurologic injury
 - Axillary nerve (deltoid wasting)
 - Brachial plexus (TOS)
 - Suprascapular nerve (supraspinatus, infraspinatus)
 - From a paralabral cyst (secondary to SLAP)



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Hill Sachs Fracture

- AKA hatchet fracture
- Impaction between the posterior portion of the humeral head and the glenoid
 - Glenoid acts like an axe
- DICOM Case 02



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Bankart Fracture

- Fracture of anterior inferior glenoid rim
- Can be from impaction
- Can be avulsion of triceps
- Associated labral pathology



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Posterior Glenohumeral Dislocation

- Very uncommon
- Associated injuries
 - Reverse Hill Sachs (trough sign)
 - Reverse Bankart
 - Glenoid labrum
- Frequently overlooked, easier to see on scapular Y view



Case courtesy of The Radswiki, Radiopaedia.org, rID: 11813

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SLAP Tears

- Superior Labrum Anterior to Posterior
- Glenoid Labrum
 - Fibrocartilaginous ring
 - Deepens and stabilizes the glenoid
 - Tears result in feelings of instability
 - Imaging
 - If there is a strong index of suspicion – arthrogram
 - Axials show anterior and posterior
 - Coronal obliques show superior and inferior
 - Including the long head biceps anchor

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SLAP Tears

- Mechanism of injury
 - Shoulder dislocation
 - Overhead activities
 - Baseball pitchers
 - Athletic swimmers
 - House painters

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SLAP Tears

- SLAP tears are less common than bony injuries, but can only be detected on advanced imaging
- 4 primary types of SLAP tears
 - 12 described SLAP injuries, but most are variants on the 4 primary types

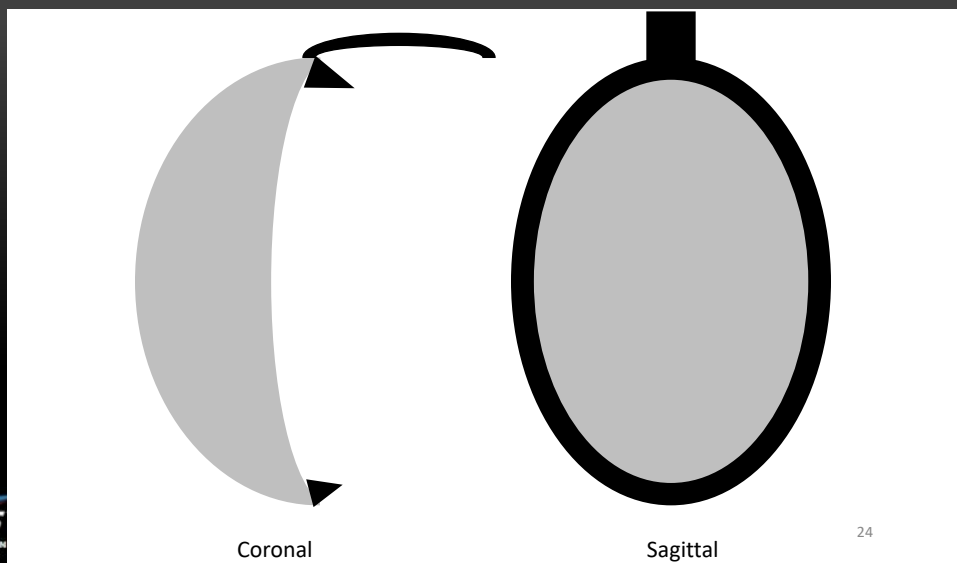
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SLAP Tear Types

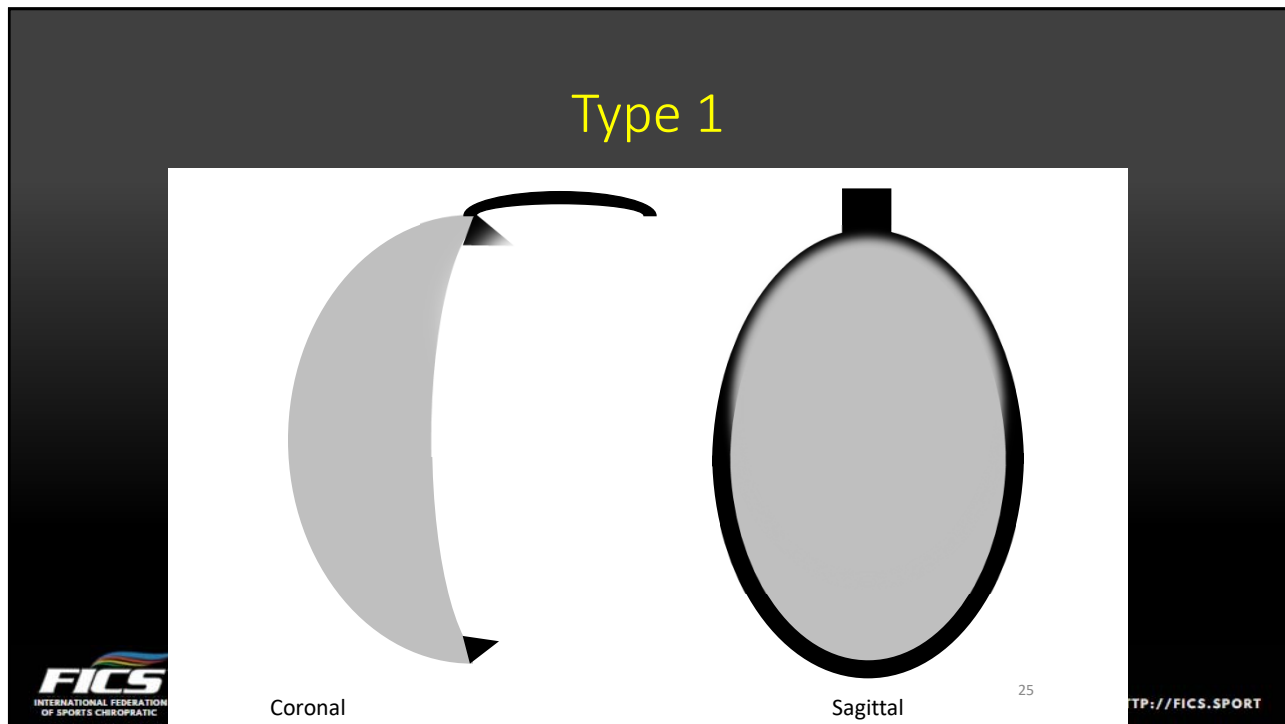
- Type 1
 - Most common
 - Fraying of the free margin
- Type 2
 - Labrum AND biceps anchor torn from glenoid
- Type 3
 - Bucket handle labral tear, intact biceps anchor
- Type 4
 - Bucket handle labral tear, splitting the biceps tendon

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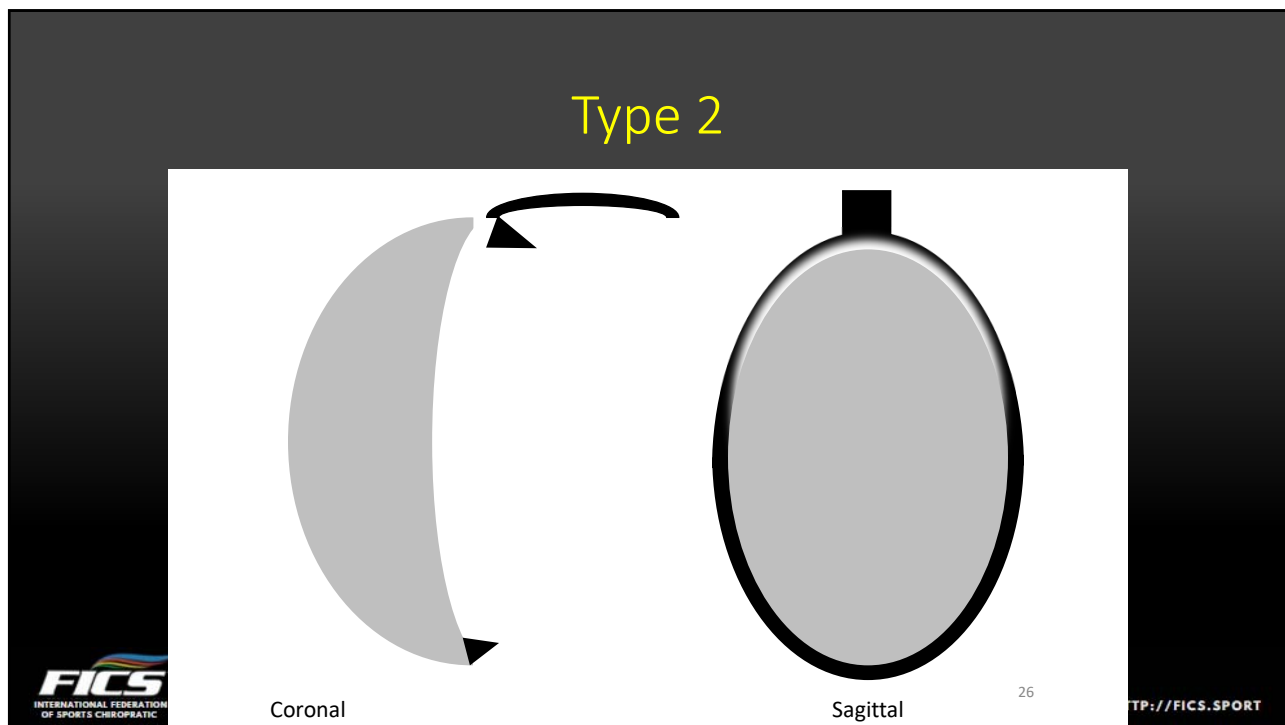
Normal Labrum Schematic



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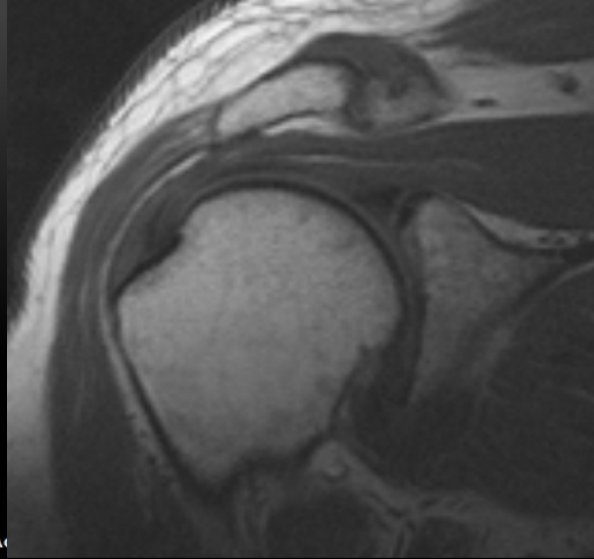


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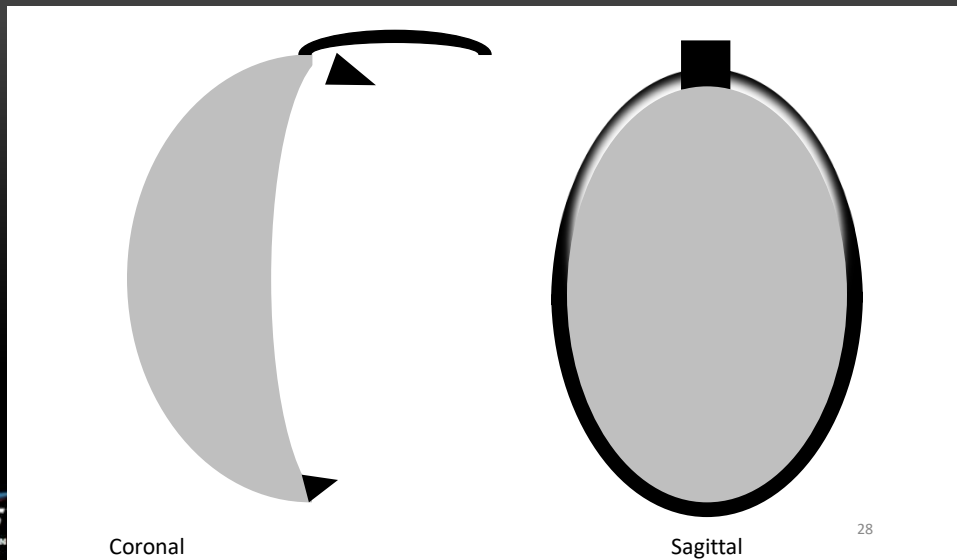
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Type 2



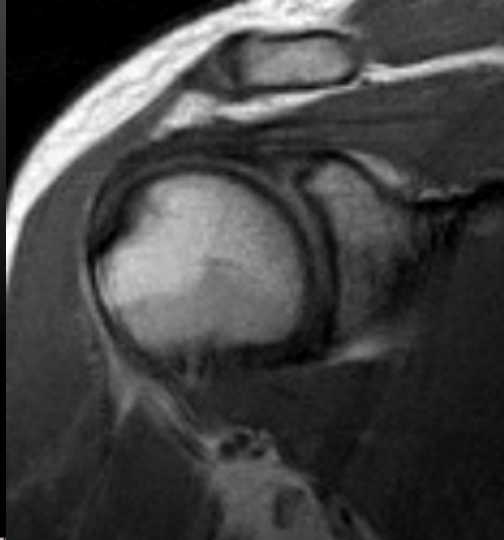
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Type 3



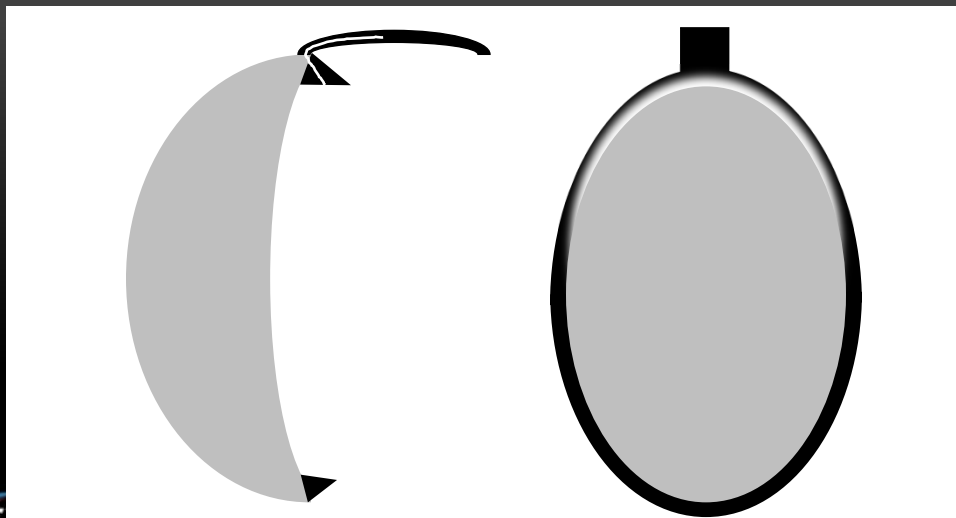
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Type 3



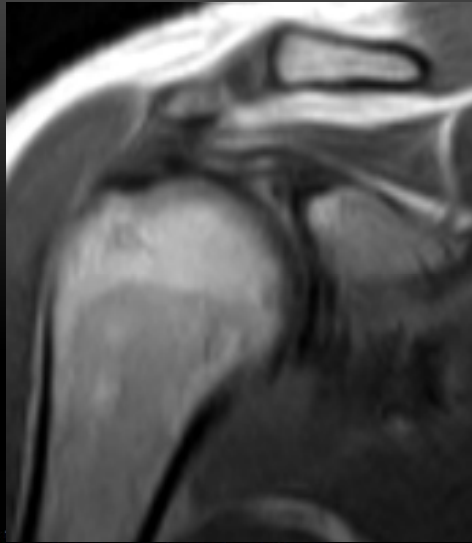
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Type 4



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Type 4



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SLAP and Paralabral Cyst

- Labral tears can often result in extravasation of synovial fluid
- Cysts in the suprascapular notch or spinoglenoid notch can denervate suprascapular nerve
- Fatty infiltration of the supraspinatus and/or infraspinatus
- DICOM Case 03

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Subacromial/Subdeltoid Bursitis

- There are 2 bursa which communicate
- Very common finding
- Non-specific
- Secondary to most shoulder injuries or chronic pain
- If bursa communicates with glenohumeral capsule, there is a rotator cuff tear somewhere

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Tendinopathy

- Or tendinosis
- NOT tendinitis
 - There has been shown to be a lack of inflammatory tissue in the painful tendons
- Tendon abnormalities
 - Tenosynovitis
 - Degeneration
 - Tears
 - HADD

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Tendinopathy

- Tendinosis can thicken or thin a tendon
- Normal tendon should be homogenous low signal
 - Quadriceps/patellar tendon and Achilles have some normal high signal inside
- DDx when tendon has increased signal
 - 1. Magic Angle Phenomenon
 - 2. True tendon pathology

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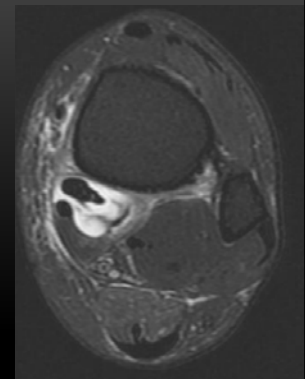
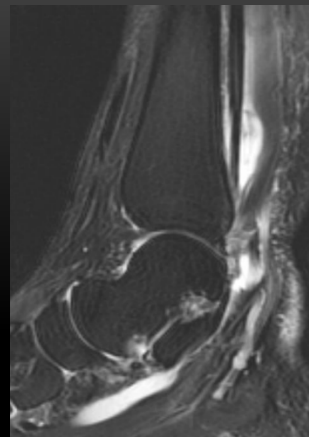
Magic Angle Phenomenon

- Seen on low TE sequences
 - T1, PD
- Structures at 55 degrees to the magnetic axis will have increased signal
- Compare with high TE sequences
 - Magic angle goes away
 - Pathology will still be high signal
- Inexperienced readers often call magic angle phenomenon a tear

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Tenosynovitis

- Tendon can look normal or have fusiform enlargement
- Synovial sheath is filled with more fluid than normal
 - Often multiloculated



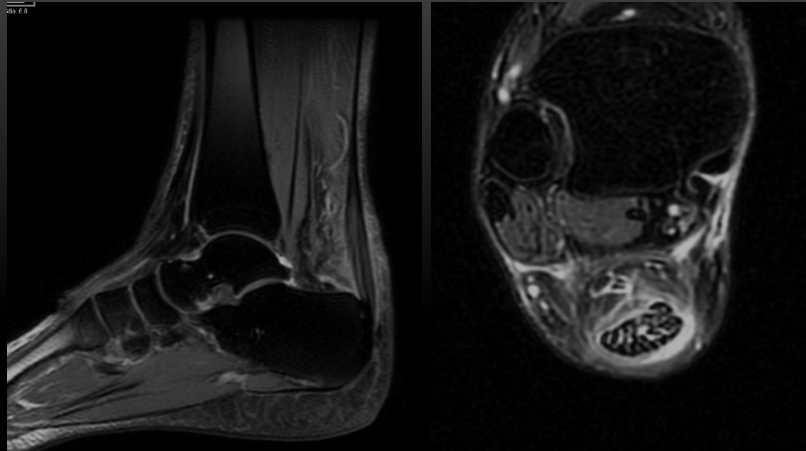
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Tendon Tears

- Tear descriptions
 - Delaminating or longitudinal
 - Complete vs incomplete
 - Partial vs full thickness

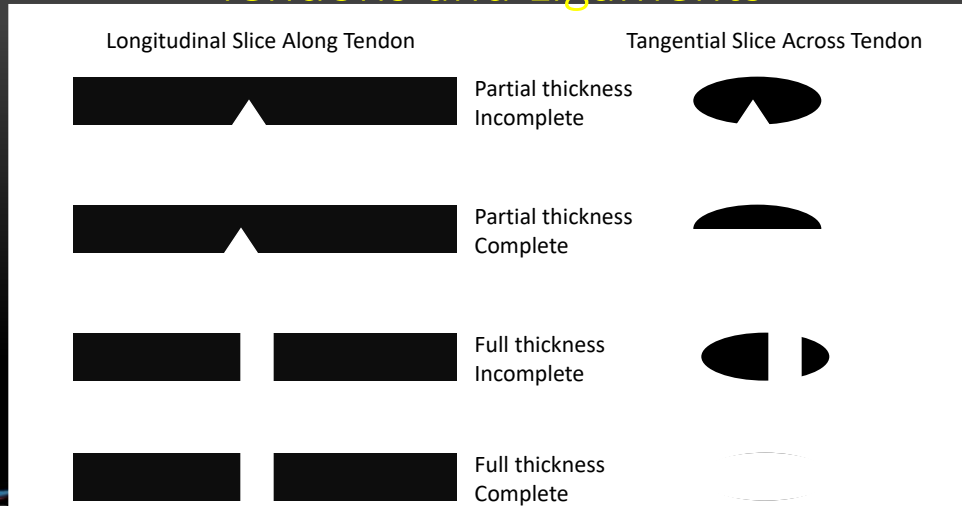
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Longitudinal/Delaminating



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Tear Patterns, Tendons and Ligaments



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DICOM DEMO

- DICOM 04: Tendinosis
- DICOM 05: FTIC Supraspinatus, subdeltoid bursitis
- DICOM 07: PTIC Supraspinatus
- DICOM 08: FTC - rupture with atrophy

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Os Acromiale

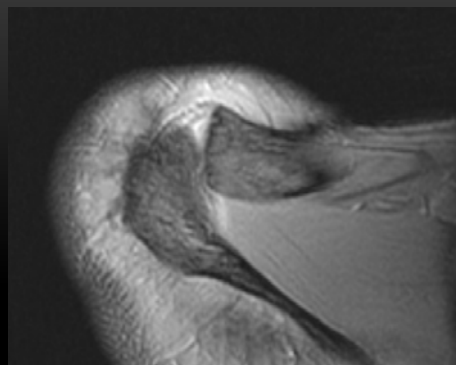
- Unfused secondary ossification center of the body of the acromion
 - Up to ~15% of the population
- Image on axial plane
- Increased incidence of impingement and rotator cuff tear



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Os Acromiale

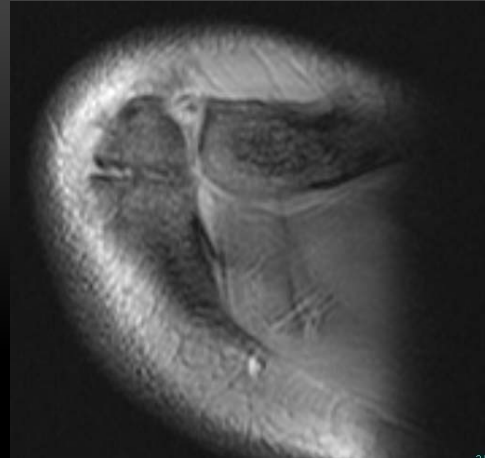
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Os Acromiale

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HADD

- Hydroxyapatite Deposition Disease
 - Calcific tendinitis
 - Calcific bursitis
- Supraspinatus is the M/C location in the body for HADD
- Easier to see on x-ray
 - One of the many reasons to get x-rays before MRI
- DICOM Demo 11, 13

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Long Head Biceps Tendon

- Can be injured with
 - SLAP 2, 4
 - Tendinosis
- Dislocation of the tendon
 - Transverse humeral ligament
 - Subscapularis tendon tear
- DICOM Demo 14



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End of Upper Extremity Injuries 1



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