Pitfalls in Shoulder Ultrasound

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Outline: rotator cuff pitfalls
- Technique
- Misinterpretation of normal structures
- Subacromial-subdeltoid bursa
- Differentiating pathology

Improper Arm Position:
- Inadequate internal rotation/extension
- Supraspinatus is hidden beneath acromion

Improper Positioning: supraspinatus

Incomplete Evaluation of Supraspinatus:
- Scan entire width of greater tuberosity
- Many tears occur anteriorly over superior facet
- Include biceps on transverse image as landmark

Disclosures
- Consultant: Bioclinica
- Advisory Board: Philips
- Book Royalties: Elsevier
- Not relevant to this talk

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Incomplete Evaluation of Supraspinatus

Internal Rotation

Short Axis US

Incomplete Evaluation of Supraspinatus

Long Axis

Long Axis

Transverse Imaging: supraspinatus

- Uniformly thins over greater tuberosity
- Cuff absent beyond greater tuberosity
- Confirm with orthogonal longitudinal imaging

Transverse Imaging: supraspinatus

Short Axis

Anisotropy: supraspinatus

Long Axis

Anisotropy: supraspinatus

Short Axis
Articular Partial-thickness Tear: supraspinatus

Cuff Tear Measurement: change with position

Crass Position
Modified Crass Position
*May over-estimate measurement of cuff tear

Ferri, AJR 2005; 184:180

Misinterpretation of Rotator Interval:
• Intra-articular portion of biceps tendon
• Hyperechoic
• Adjacent hypoechoic gap*
• May simulate tear

*Middleton et al. AJR 1986; 146:555

Musculotendinous Junction:
• Supraspinatus: several distinct tendons
• Appears as hypoechoic area extending into tendon
• Usually terminates by mid-tendon
• Characteristic tapering from proximal to distal

Turrin et al. Skeletal Radiology 1997; 26:89

Musculotendinous Junction: supraspinatus

Long Axis Short Axis

BT Subscap Humerus
Musculotendinous Junction:
- Subscapularis: several distinct tendons
- Appears as hypoechoic area extending into tendon
- Heterogeneous to lesser tuberosity

Supraspinatus - Infraspinatus Junction
- Converging fibers – posterior
  - Over middle facet of greater tuberosity
- Hypoechoic fibers: anisotropy
- Regular intervals

Subacromial-subdeltoid Bursa:
- Hyperechoic synovium may appear similar to tendon fibers
- Hyperechoic thickness that extends beyond greater tuberosity is synovium and not cuff fibers

From: Chang EY et al. AJR 2014; 202:w376
Bursal Thickening Simulating Intact Cuff

Bursal Partial-thickness Tear: supraspinatus

Pseudofibers with full-thickness tear:
- Hyperechoic and fibrillar
- Typically thinner than normal cuff
- Extends beyond greater tuberosity

Tendon Tear versus Tendinosis

*both may appear hypoechoic

Tear
- Anechoic
- Well-defined
- Homogeneous
- Thinned
- Bone irregularity*

Tendinosis
- Hypoechoic
- Ill-defined
- Heterogeneous
- Swollen
- Smooth cortex

*At supraspinatus tendon footprint in patients over 40 years old
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

Outline:
- Calcific tendinosis: isoechoic
- Deltoid fascia: shadow
- Aponeurotic expansion of supraspinatus

Calcific Tendinosis
- Formative: Defined, shadow
- Resorptive: Amorphous, little shadow

Calcific Tendinosis: supraspinatus
Use of Tendon Anisotropy

Pitfall Alert!
Deltoid fascia shadow
- Deltoid fascia
- Between segments of deltoid muscle
- Shadow: simulate biceps tendinosis
- Correct: move transducer to project shadow away

Biceps Brachii: short axis
Aponeurotic Expansion of Supraspinatus Tendon

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

Take-home Points

- Incomplete evaluation of cuff
- Anisotropy: focal versus partial tear
- Tear versus tendinosis
  - Indirect signs of cuff tear
  - Cortical irregularity (supraspinatus)
  - Volume loss or tendon thinning

Syllabus on line and other educational material:
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