

Key Diagnoses and Differentials in Shoulder Ultrasound

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Disclosures

- Consultant: Bioclinica
- Book Royalties: Elsevier
- Not relevant to this lecture

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Outline

- Rotator cuff:
 - Differentiating between different tears
- Biceps brachii
 - Tenosynovitis and tears
- Subacromial-subdeltoid bursa
 - Differentiating from other bursa/recesses
- Acromioclavicular joint
- Paralabral cyst

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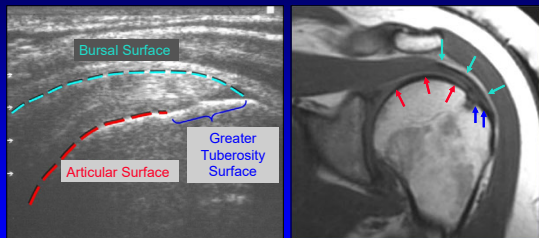
Rotator Cuff Tears

- Tears are hypoechoic / anechoic
- Indirect signs at ultrasound:
 - Cortical irregularity: supraspinatus footprint
 - If present on radiographs, 75% have tear
 - Volume loss
- Massive tear: non-visualization

AJR 1998; 171:229
Radiology 2004; 230:234

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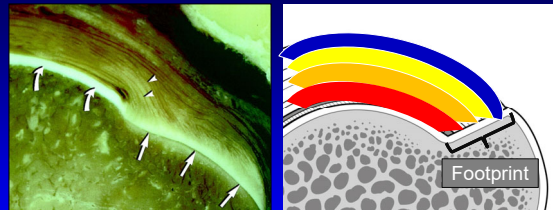
Supraspinatus: normal



Long Axis

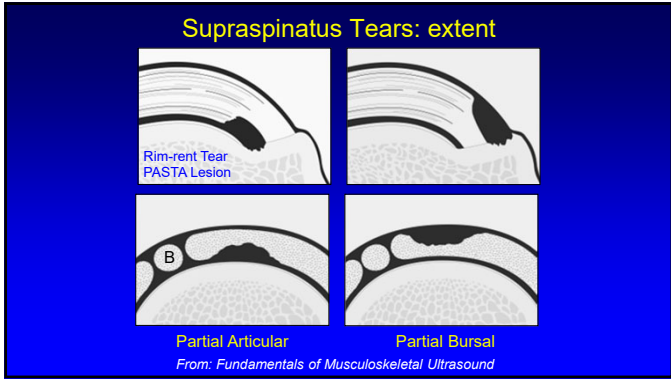
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Supraspinatus Insertion

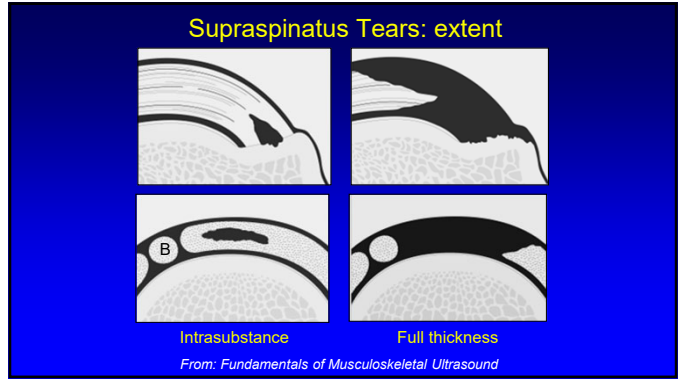


From: Siebold et al.
RadioGraphics
1999; 19:685

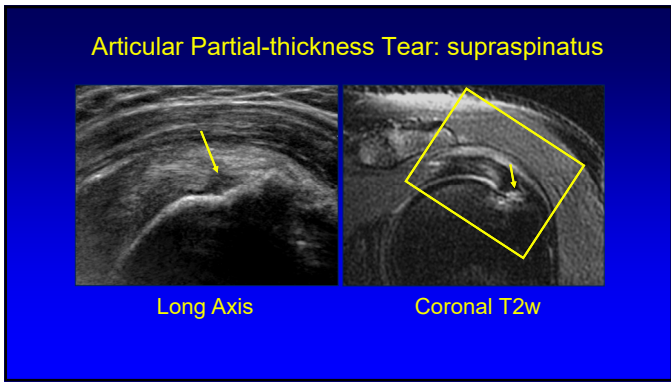
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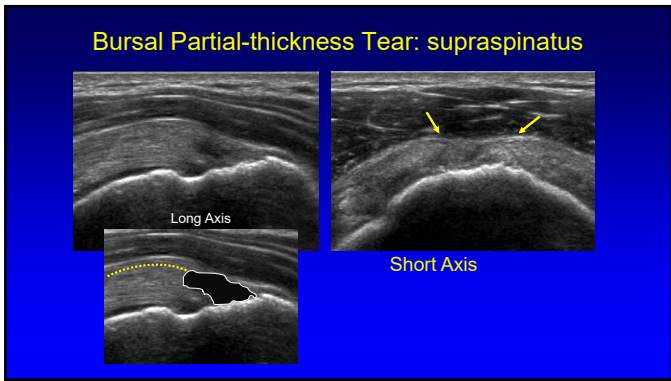
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Pitfall Alert! Anisotropy

- Sound beam oblique to tendon fibers
- Artificially hypoechoic
- Most common location for this error: rim rent area

Supraspinatus: long axis

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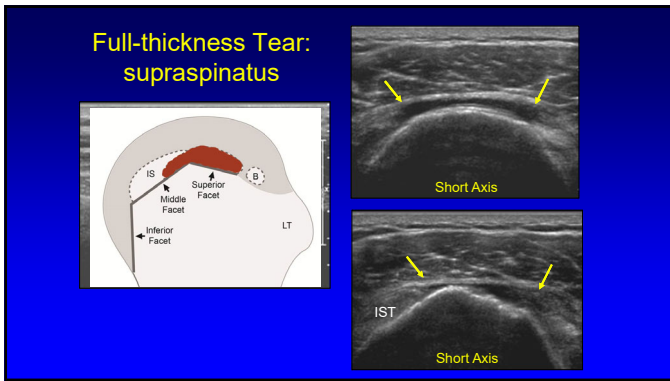
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Full-thickness Tear: supraspinatus

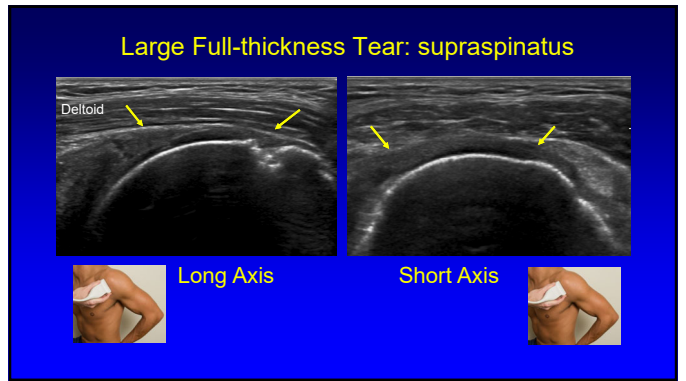
Long Axis Short Axis

Note: Cartilage Interface Sign (open arrow)

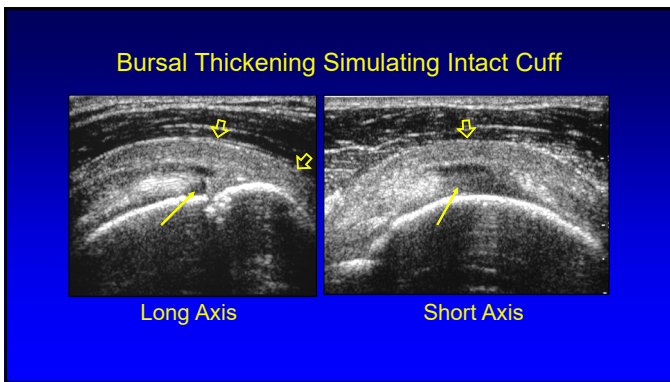
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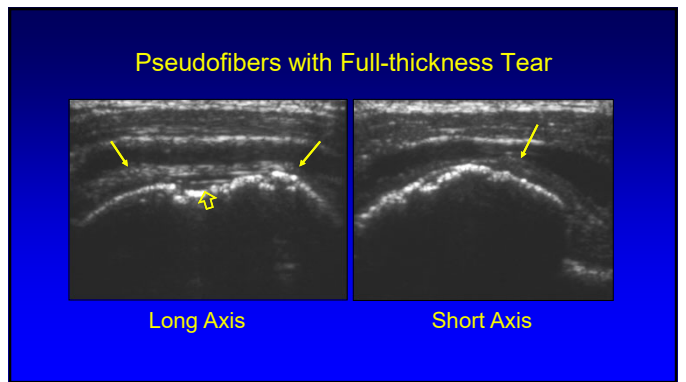
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Tendinosis

- No inflammatory cells
 - Mucoïd degeneration, chondroid metaplasia
- Hypochoïc, ill-defined
- Possible increased thickness
- No cortical irregularity*

From: Wilson JJ, et al. Am Fam Physician. 2005; 32:165

From: Hodler J, et al. J MRI; 2010; 72:811

*Radiology 2004; 230:234

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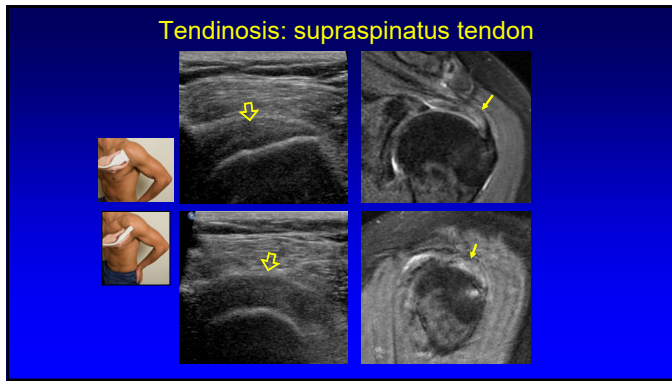
Tendon Tear versus Tendinosis

**both may appear hypochoïc*

<p><u>Tear</u></p> <ul style="list-style-type: none"> • Anechoic • Well-defined • Homogeneous • Thinned • Bone irregularity* 	<p><u>Tendinosis</u></p> <ul style="list-style-type: none"> • Hypochoïc • Ill-defined • Heterogeneous • Swollen • Smooth cortex
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*At supraspinatus tendon footprint in patients over 40 years old

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Fatty Infiltration and Muscle Atrophy

- Supraspinatus and infraspinatus
 - Infraspinatus: only variable to predict cuff healing¹
- Associations:
 - Chronic, large, anterior supraspinatus tears²
- Ultrasound:
 - Comparable to MRI³
 - Improved reliability with extended field-of-view⁴

¹Chung et al. Am J Sports Med 2013; 41:16764
²Hodler et al. Radiology 2005; 237:584.
³Wall LB et al. JBJS 2012; 94:e83.
⁴Nazarian et al. 2008; 190:27.

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Fatty Infiltration and Muscle Atrophy

- Indistinct tendon-muscle border
- Increased muscle echogenicity
 - Compare to teres minor
- Decreased muscle bulk
 - Compared to teres minor
 - Bone landmark: ridge in scapula
 - Short axis: infraspinatus 2x size

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Atrophy: supraspinatus and infraspinatus

Short Axis (extended field-of-view)

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Secondary Findings of Rotator Cuff Tears:

- Cortical irregularity
- Volume loss of tendon substance
- Cartilage interface sign
- Effusion (articular & bursal)

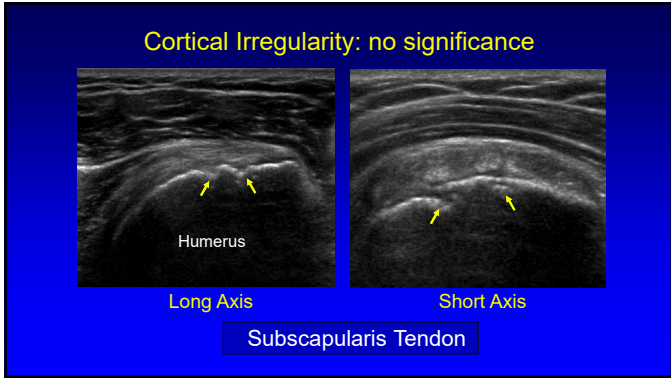
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Cortical Irregularity:

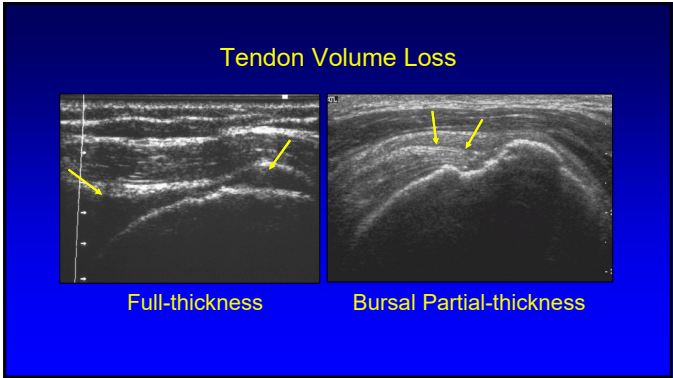
- Greater tuberosity: at supraspinatus insertion
- When present: 75% have rotator cuff tears
 - Patient over 40 years old
- When absent: 96% normal cuffs by sonography

AJR 1998; 171:229
 Radiology 2004; 230:234

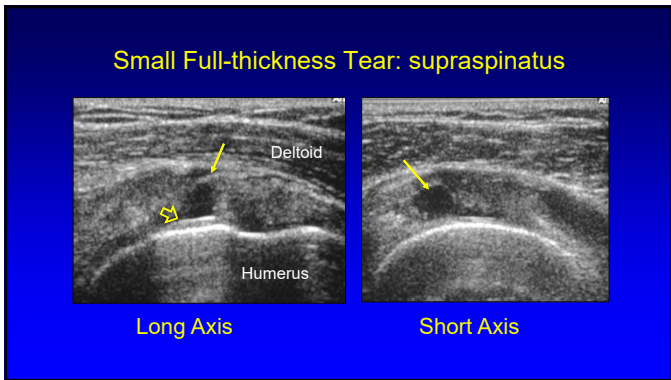
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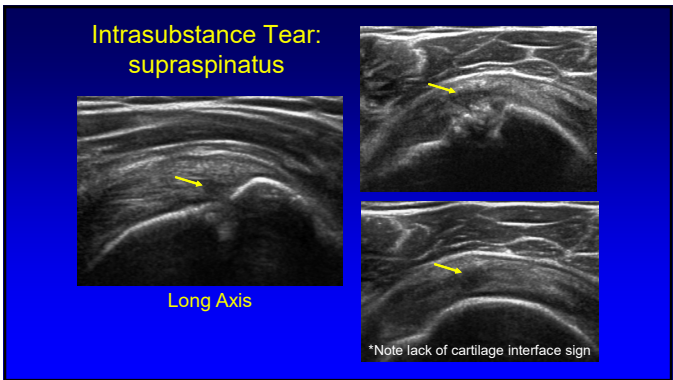
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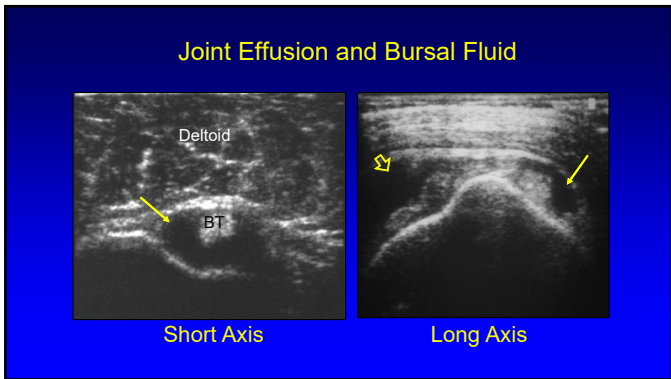
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Biceps Tendon:

- Glenohumeral joint effusion:
 - Collects around biceps tendon
 - Tendon sheath communication
 - Seen in 97% with joint effusion
 - Abnormal: > 1 mm¹

¹Zubler et al. Eur Radiol 2011; 21:1858

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Shoulder Joint Recesses

- Long head biceps tendon sheath
- Posterior recess:
 - Image with shoulder in external rotation
- Axillary recess
- Subscapularis recess

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Subacromial-subdeltoid bursa (SASD) vs. subscapularis recess (SSR) vs. subcoracoid bursa (SCB)

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Subscapularis Recess

*Note redistribution of joint fluid with internal and external shoulder rotation

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Subcoracoid Bursa

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Inflammatory Tenosynovitis: biceps tendon

Long Axis

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Biceps Tendon:

- Partial-thickness tear:
 - Hypoechoic /anechoic cleft
 - Tenosynovitis
 - Sensitivity: 27%
 - Accuracy: 88%
 - **Subluxation / spur**
 - Important secondary signs

Skendzel J, et al. AJR 2011; 197:942

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Aponeurotic Expansion of Supraspinatus Tendon

- Up to 49% of shoulders
- Cleft: coronal plane
- Origin: supraspinatus
- Distal: pectoralis or bicipital groove

Moser et al. Skeletal Rad 2015; 44:223

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Pitfall Alert! Pseudo Biceps Tendon

- Biceps brachii long head
- Complete retracted tear
- Visible "fibers" in groove
 - Collapsed tendon sheath
 - Aponeurotic expansion of supraspinatus
- Look for distal retracted tendon and absent tendon in rotator interval

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Large Full-thickness Tear: geyser sign

Long Axis Coronal T1w

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Post-traumatic Osteolysis of the Clavicle

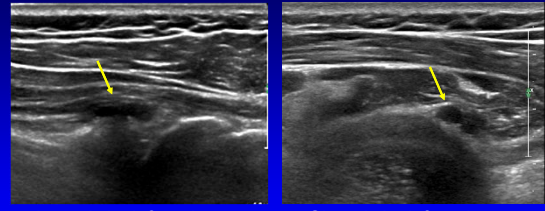
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Labral Tear and Labral Cyst



Long Axis: infraspinatus

Short Axis: infraspinatus

*Note: non-compressible

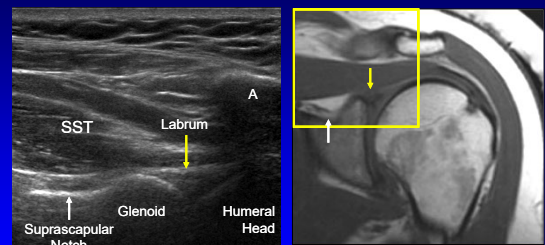
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Pitfall: suprascapular vein dilation



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Suprascapular Notch and Superior Labrum



Coronal Plane

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Take-home Points

- Rotator cuff pitfalls:
 - Partial articular: focal anisotropy
 - Partial bursal: SA-SD bursal thickening
 - Full-thickness: extent, chronic tear
- Secondary signs of cuff tear:
 - Cortical irregularity (SST), thinning, cartilage interface
- Biceps: don't overcall tenosynovitis
- AC joint: important structure to assess
- Paralabral cyst: suprascapular vein dilation

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Thank you!



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Syllabus →



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