

**Shoulder Pain:
How to Make the Diagnosis**

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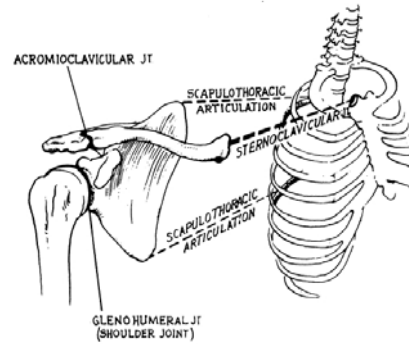
Objectives

- Develop concepts of correlation anatomy, injury mechanism, PE and imaging to make correct diagnosis
- Show case-based examples of shoulder disorders
- Understand making the correct primary diagnosis will improve patient outcomes and management of shoulder pain patients

Differential Diagnosis

	<u>Think Joint</u>	<u>Mechanism</u>
Joints (3)	Glenohumeral SC AC	One Event
Spaces (2)	Subacromial Scapulothoracic	Repetitive
Referred	Neck Scapula Lung Ribs	Repetitive - No event

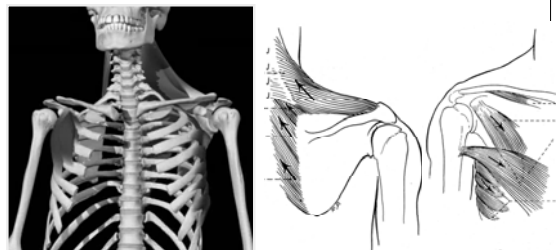
FUNCTIONAL ANATOMY: Joints

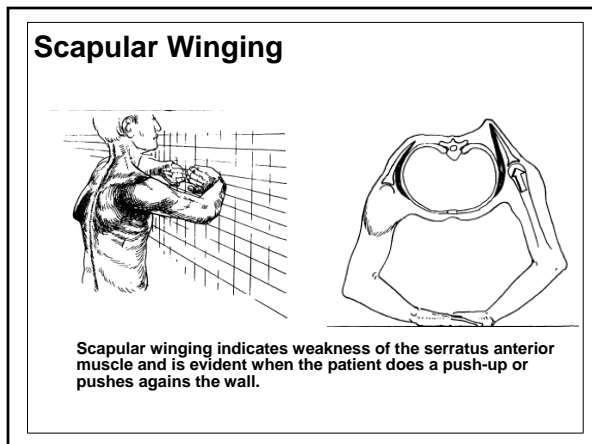
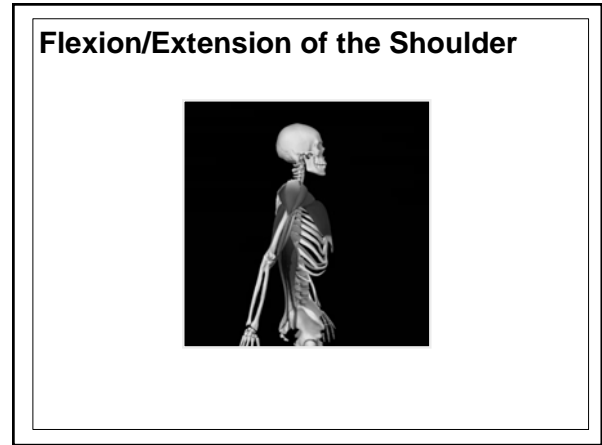
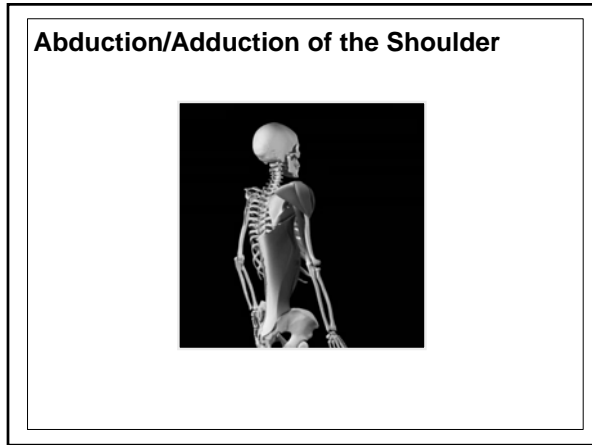
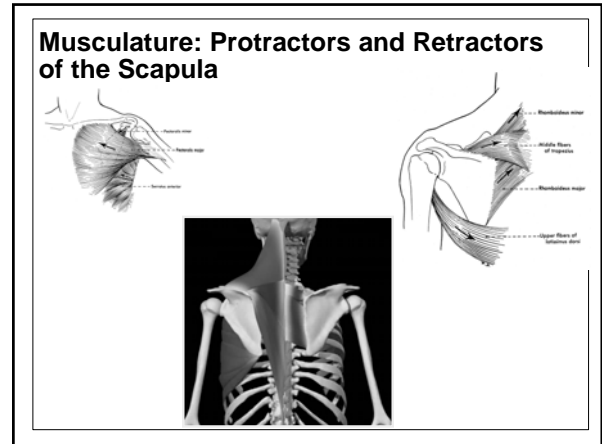
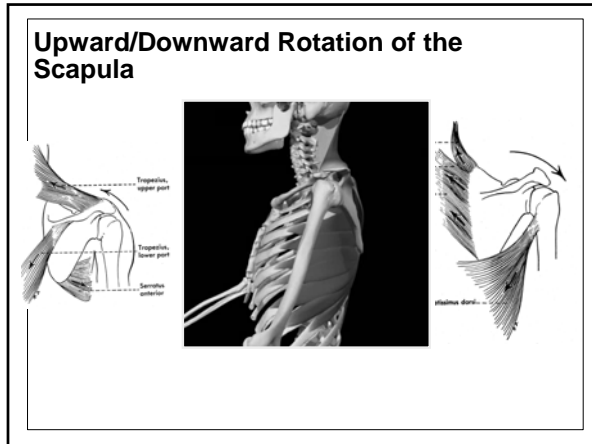


Primary Diagnosis

- **Involved Structure**
- **Age Group**
 - Younger Instability (<30 yrs)
 - Older Rotator cuff (>40 yrs)
- **Diagnosis**
 - Inflammation
 - Tear
 - Sprain
 - Instability

Elevation/Depression of the Scapula





Remember to examine scapular position

- Have patient reproduce symptoms
- If scapula is unstable, shoulder problems will result
- An unstable scapula is similar to firing a cannon out of a canoe

Scapular Dysfunction

- If exists, shoulder function is like *firing a cannon out of a canoe!*
- Remember the scapula!
 - Tightness anterior
 - Forward head
 - Overdeveloped pectoralis
 - Scapular movements
 - Touch medial borders
 - Elbows to back pocket
 - Shrugs
 - Clockwise/counterclockwise

Is the pain referred?

- Neck
- Scapula
- Lung
- Ribs
- Tumor

Muscle Testing

Table 39-1. Shoulder Muscle Testing Chart

MUSCLE	INNERVATION	MYOTOMES	TECHNIQUE FOR TESTING
Trapezius	Spinal accessory	C2-C4	Patient shrugs shoulders against resistance.
Sternocleidomastoid	Spinal accessory	C2-C4	Patient turns head to one side with resistance over opposite temporal area.
Serratus anterior	Long thoracic	C5-C7	Patient pushes against wall with outstretched arm. Scapular winging is observed.
Latissimus dorsi	Thoracodorsal	C7-C8	Downward backward pressure of arm against resistance. Muscle palpable at lat. angle of scapula during cough.
Rhomboids	Dorsal	(C4) C5*	Hands on hips pushing elbows backward against resistance.
Levator scapulae	Scapular	C5-C6	None.
Subclavius	Nerve to subclavius	C5-C6	Similar to lat. dorsi; muscle palpable at lower border of scapula.
Teres major	Subscapular (lower)	C5-C6	None.
Deltoid	Axillary	C5-C6 (C7)	With arm abducted 90°, downward pressure is applied. Anterior and posterior fibers may be tested in slight flexion and extension.
Subscapularis	Subscapular (upper)	C5	Arm at side with elbow flexed to 90°. Examiner resists internal rotation.
Supraspinatus	Suprascapular	C5 (C6)	Arm abducted against resistance (not isolated). With arm pronated and elevated 90° in plane of scapula, downward pressure is applied.
Infraspinatus	Suprascapular	C5 (C6)	Arm at side with elbow flexed 90°. Examiner resists external rotation.
Teres minor	Axillary	C5-C6 (C7)	Same as for infraspinatus.
Pectoralis major	Medial and lateral pectoral	C5-T1	With arm flexed 30° in front of body, patient, abducts against resistance.
Pectoralis minor	Medial pectoral	C5, T1	None.
Coracobrachialis	Musculocostaneous	(C4) C5-C6 (C7)	None.
Biceps brachii	Musculocostaneous	(C4) C5-C6 (C7)	Flexion of the supinated forearm against resistance.
Triceps	Radial	(C5) C6-C8	Resistance to extension of elbow from varying position of flexion.

*Numbers in parentheses indicate a variable but not rare contribution. From Rockwood CA, Matsen FA III (eds): The Shoulder, Vol 1. Philadelphia, WB Saunders, 1990, with permission.

Abnormal Shoulder Differential Diagnosis

Table 39-4. Abnormal Shoulder Exam: Differential Diagnosis — Make the Primary Diagnosis

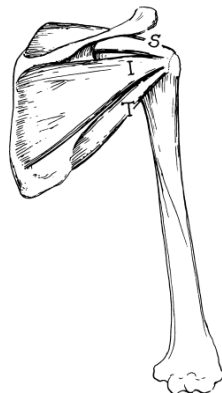
INVOLVED JOINT	DIAGNOSIS	PATHOMECHANICS	MOST COMMON SPORTS
Glenohumeral	Instability	Contact	Collision—Football, gymnastics, cheerleading, swimming
	Direction	Noncontact	
	Unidirectional		
Subacromial	Multidirectional	Distraction/compression	Throwing, weight lifting
	Labral tear	Distraction	Throwing, baseball
	Articular side		
Acromioclavicular	Rotator cuff tear	Microtraumatic	Tennis, golf
	Bursal-sided rotator cuff involvement from bony impingement	Compression	
	Subacromial arch	Compression	Weight lifting
Scapulothoracic	AC joint	Macro and micro contact	Weight lifting
	Arthritis/osteolysis	Loading	Rugby, ice hockey, equestrian
	Arthritis	Macro contact	Baseball, archery
Neurologic	Long thoracic nerve involvement	Serratus anterior weakness	Baseball, archery
	Physiologic dysfunction	Underlying lack of strength	Swimming, tennis

ROTATOR CUFF

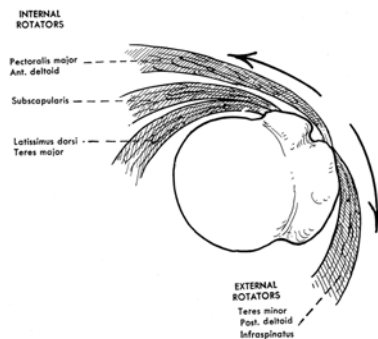
- Supraspinatus
- Infraspinatus
- Teres minor

The "SIT" Muscles

Palpate and Manual Muscle Test Arm in varying degrees of abduction and rotation

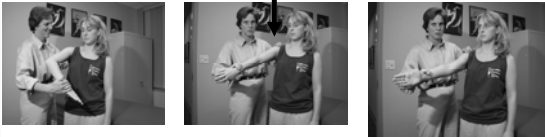


Internal and External Rotators



Rotator Cuff Testing

- Empty can position
- Weakness in external rotation



Be Specific:


The diagnosis should define the structure that is injured and the condition

Diagnosis Rotator Cuff

- Inflammation
- Tear
 - Partial vs. Complete
 - Articular side vs. Bursal side


Complete Tear

- Suspension bridge
 - Free side of tear (cable)
 - Attachments of tear or (supports at each end)

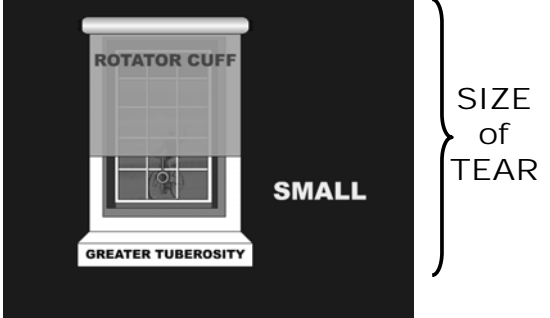


MRI

- Full Thickness supraspinatus tear



Window shade to sill (cuff) (greater tuberosity)
Use this comparison for patient education



There are many clinical tests named after someone. Instead of description by name:

- Think of the motion of joint and forces you apply:
 - Is it labral?
 - (Axial loading like McMurray's)
 - Is it the rotator cuff?
 - (compressing or impinging)
 - Is it instability?
 - (distraction of joint capsule subluxing the humeral head)

Named Tests vs. Movement Description

- Many tests for biceps tendon disorders
- Think about patient history, anatomy and move the arm, load the joint to reproduce patient's symptoms

Do the most painful part of the exam LAST

Tests for proximal biceps tendon dysfunction – long head

- Ludington's
- Yergason's
- Abbott and Saunders'
- DeAnquin's
- Matsen's
- Speed's

**Include these for complete exam
Rarely isolated biceps problem
Think associated tear subscap/labrum/RC**

Abbott and Saunders' test

DeAnquin's test



Matsen's test



from - Burkhead WZ, Arcand MA, Zeman C, Habermeyer P, Walch G, *The Biceps Tendon*, In: *The Shoulder*, Rockwood CA, Matsen FA (Saunders, Philadelphia, 1998), 1036.

Speed's test



The biceps resistance test is performed with the patient flexing the shoulder against resistance, with the elbow extended and the forearm supinated.

Pain referred to the biceps tendon area constitutes a positive result.

from - Burkhead WZ, Arcand MA, Zeman C, Habermeyer P, Walch G, *The Biceps Tendon*, In: *The Shoulder*, Rockwood CA, Matsen FA (Saunders, Philadelphia, 1998), 1035.

Yergason's test



With the arm flexed, the patient is asked to forcefully supinate against resistance from the examiner's hand.

Pain referred to the anterior aspect of the shoulder in the region of the bicipital groove constitutes a positive result.

from - Burkhead WZ, Arcand MA, Zeman C, Habermeyer P, Walch G, *The Biceps Tendon*, In: *The Shoulder*, Rockwood CA, Matsen FA (Saunders, Philadelphia, 1998), 1036.

Ludington's test



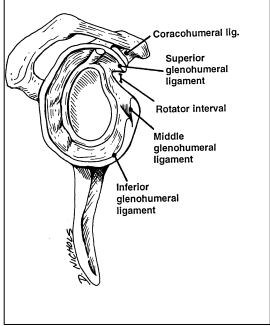
The patient is asked to put his or her hands behind the head and flex the biceps. The examiner's finger can be in the bicipital groove at the time of the test.

Subtle differences in the contour of the biceps are best noted with this maneuver. In this illustration the patient has a ruptured biceps at the left shoulder.

from - Burkhead WZ, Arcand MA, Zeman C, Habermeyer P, Walch G, *The Biceps Tendon*, In: *The Shoulder*, Rockwood CA, Matsen FA (Saunders, Philadelphia, 1998), 1037.

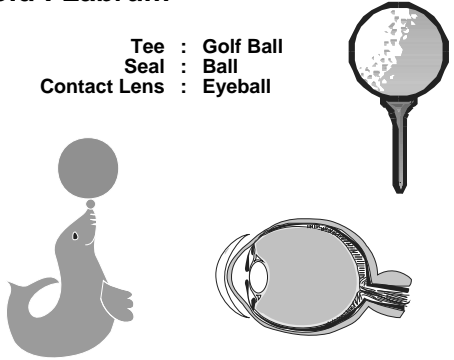
Labrum & Capsule

- Labral Function
- Stability
- Bumper
- Biceps attachment
- Shock absorber



Glenoid : Labrum

Tee : Golf Ball
Seal : Ball
Contact Lens : Eyeball



- Prospective study
- 61 shoulders, 62 patients
- Tests Used
 - Jobe relocation test
 - O'Brien test
 - Anterior apprehension test
 - Bicipital groove tenderness
 - Crank test
 - Speed test
 - Yergason test
- Only O'Brien and Jobe relocation test were statistically correlated with presence of labrum tear, including SLAP
 - Other five not found useful for labral tears
 - None of the tests or combinations statistically valid for SLAP lesion only

Guanche CA and Jones DC, "Clinical Testing for Tears of the Glenoid Labrum," in *Arthroscopy: The Journal of Arthroscopic and Related Surgery*, vol 19, no 5 (May-June 2003), 517-523.

O'Brien's Test




O'Brien's Test © 2005 Ky, Sports Medicine

Shoulder Palpation Crank Tests



Shoulder Palpation, Tests © 2005 Ky, Sports Medicine

Shoulder Stability



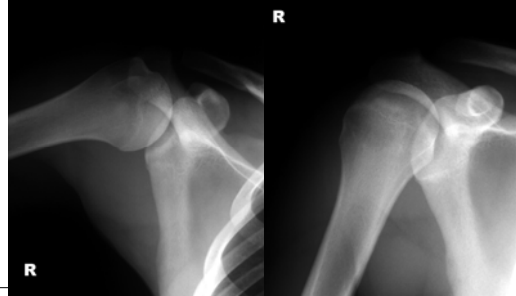
Shoulder Stability Tests © 2005 Ky, Sports Medicine

18 YO Freshman Football Athlete

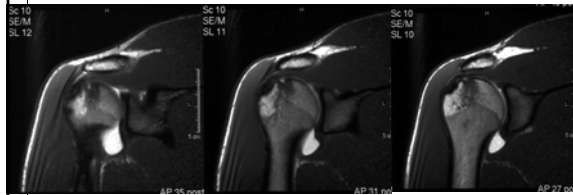
- 18 YO Freshman RB for EKU w/ dominant right shoulder injury
- Opening game, 8/31/2000
- No previous H/O injury
- Dead Arm Complaints
- Mechanism of Injury thought to be a lateral blow to the shoulder while being tackled

Clinic Radiographs

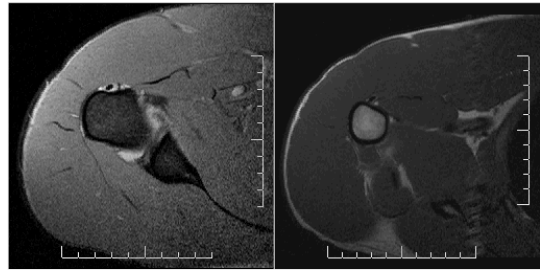
- Confirm humeral head radiolucency consistent with Hill-Sachs lesion



MRI



- Hill-Sachs lesion approx. 20%
- Anteroinferior Labral Detachment
- Anterosuperior Labral Detachment

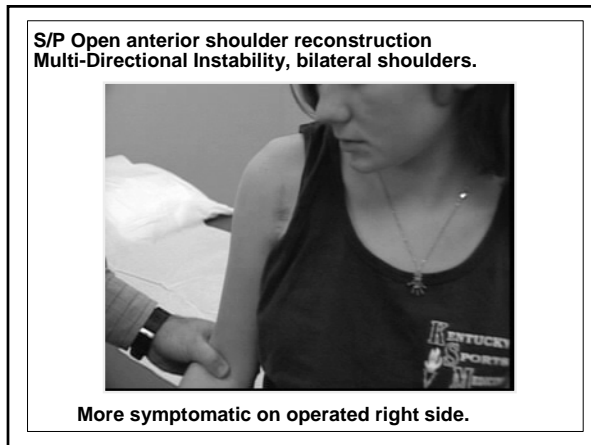
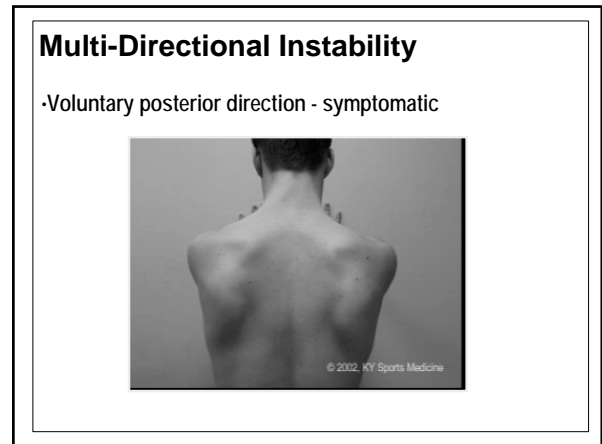
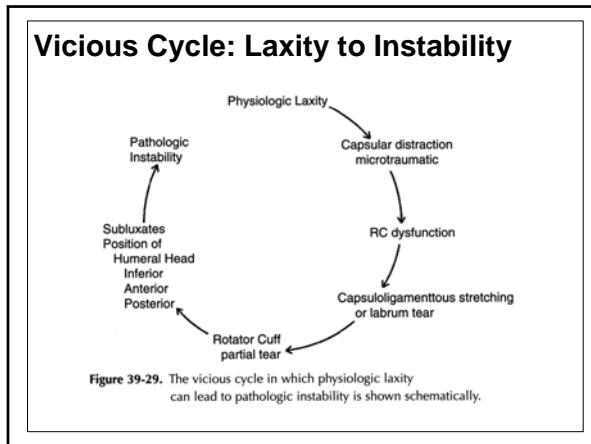


Posterior Instability Test



Prone Posterior Instability Test



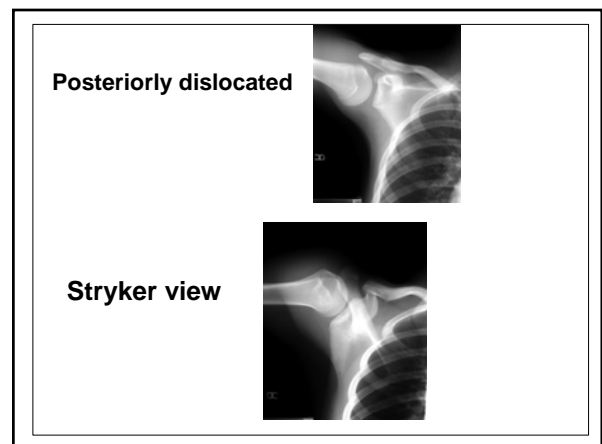
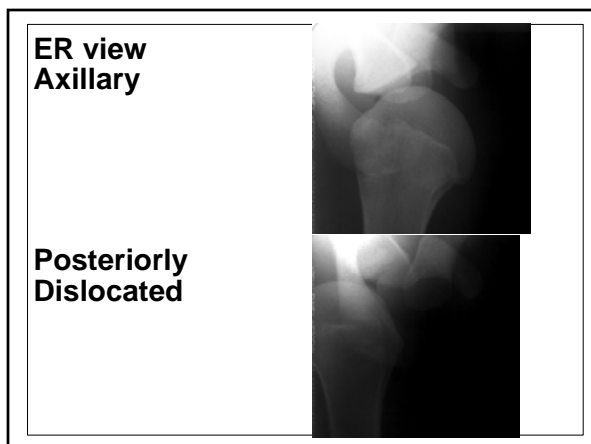


18 YO Right-Hand-Dominant Discus Thrower

- Threw the discus
- Felt pop, pain, inability to move her arm
- Went to the emergency room

Posterior Dislocation

- X-rays showed humeral head posteriorly dislocated on axillary view
- This direction of dislocation still is missed in emergency rooms



Shoulder Pain Algorithm: AAOS Clinical Guideline on Shoulder Pain, in *Orthopaedic Knowledge Update: Shoulder and Elbow 2* (AAOS, 2002), p. 448-455.

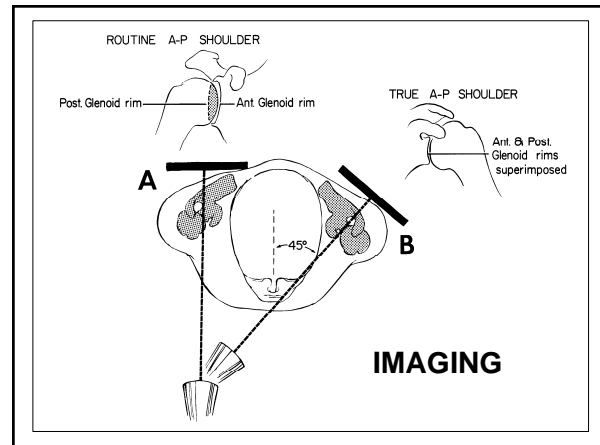
The image shows the cover of the book 'Orthopaedic Knowledge Update: Shoulder and Elbow 2' on the left. On the right is a flowchart titled 'Shoulder Pain Algorithm' with decision points and treatment paths. Arrows point from the book cover to the algorithm and vice versa. There are also arrows pointing to '[more]' at the bottom of the algorithm.

Imaging

- Plain films
- Make the diagnosis by history and physical and plain films
- Institute treatment
- Re-examine
- Then special Imaging Studies

Shoulder Pain Algorithm: AAOS Clinical Guideline on Shoulder Pain, in *Orthopaedic Knowledge Update: Shoulder and Elbow 2* (AAOS, 2002), p. 448-455.

- **Initial Imaging**
 - True AP in 0° external rotation
 - Lateral in scapular plane
 - Axially view
 - When imaging studies are indicated during the initial evaluation and treatment of a patient with shoulder pain, appropriate plain "x-rays" should be obtained. More sophisticated imaging studies (such as shoulder MRI, ultrasound, or arthrography) are not indicated.

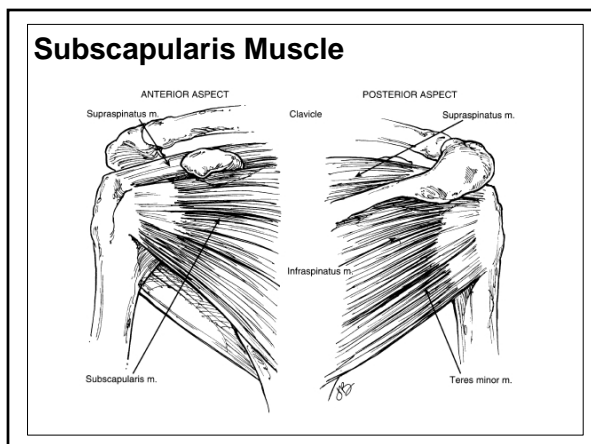
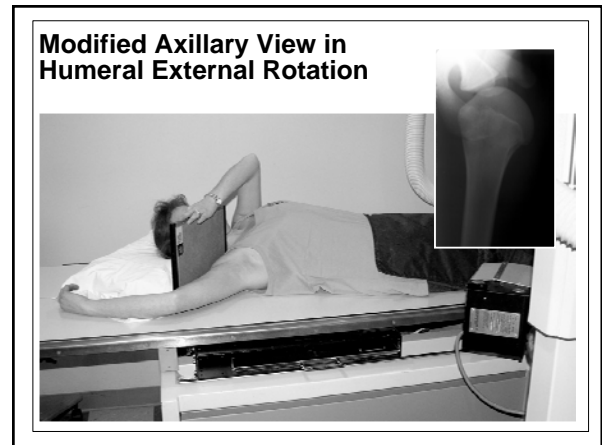
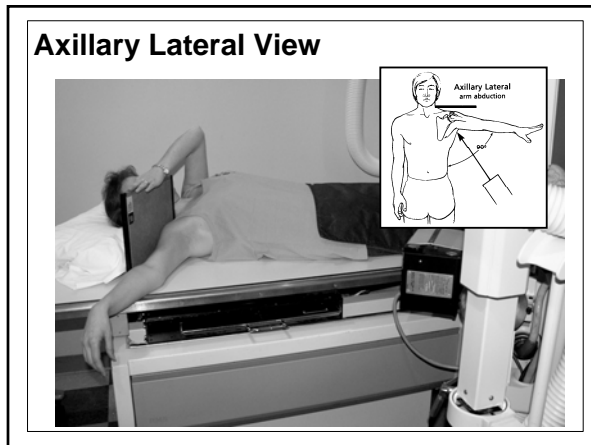
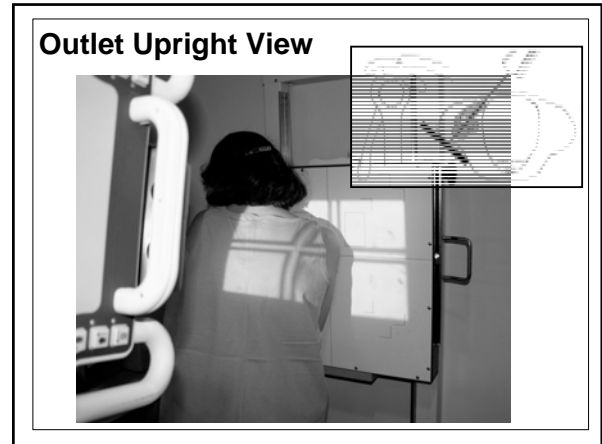
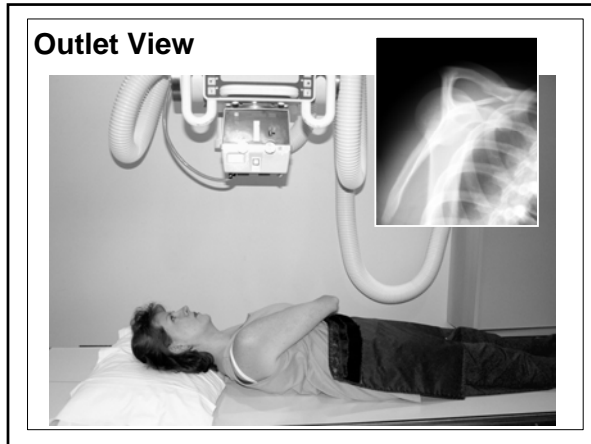


AP Internal View

The photograph shows a patient lying on their back on a table. An X-ray machine is positioned above them. An inset image shows the resulting AP internal view X-ray of the shoulder joint.

Stryker Notch View

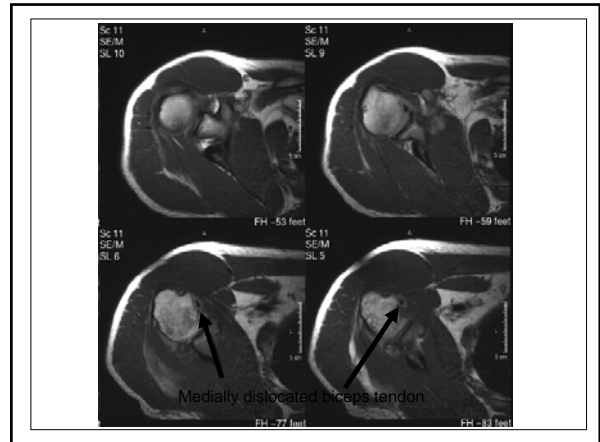
The photograph shows a patient lying on their back on a table. An X-ray machine is positioned above them. An inset image shows the resulting Stryker notch view X-ray of the shoulder joint. Another inset shows a diagram of the patient's arm abducted and the X-ray beam directed through the acromion.



- Subscapularis Tears**
- Lift Off (75% tear 5-30)
 - Hand or back L spine
 - Maximum LR
 - Napoleon (50% tear)
 - Press belly, flexes wrist
 - Bear Hug (Upper tear, most sensitive)
 - Hand on opposite shoulder
 - Elbow forward
 - Examiner pulls hand off shoulder

Initial Clinic Visit

- 46 year-old right-hand dominant male fell onto an outstretched right arm after tripping over his dog.
- Felt a ripping sensation in his shoulder
- Went to the emergency room, plain x-rays normal
- PE next day:
 - Pain diffusely anterior shoulder
 - Weakness, IR > ER



Biceps Tendon

- Often associated with:
 - Subscapularis tear
 - Chronic rotator cuff tears
- Presentation
 - Initial ecchymosis and pain, then feel better
- Treatment
 - Repair other associated tears
 - Tenodesis vs. tenotomy



Pectoralis Major Rupture 33 YO Male

- Bench pressing weights
- Weight amount he did ten years previously
- Felt a rip, pain, deformity, right pectoralis



34 YO RHD weight-lifter

Pain over AC joint s/p arthroscopy labral debridement 3 years previously
Right AC osteolysis



You May Not Have Seen It,
But It Has Seen You

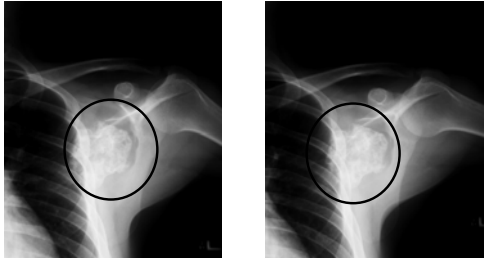


12 YO Male Soccer Athlete

- Pain in left shoulder, 1 to 2 years
- No injury
- PE: normal stability
- Mildly tender firm axillary mass


22YO LHD Male

- Multiple osteochondroma
- Girlfriend noted scapular asymmetry



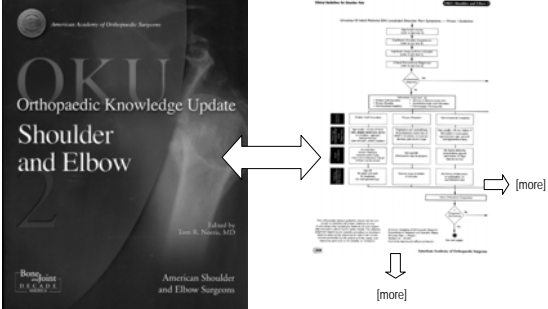
True space occupying mass

- Causing “winging” and “snapping”
- Axial skeleton osteochondroma
- Underwent resection mass
- Diagnosis: osteochondroma, no malignant change



Make the Primary Diagnosis!

Shoulder Pain Algorithm: AAOS Clinical Guideline on Shoulder Pain, in *Orthopaedic Knowledge Update: Shoulder and Elbow 2* (AAOS, 2002), p. 448-455.



Imaging

- Special Studies
 - MRI scan
 - With or without gadolinium
 - CT scan
 - Ultrasound

Ultrasonography

- In office
- Accurate
- Low cost

Churchill RS, Fehring EV, Dubinsky TJ, Matsen FA, "Rotator cuff ultrasonography: diagnostic capabilities," *J Am Acad Orthop Surg* 2004 Jan-Feb;12(1):6-11.

Ultrasound showing symptomatic progression of previously asymptomatic rotator cuff tear.

Yamaguchi K et. al., "Natural history of asymptomatic rotator cuff tears: A longitudinal analysis of asymptomatic tears detected sonographically," *J Shoulder Elbow Surg* 2001;10:199-203.

Shoulder Pain Algorithm: AAOS Clinical Guideline on Shoulder Pain, in *Orthopaedic Knowledge Update: Shoulder and Elbow 2* (AAOS, 2002), p. 448-455.

Differential Diagnosis Categories

- Rotator Cuff Disorders
 - ↳ Frozen shoulder
 - ↳ GH Instability
 - ↳ Arthritis
 - ↳ AC Joint Disorder
 - ↳ Fibromyalgia

Shoulder Pain Algorithm: AAOS Clinical Guideline on Shoulder Pain, in *Orthopaedic Knowledge Update: Shoulder and Elbow 2* (AAOS, 2002), p. 448-455.

- Needs specialized care
 - ↓
 - Refer to specialist

Definition of musculoskeletal specialist:
licensed physician who focuses on management of musculoskeletal conditions

CONCLUSIONS

- Don't order a test if you can't read it.
- Communicate with the radiologist at your imaging center.
- A bad scan is worse than no scan.
- In KY, we have many MRI scanners. Shoulder scans are notoriously bad if ordered by someone who is unable to examine a shoulder.

CONCLUSIONS
"Sometimes an MRI report just doesn't help. . ."

Conclusions

- By:
 - Knowing Anatomy
 - Understanding Biomechanics
 - Sport of injury
 - Mechanism
- Physical Exam makes sense and Specific Diagnosis is made

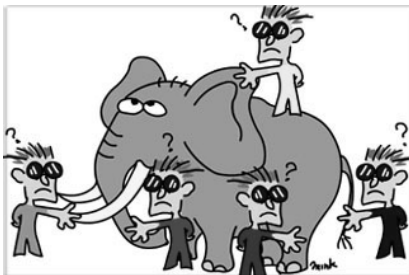
Little League pitchers do NOT become Big League pitchers



Nolan Ryan didn't start pitching until he was in high school



Try to put the whole picture together



Treat the entire patient!

The End . . . Thank You!



QUIT