

Standardized scanning of the shoulder: normal and basic pathological findings

**MUSCULOSKELETAL ULTRASOUND COURSE FOR
RHEUMATOLOGIST- BASIC LEVEL**

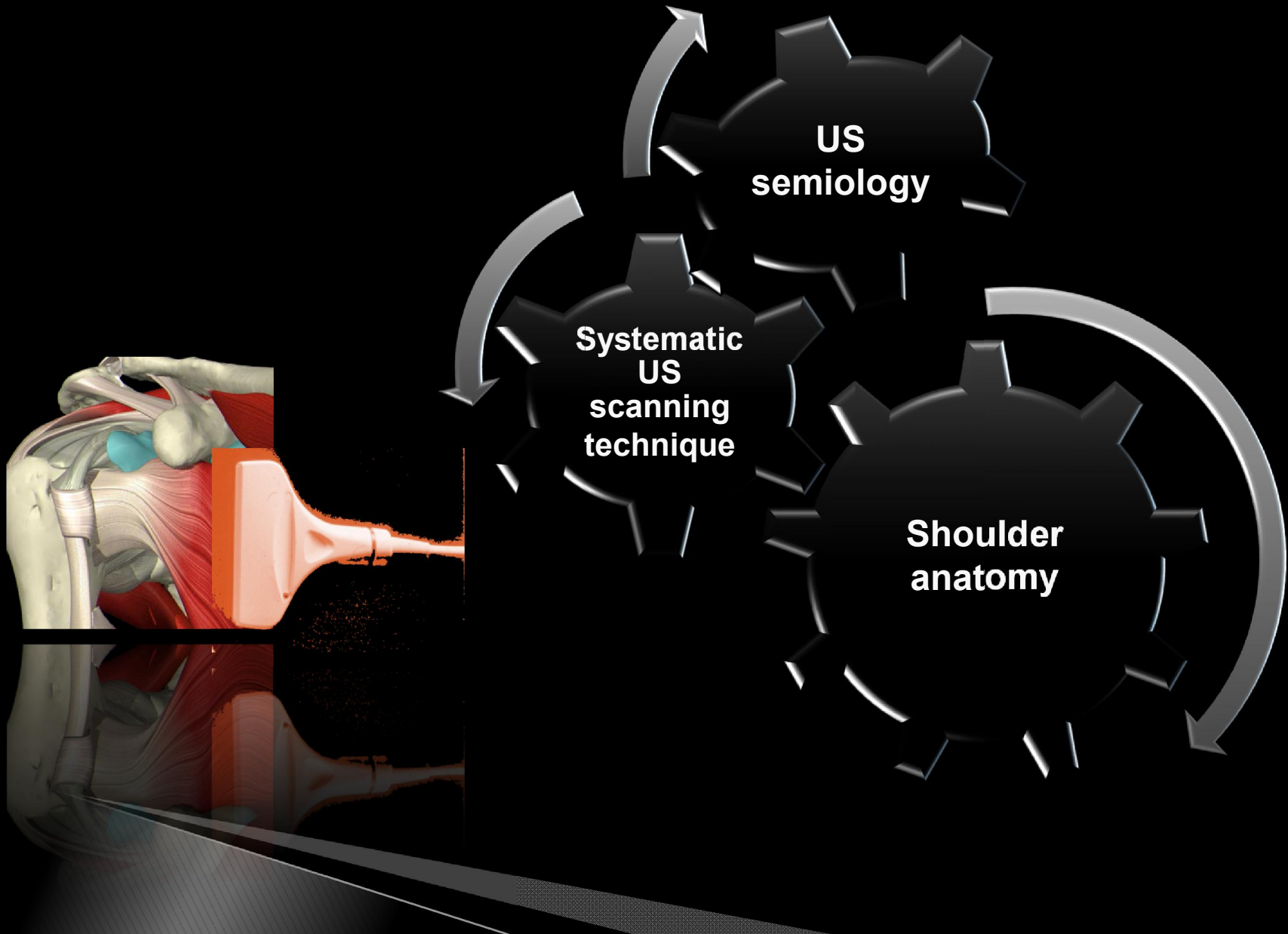
14-16 January 2016, Plovdiv, Bulgaria

***Esperanza Naredo
Rheumatology Department,
Hospital GU Gregorio Marañón, Madrid,
Spain***

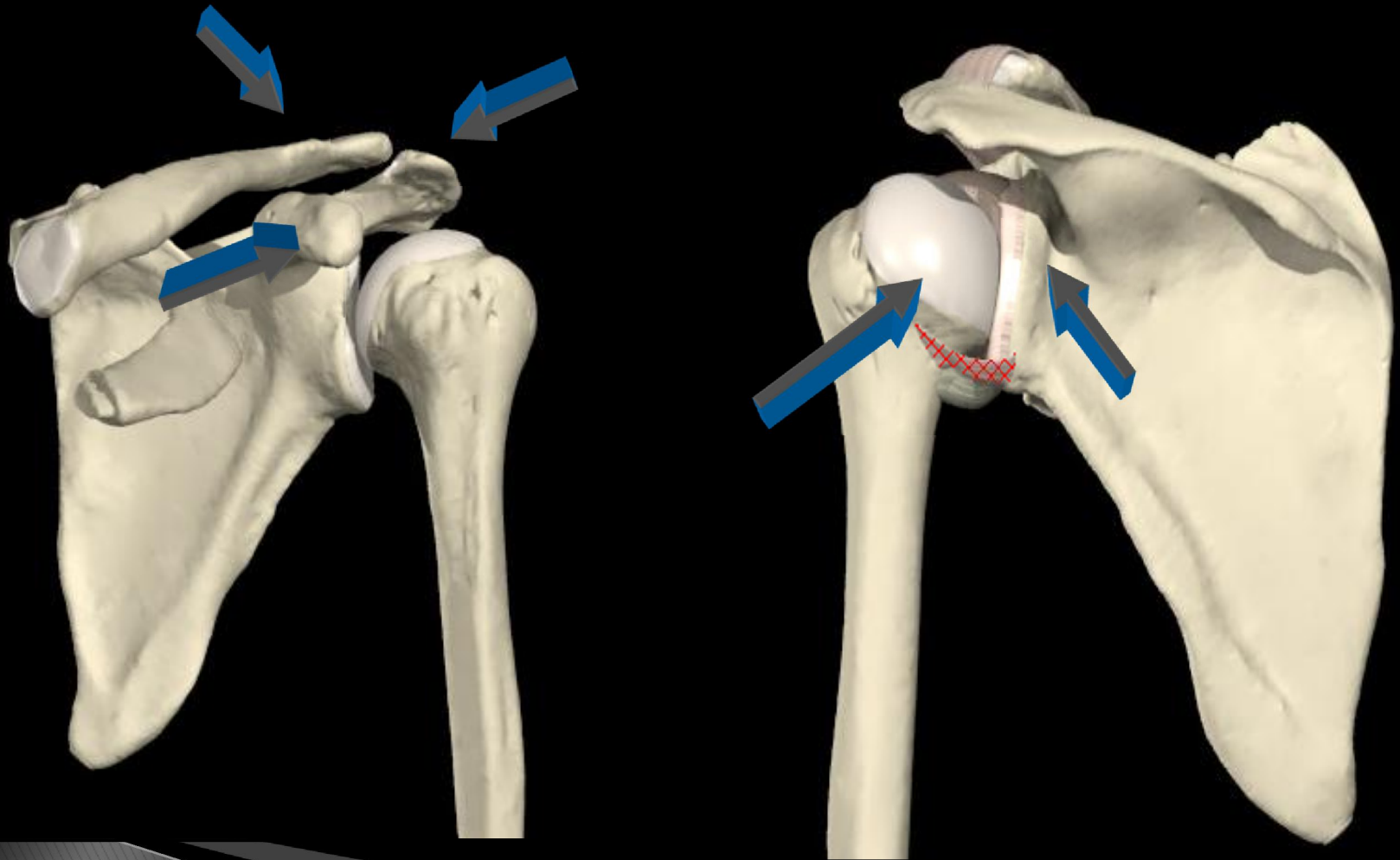
Disclosures

**Speaker fees from Abbvie, Roche Farma,
BMS, Pfizer, UCB and Novartis**

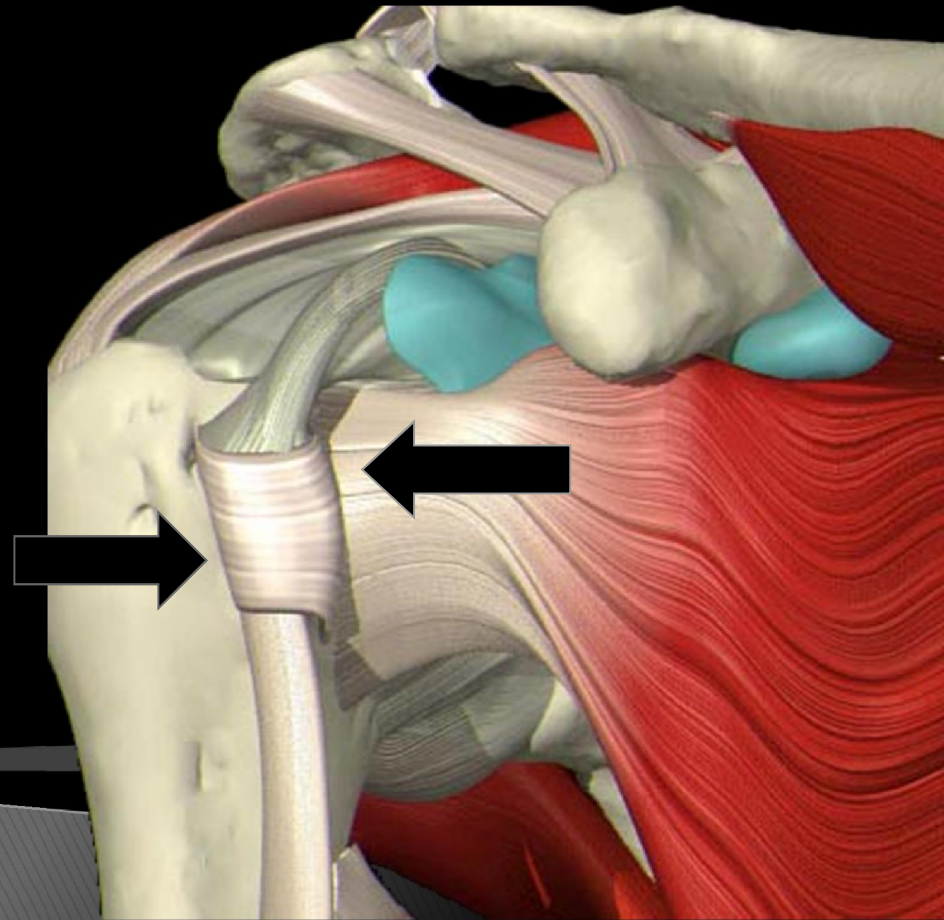
Shoulder US



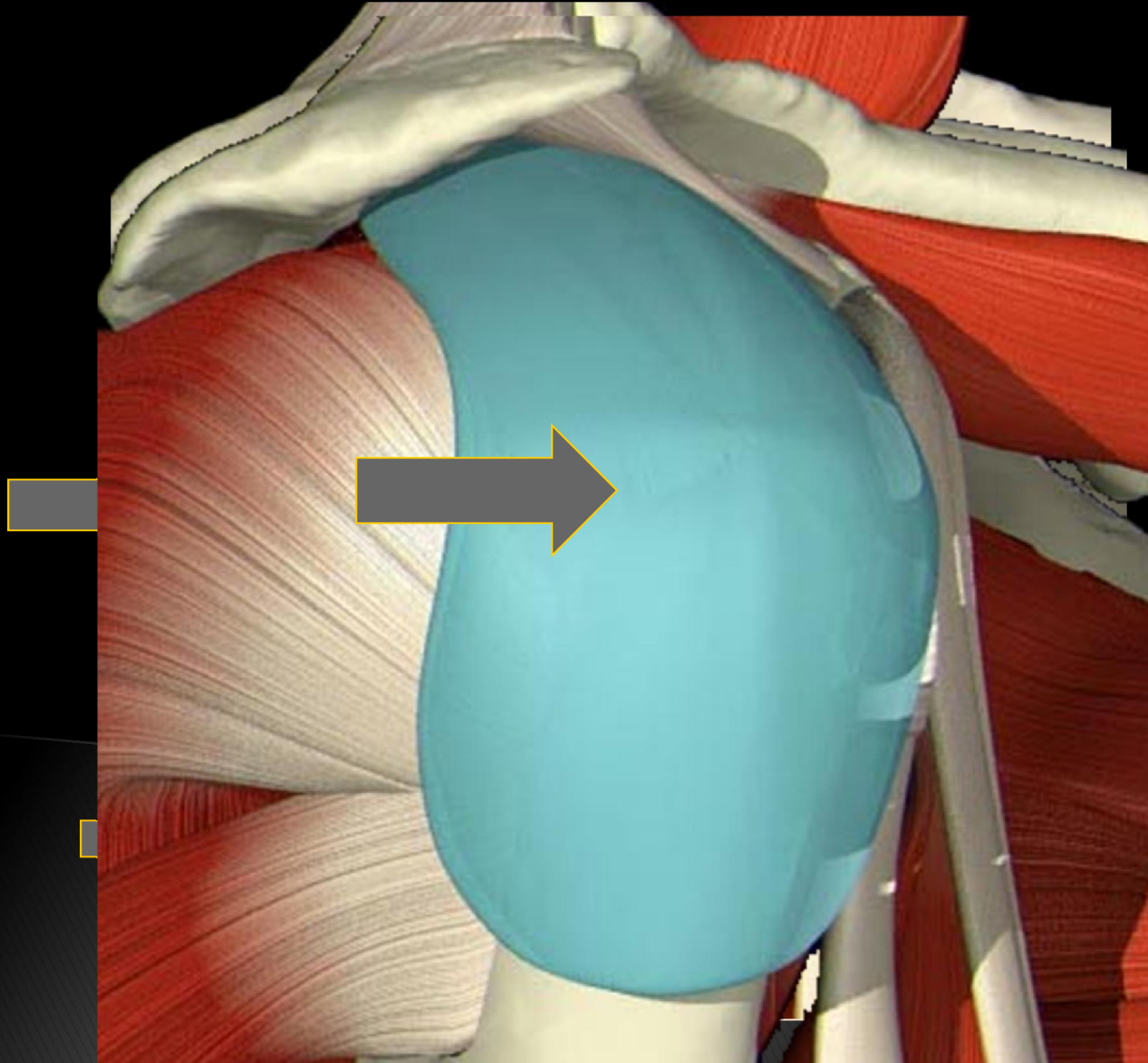
Shoulder anatomy. Bony landmarks



Anterior shoulder

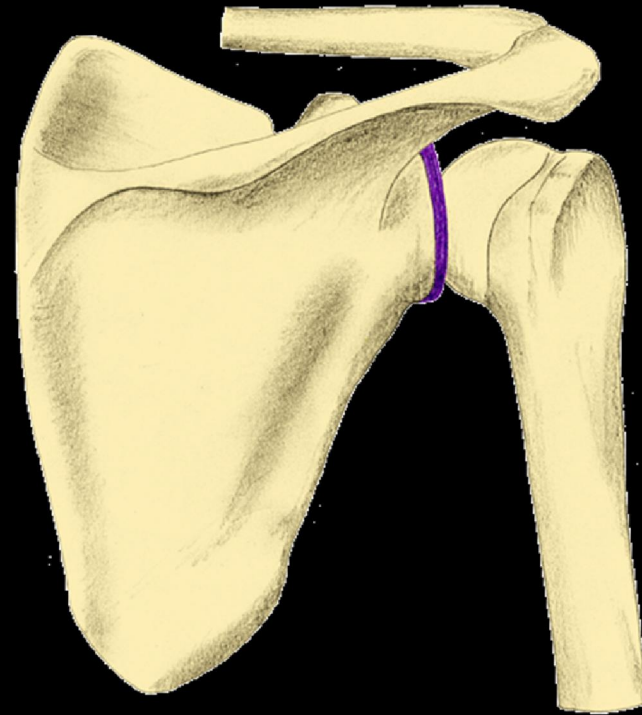


Lateral shoulder



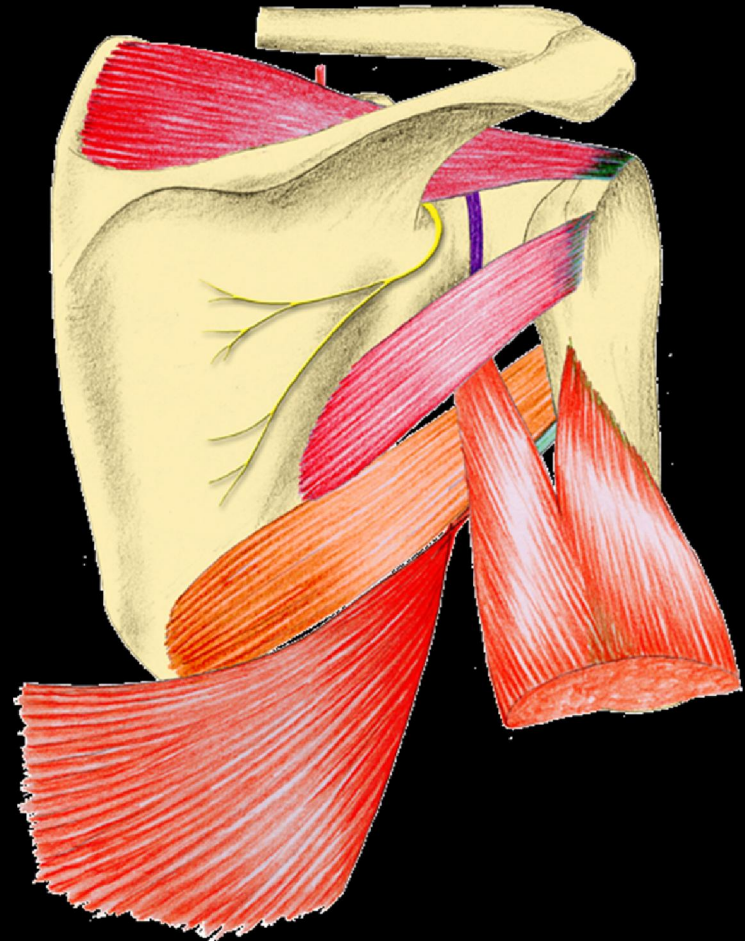
Posterior shoulder

Glenoid labrum



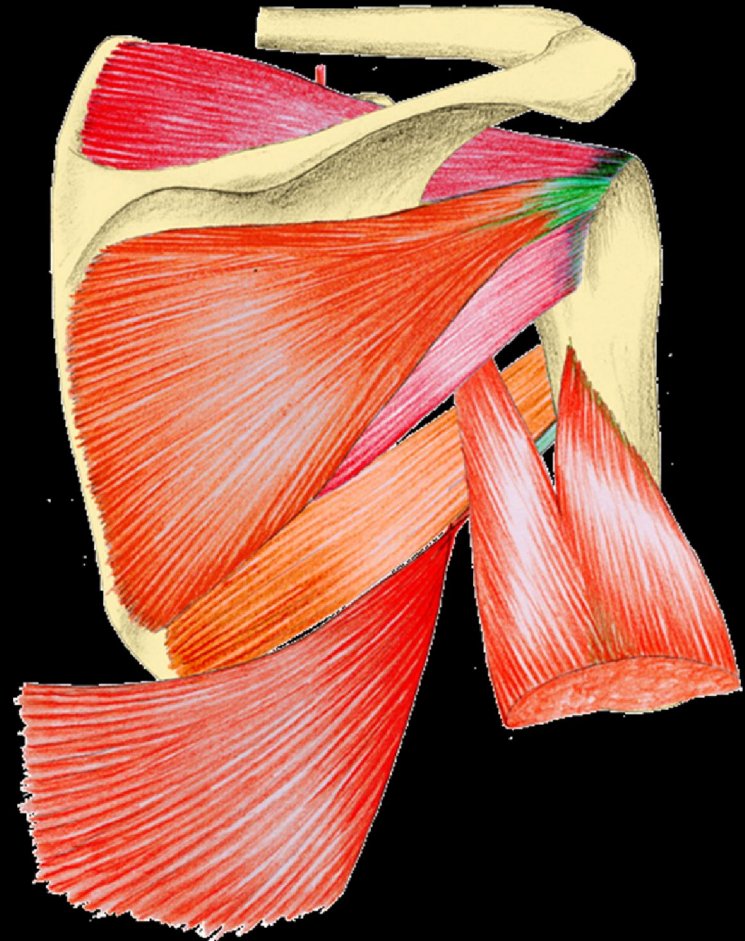
Posterior shoulder

Supraspinatus



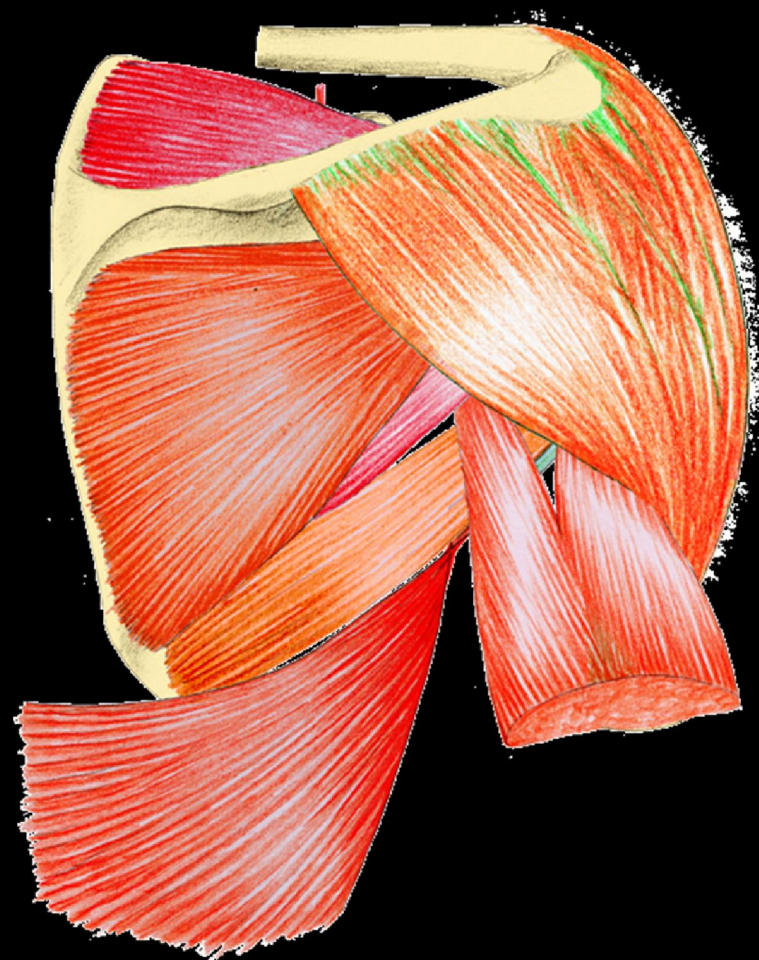
Posterior shoulder

Infraspinatus



Posterior shoulder

Deltoid muscle



Examination technique

EULAR guidelines (Backhaus M, ARD 2001)

Musculoskeletal Ultrasound Society (M. van Holsbeeck, JA Bouffard, et al)

European Society of Musculoskeletal Radiology

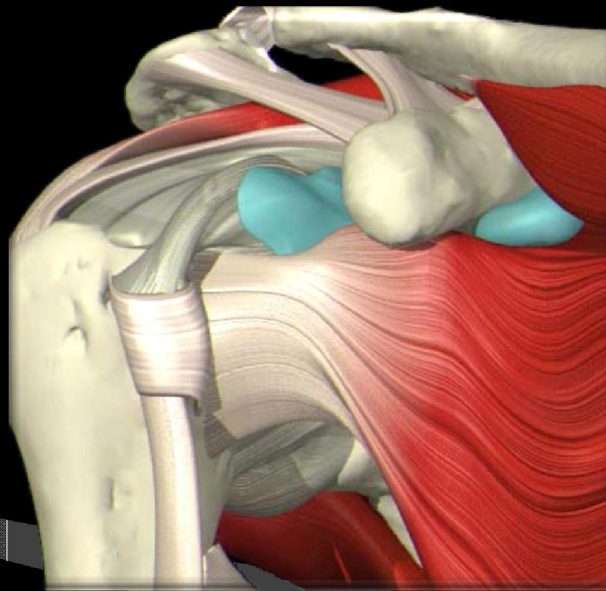
- **Biceps tendon**
- **Subscapularis tendon**
- **Acromioclavicular joint**
- **Supraspinatus tendon**
- **Infraspinatus tendon**
- **Posterior examination**
- **Axillar examination**

(Sit higher than the patient)



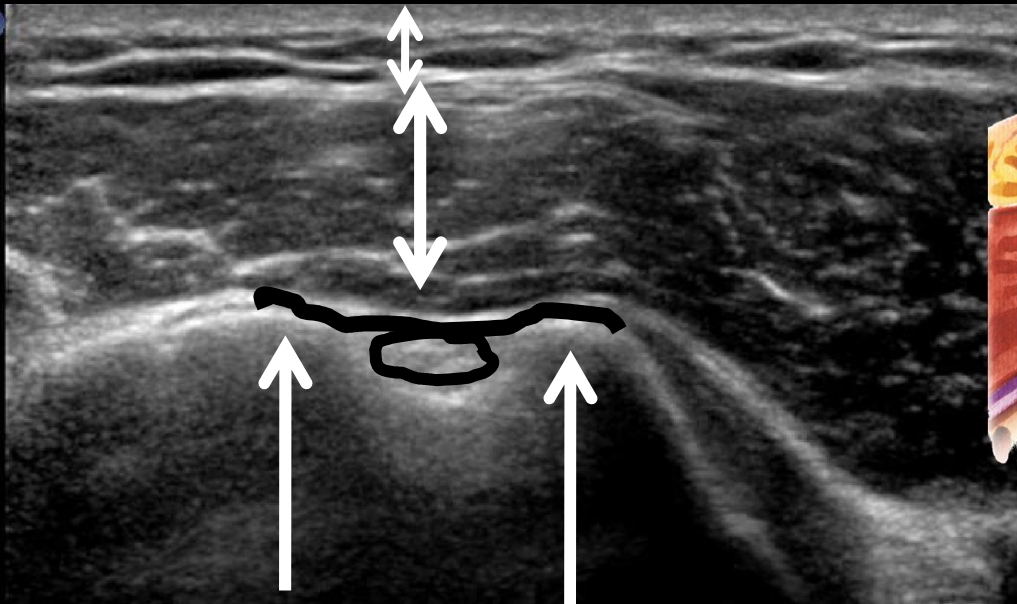
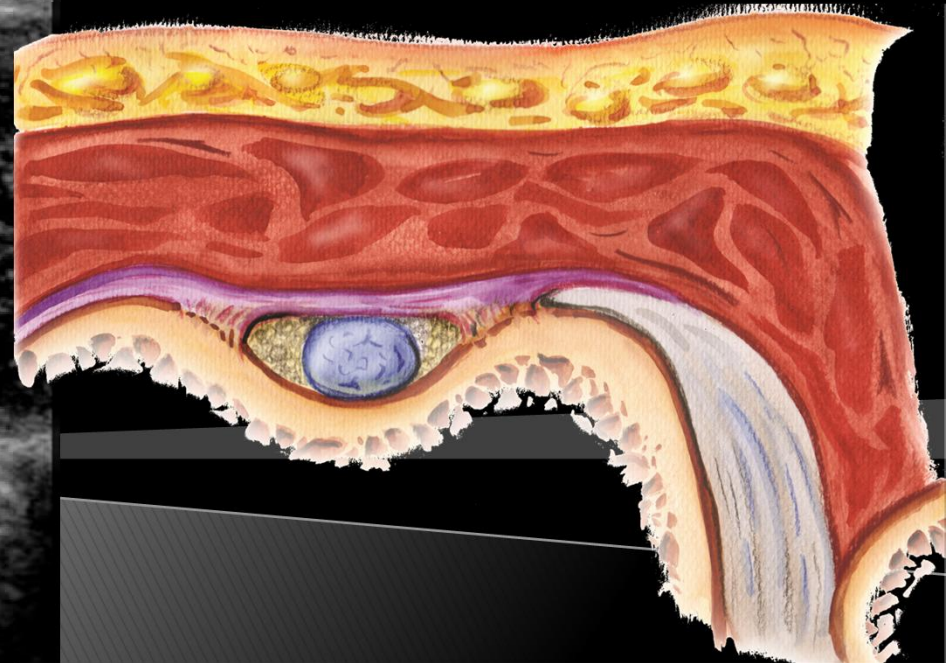
Anterior shoulder

- Biceps tendon
- Subscapularis tendon
- Acromio-clavicular joint
- Coracoacromial ligament



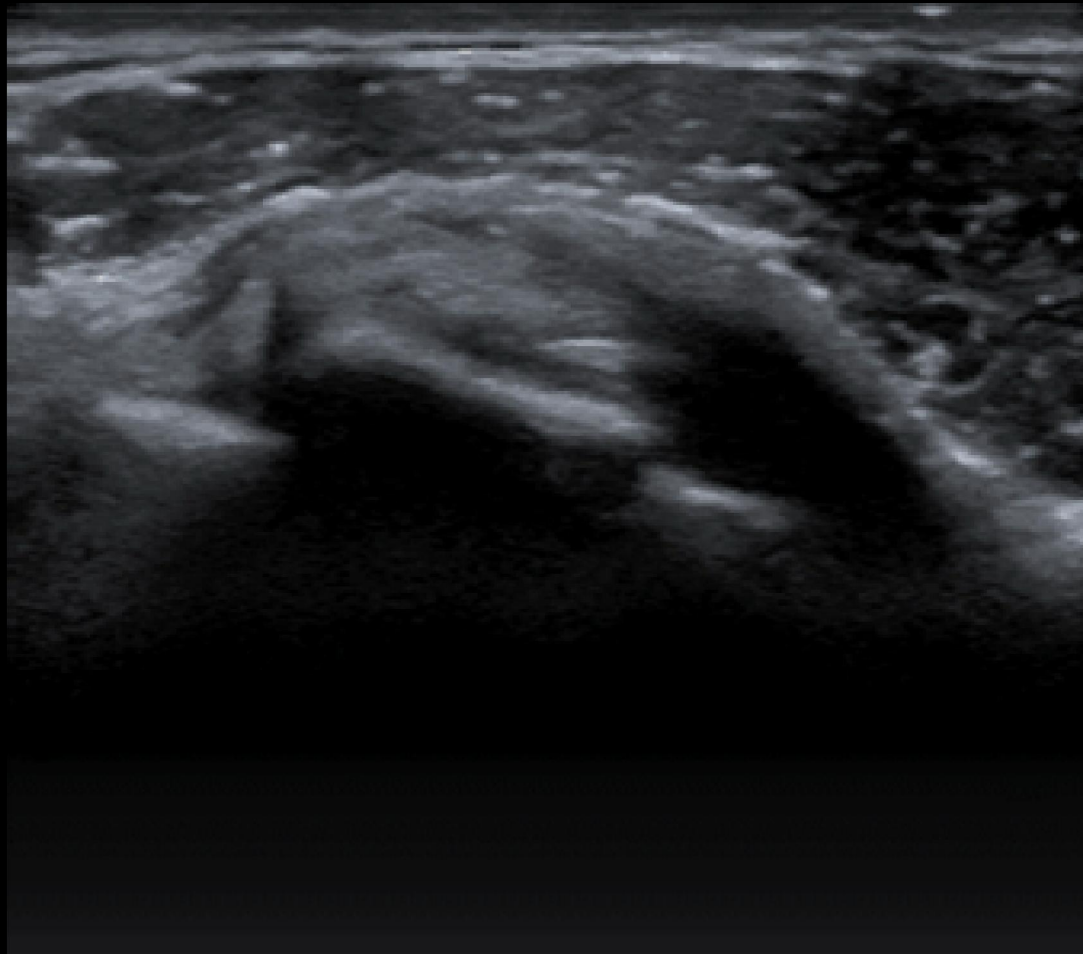
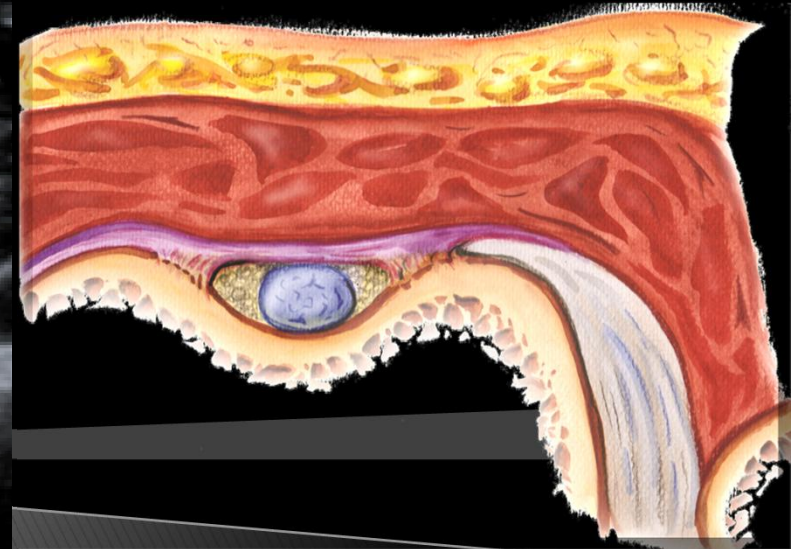


Biceps tendon, transverse
elbow flexed , forearm resting on
their lap and palm up

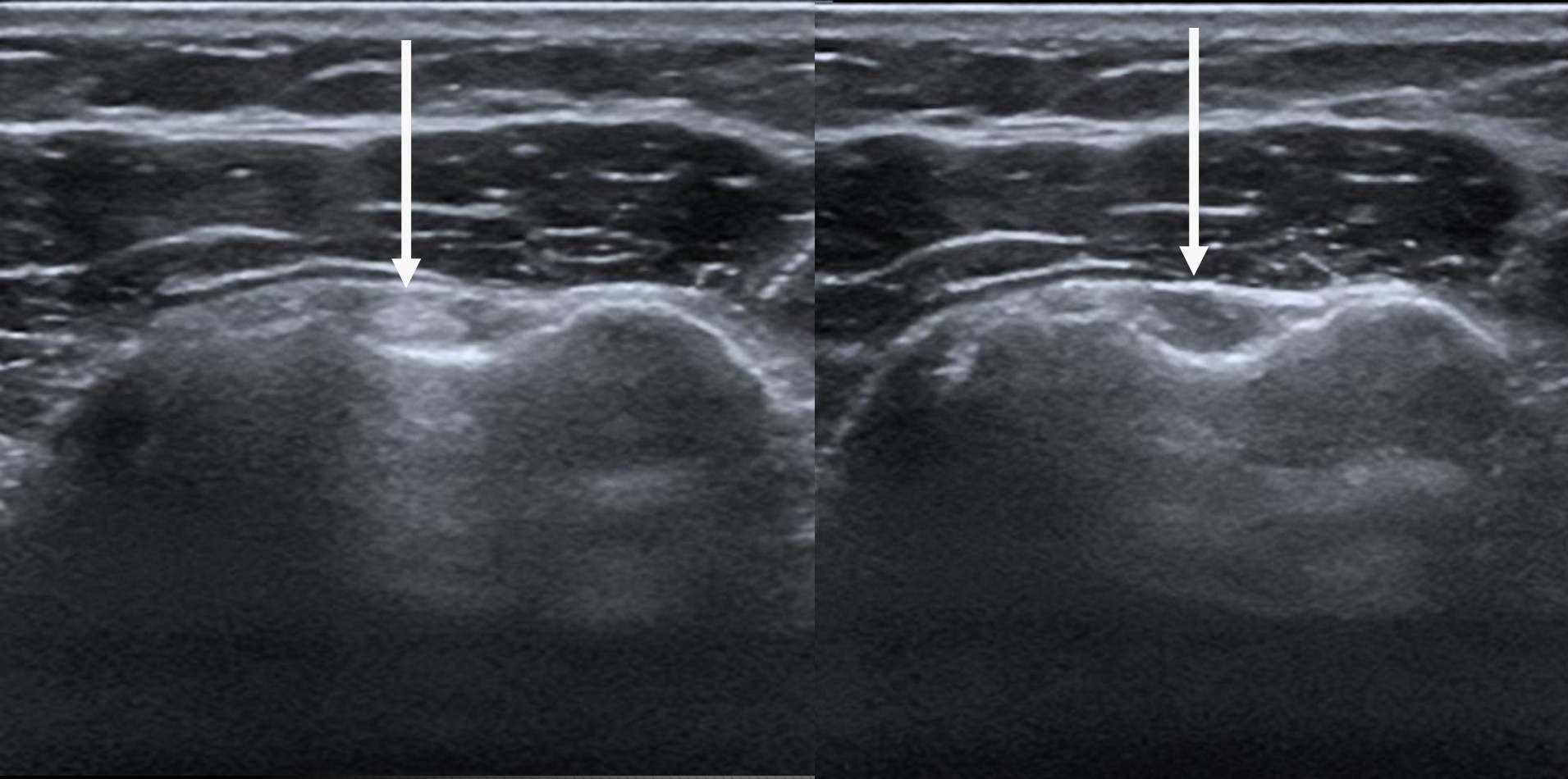




Biceps tendon, transverse
elbow flexed , forearm resting on
lap and palm up



Anisotropy!

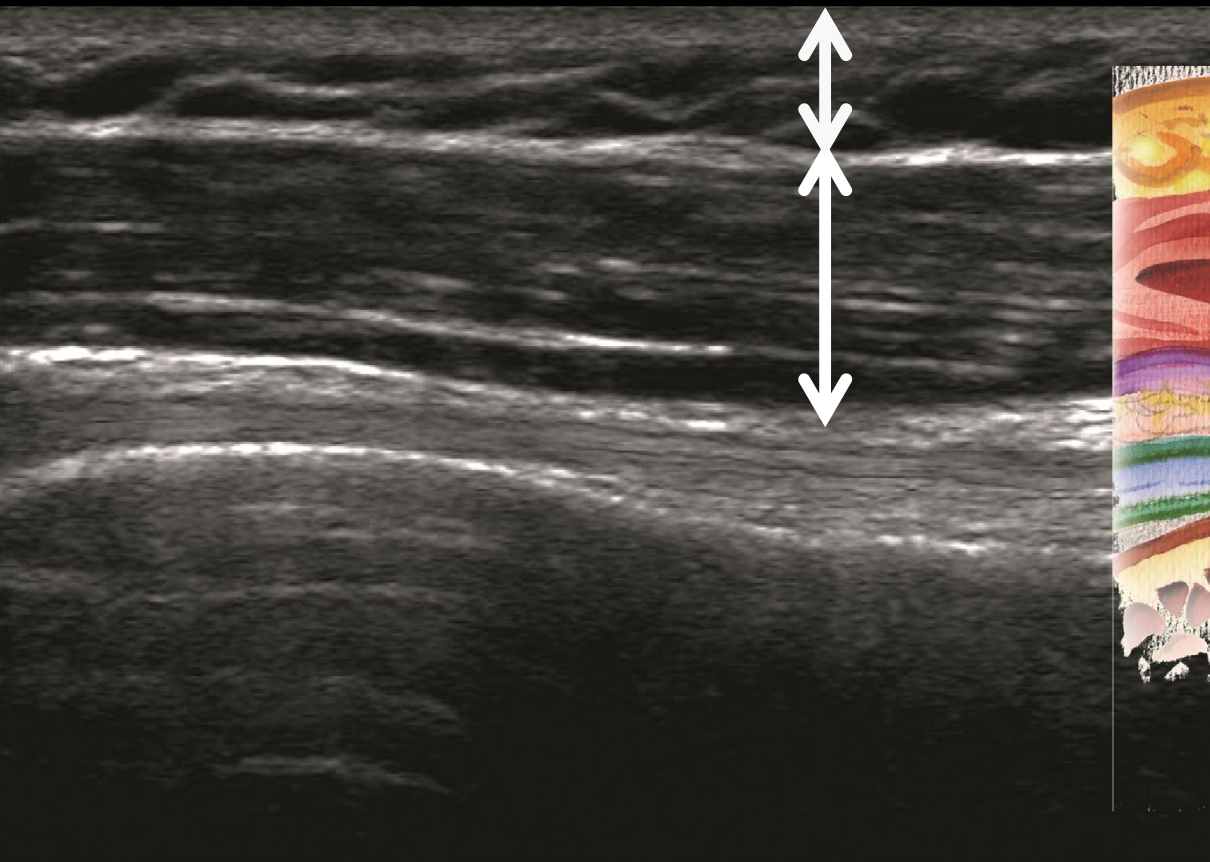
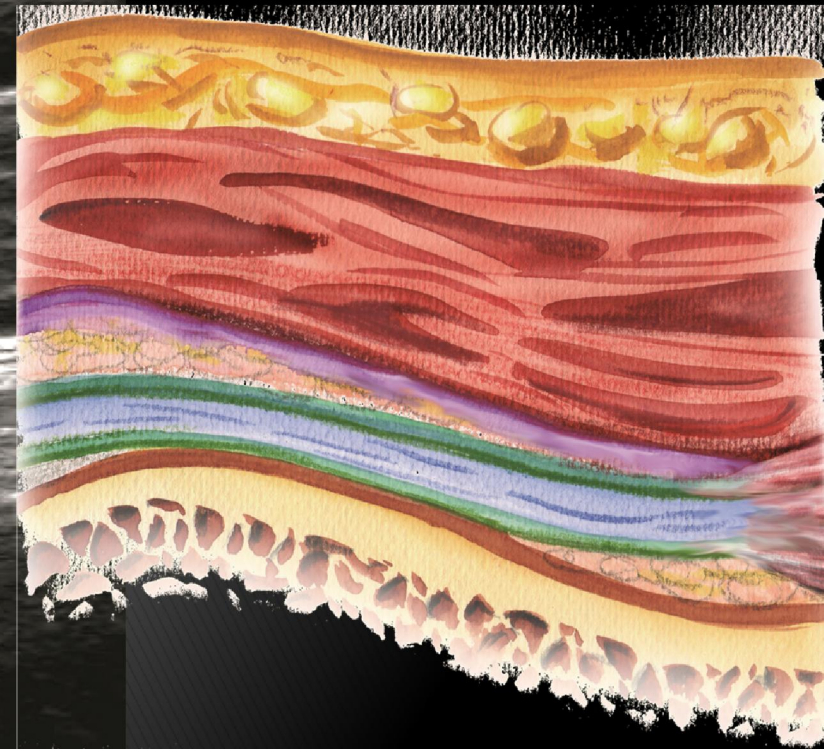


Biceps T. trans

The probe should be maintained perpendicular to the tendon

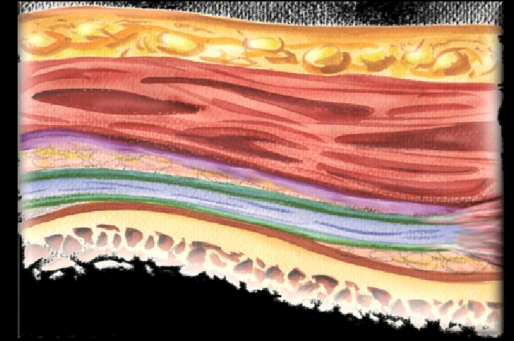
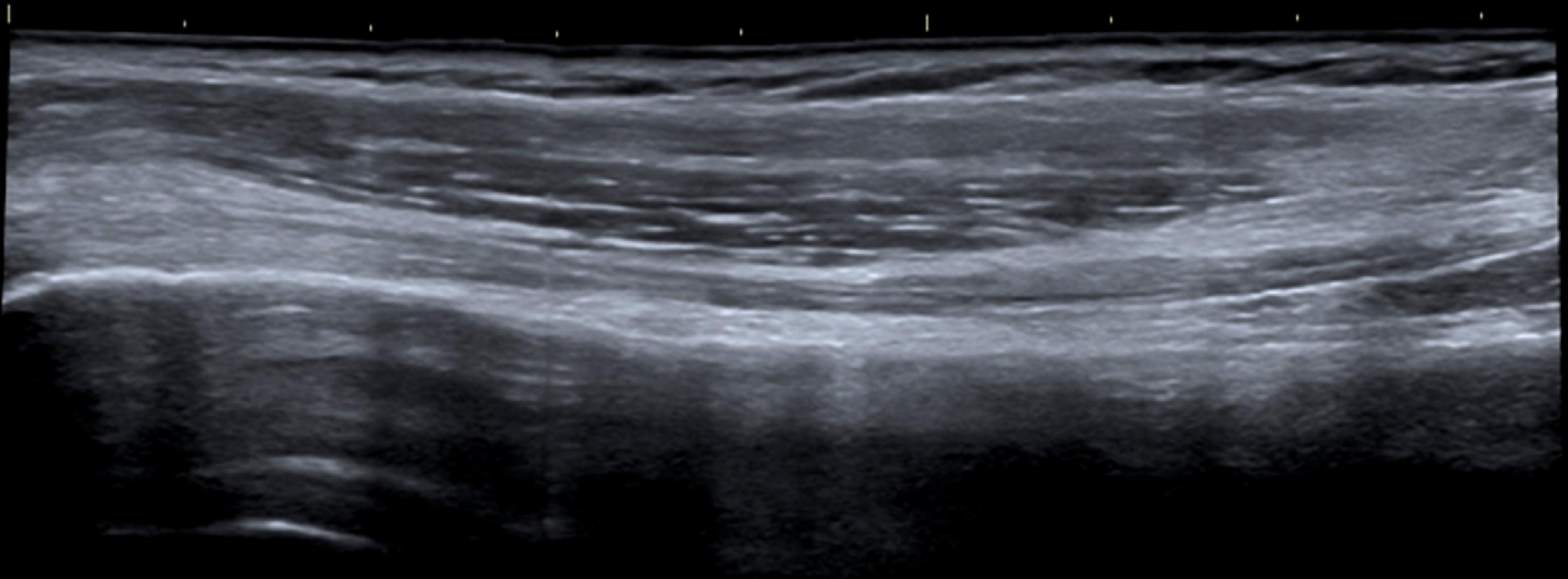


Biceps tendon, longitudinal
elbow flexed , forearm resting on
lap and palm up



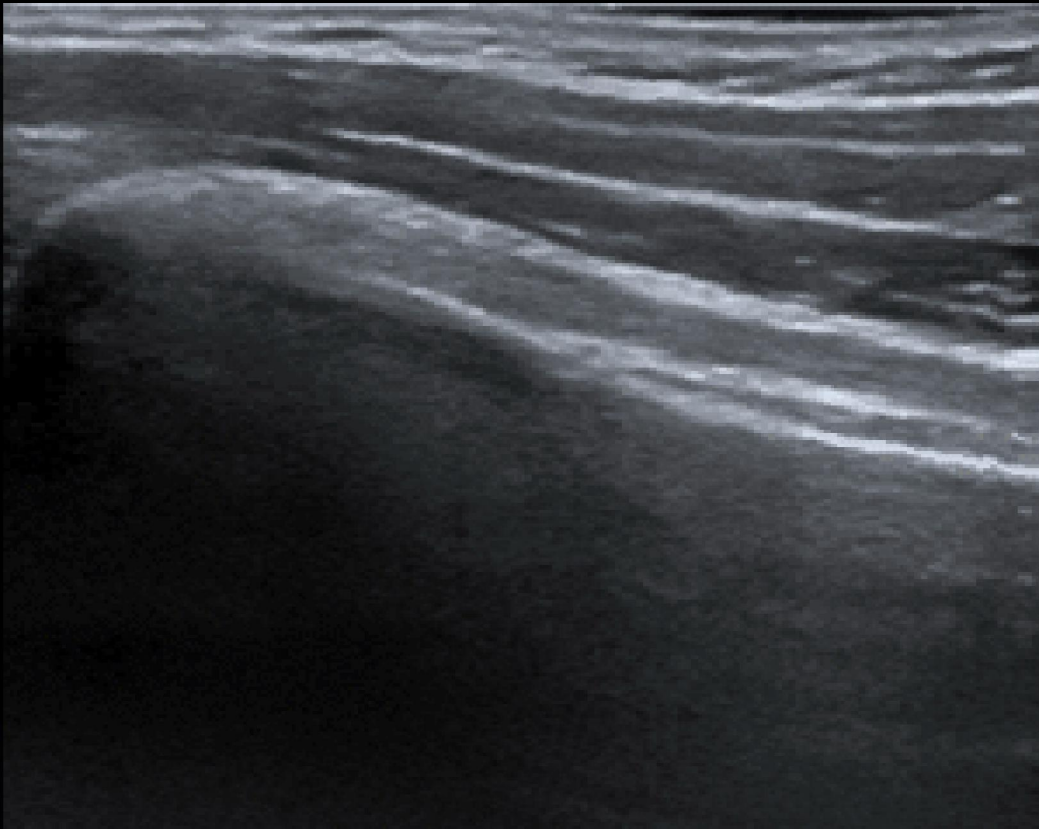
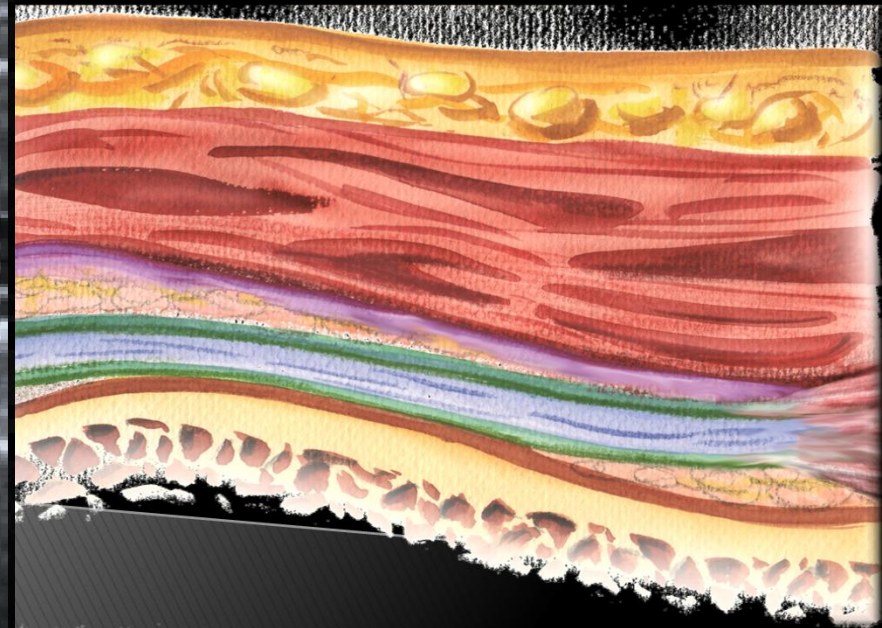


Biceps tendon, longitudinal
elbow flexed , forearm resting on
lap and palm up

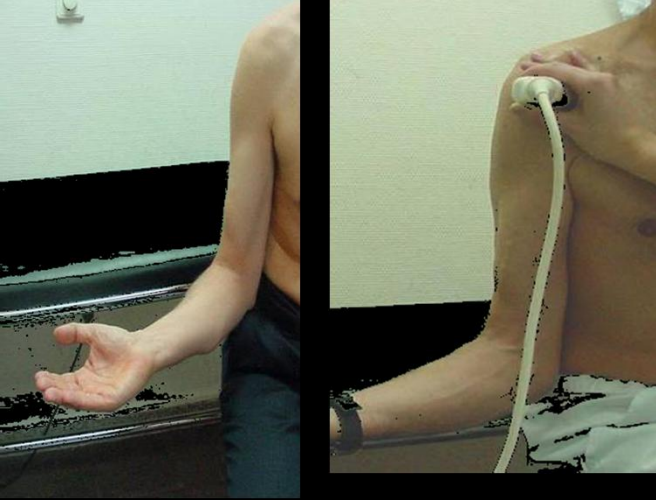
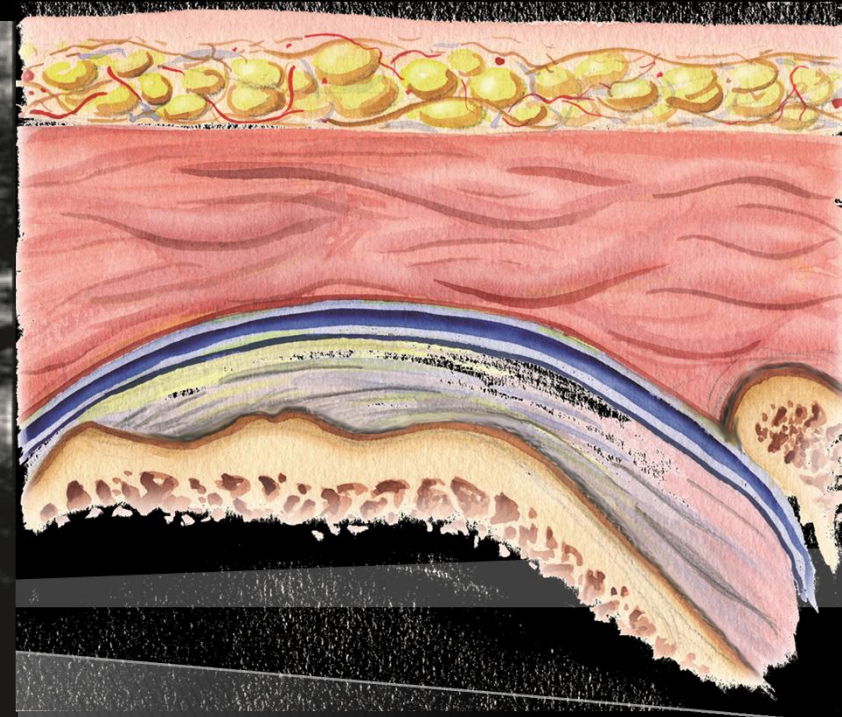




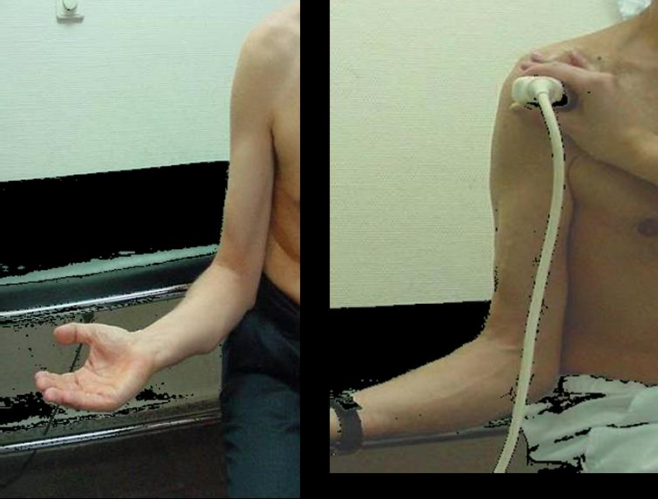
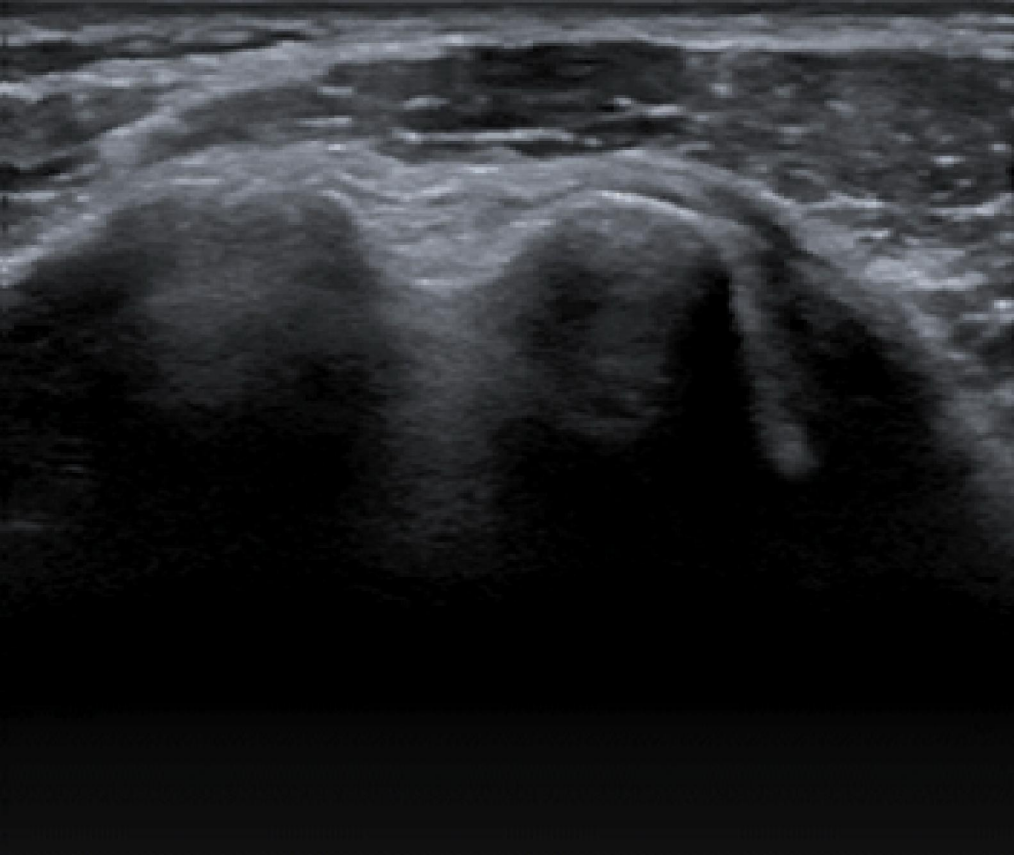
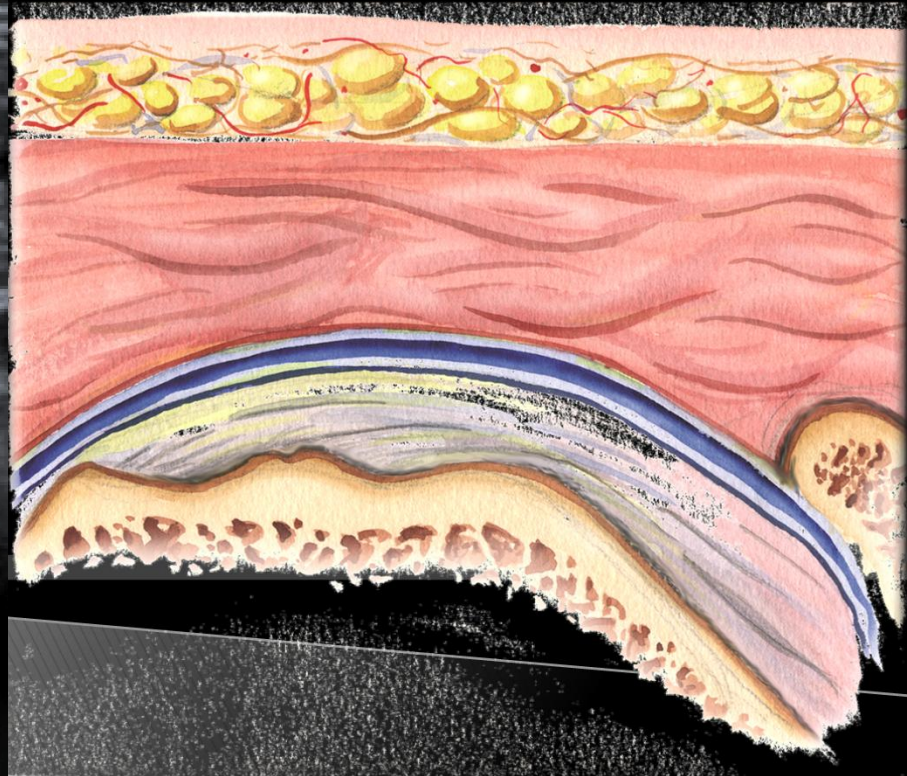
Biceps tendon, longitudinal
elbow flexed, forearm resting on
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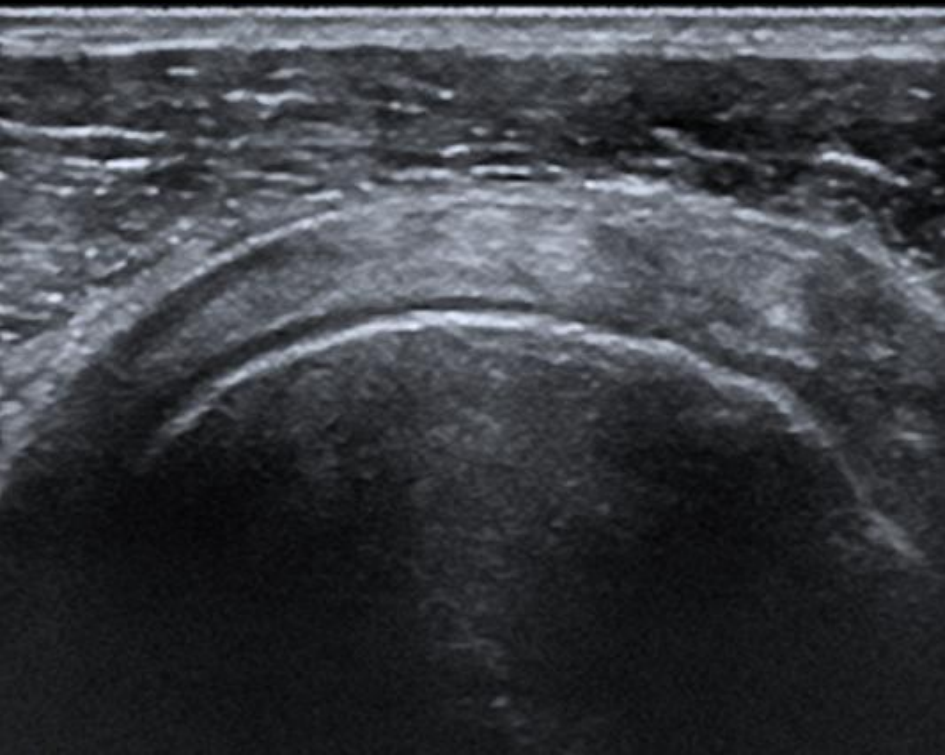
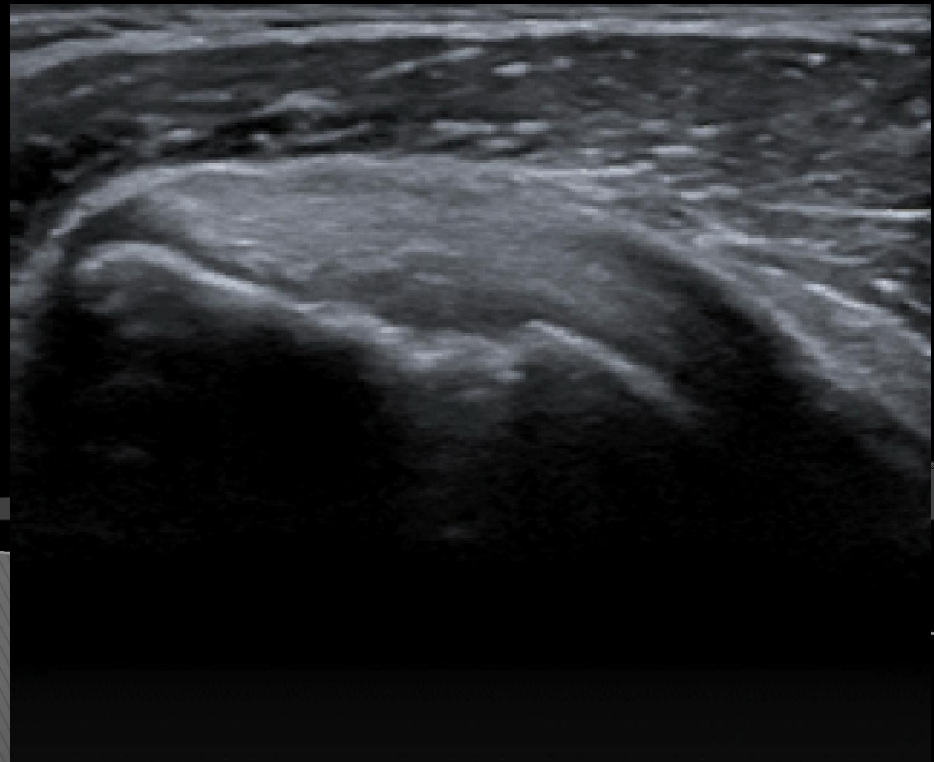
Subscapularis tendon, long external rotation



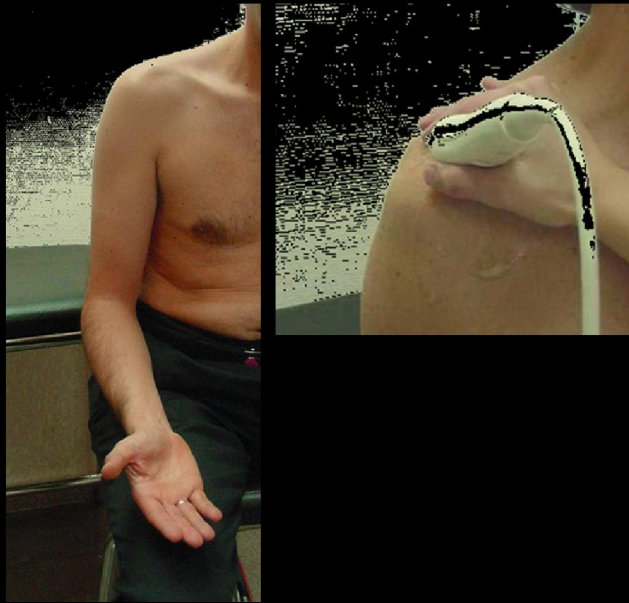
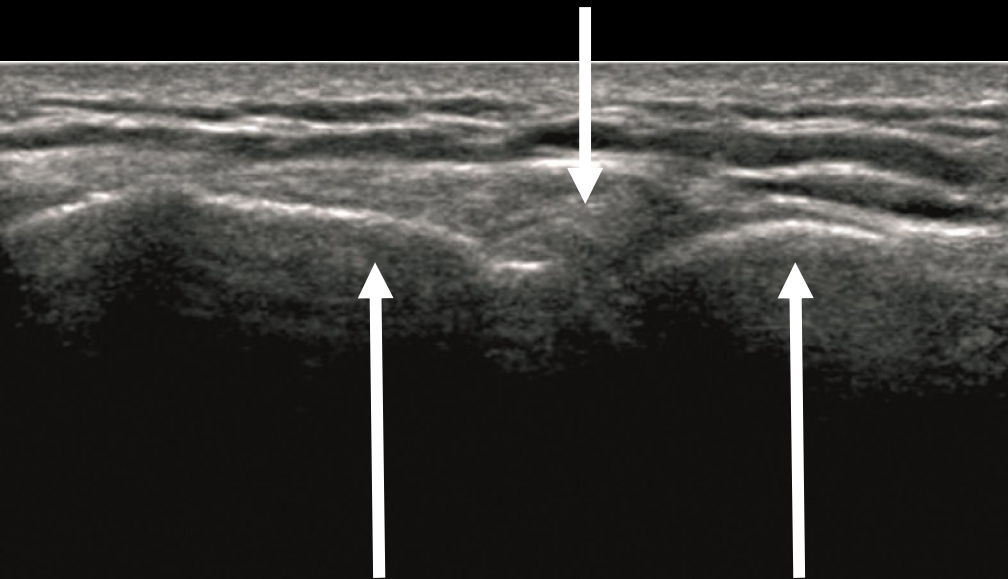
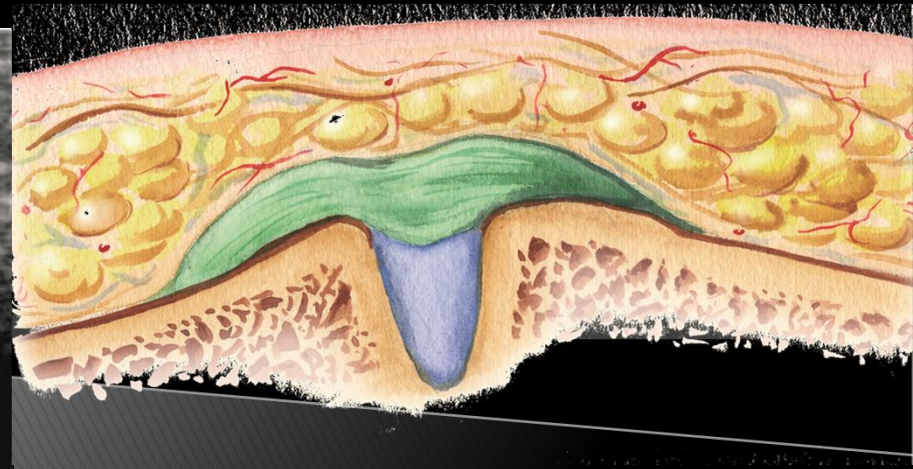
Subscapularis tendon, long external rotation



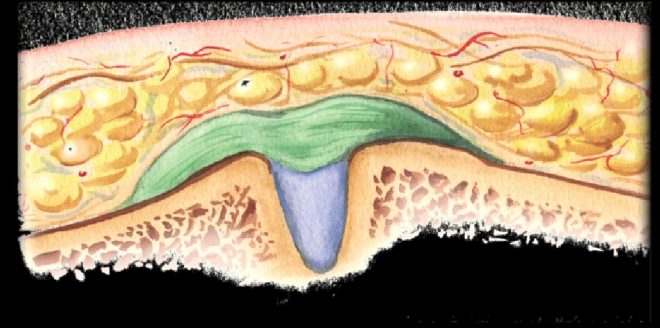
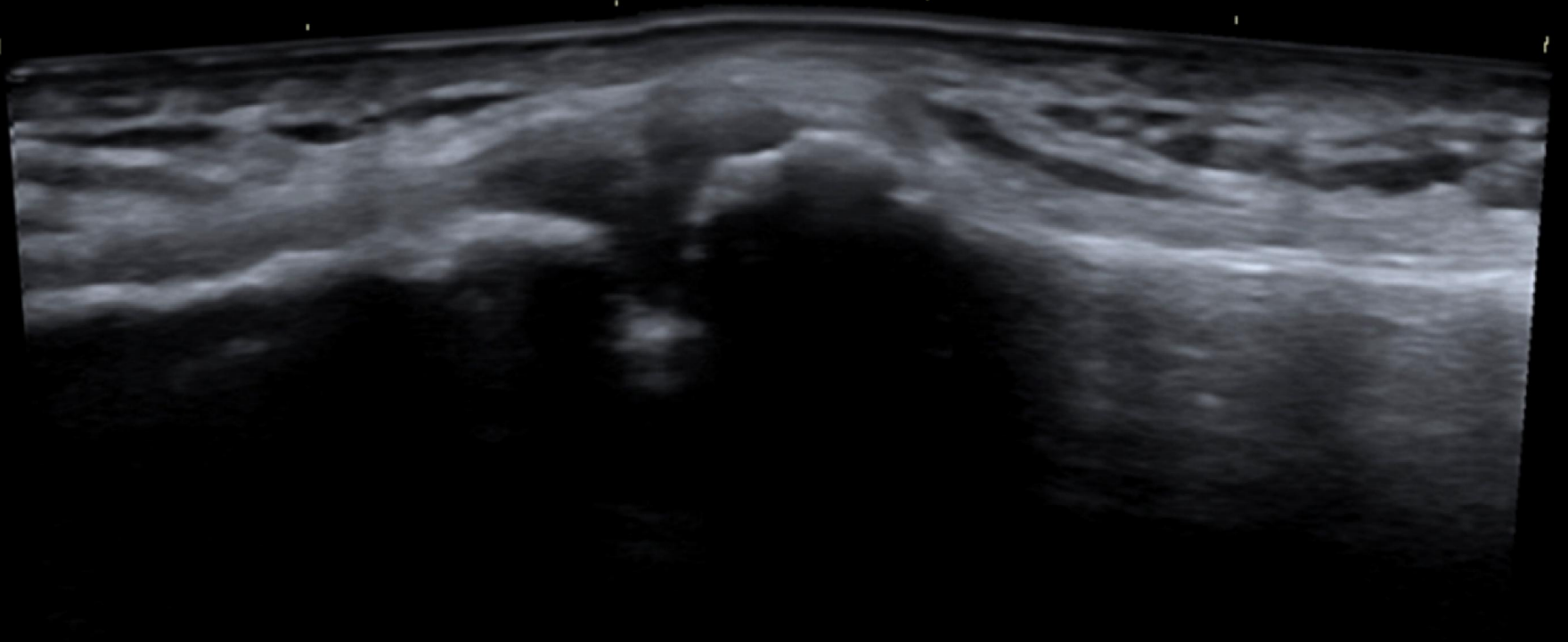
Subscapularis tendon, trans external rotation



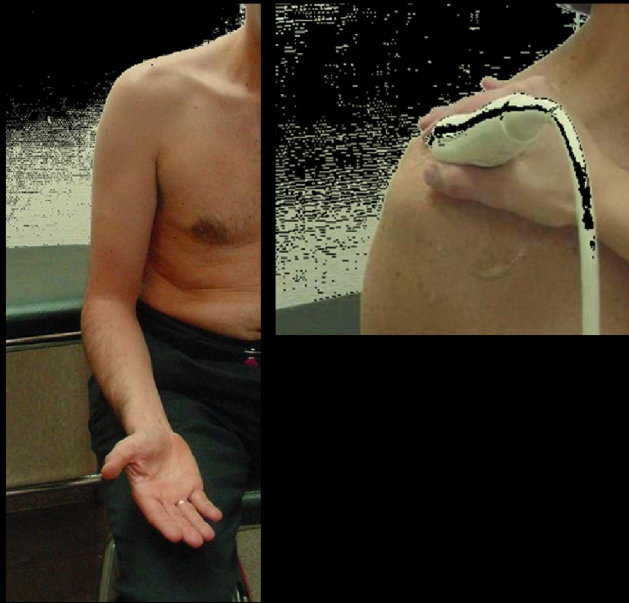
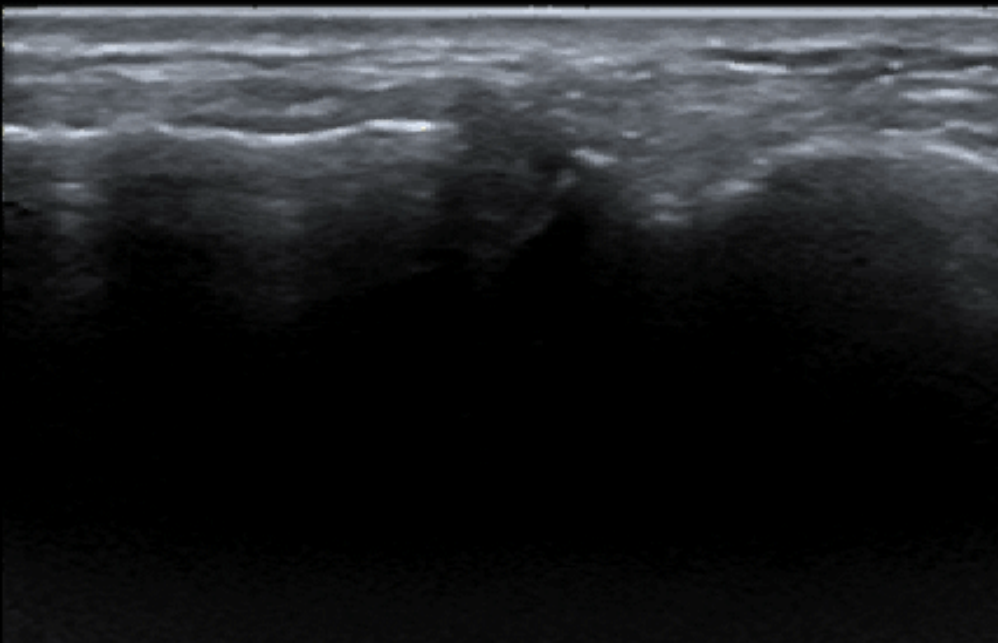
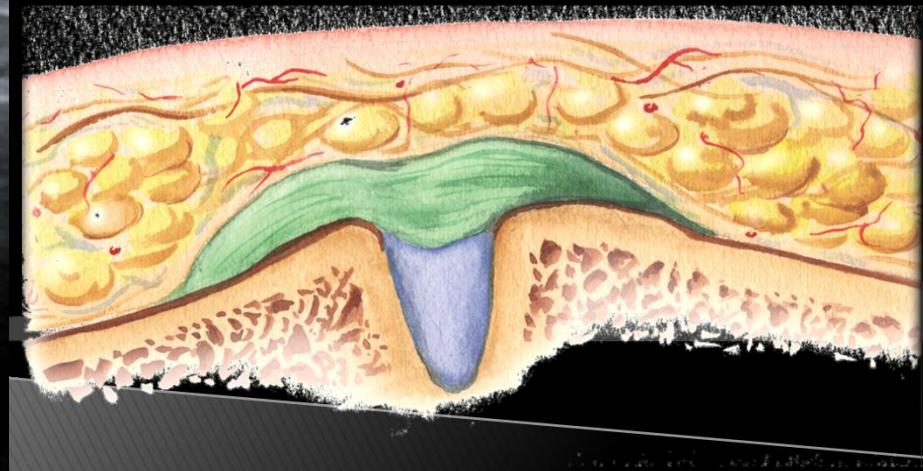
Acromioclavicular J, longitudinal



Acromioclavicular J, longitudinal

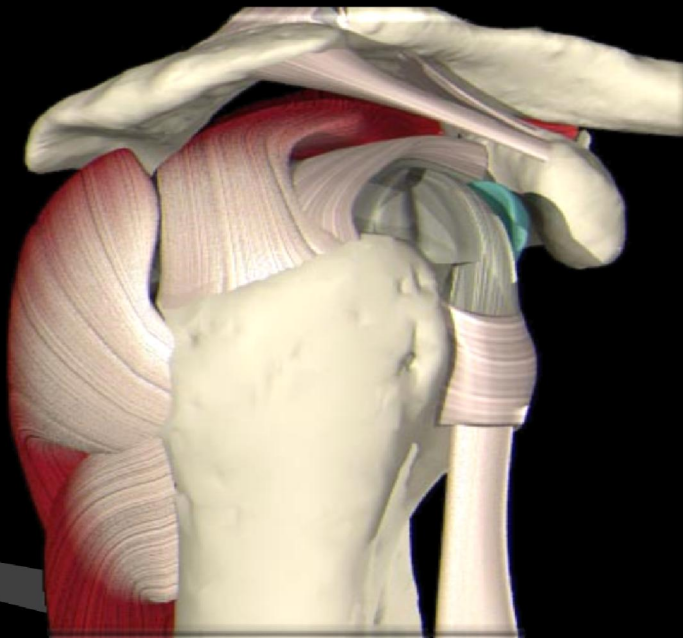


Acromioclavicular J, longitudinal



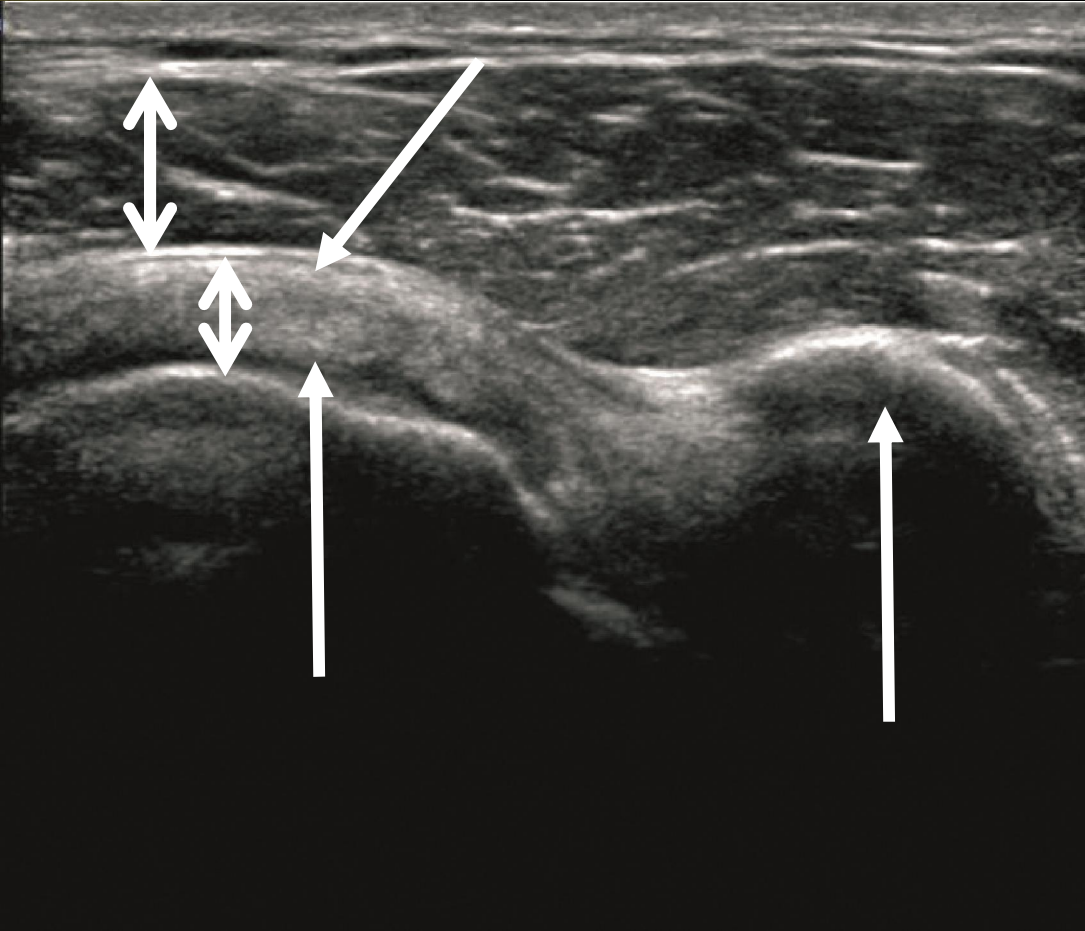
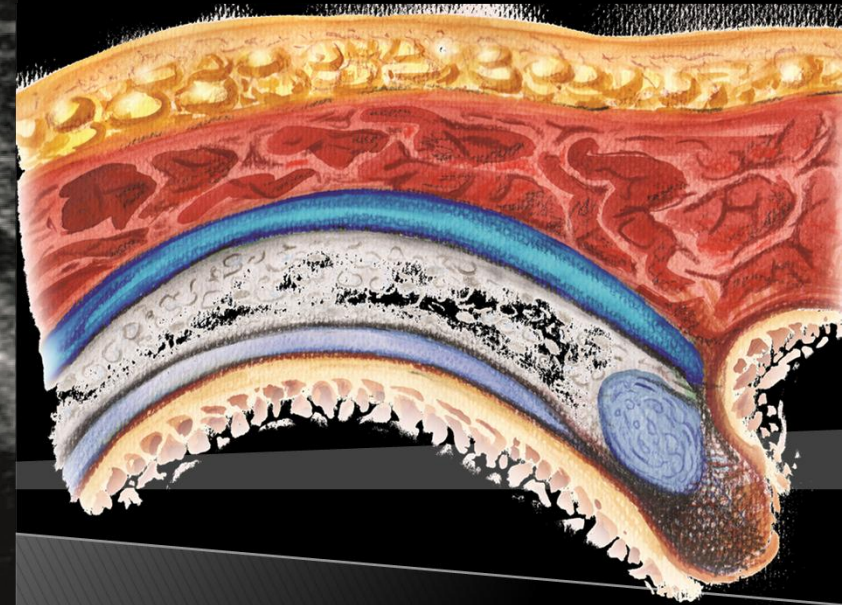
Lateral shoulder

- Supraspinatus tendon infraspinatus tendon
- Subacromial-subdeltoid bursa
- Humeral cartilage
- Humeral head: cortical profile



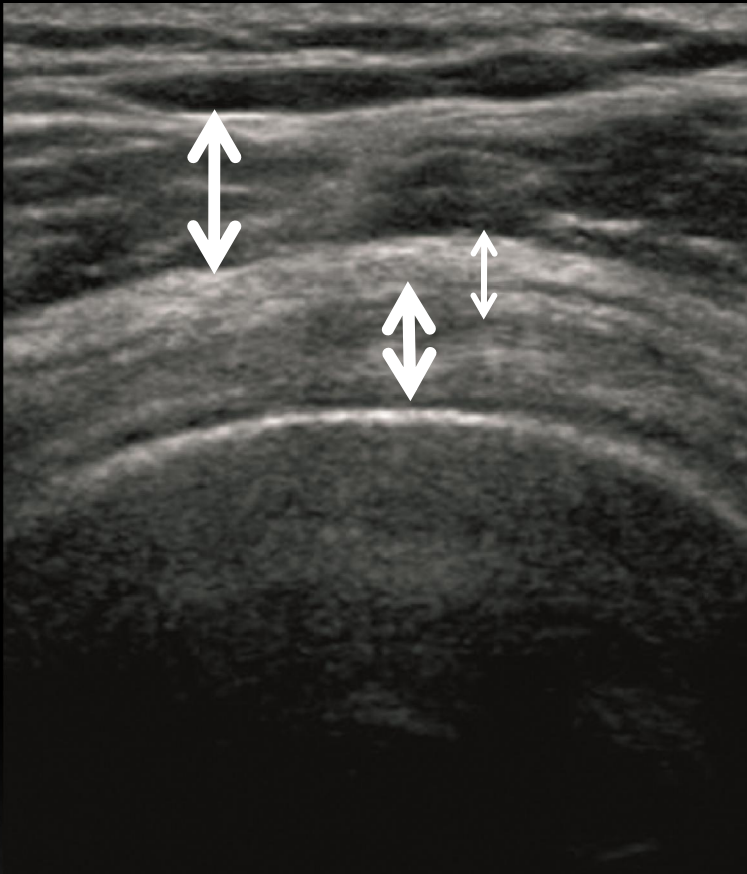
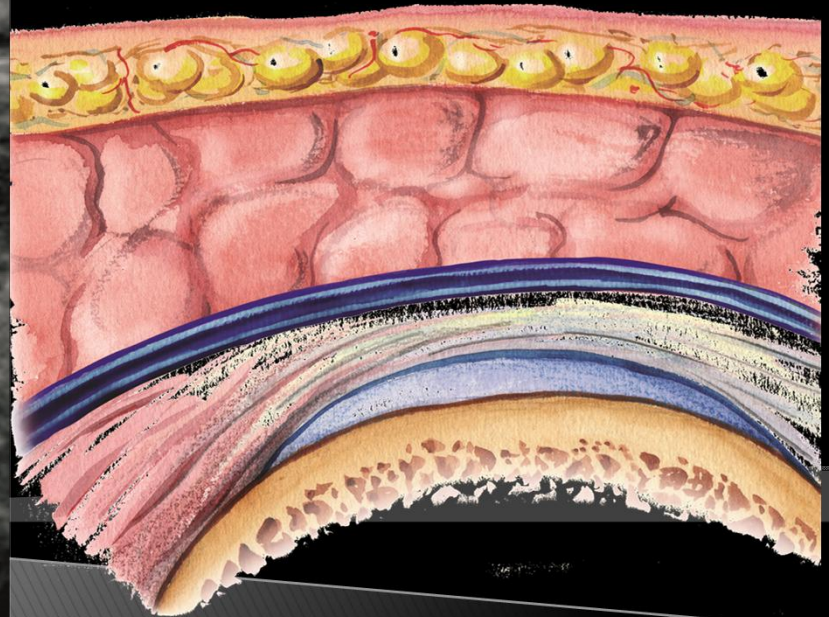


Supraspinatus tendon, trans
full internal rotation and adduction
Crass (1988) and Middleton (1992) position



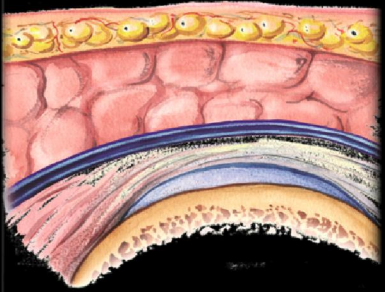
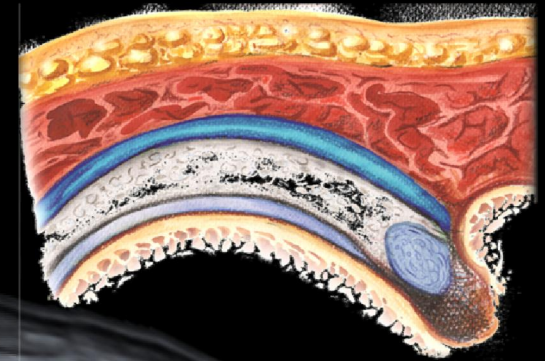
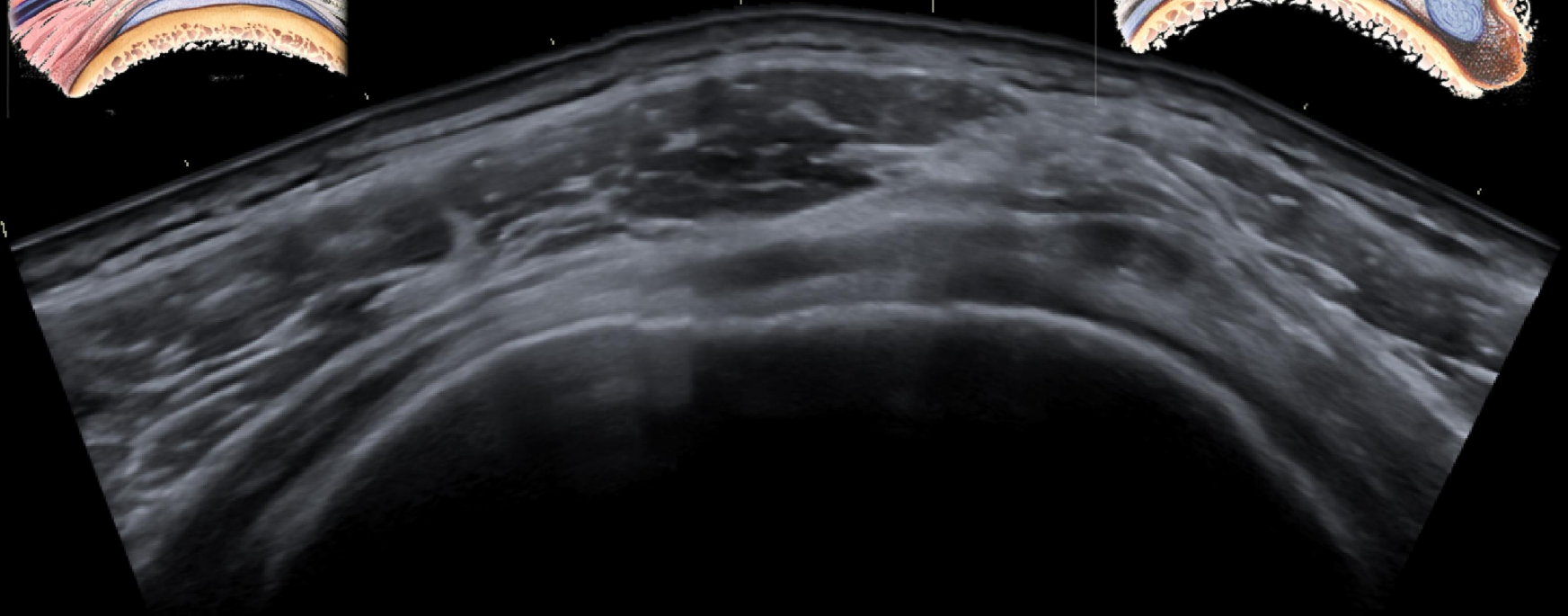
Infraspinatus tendon, trans

full internal rotation and adduction



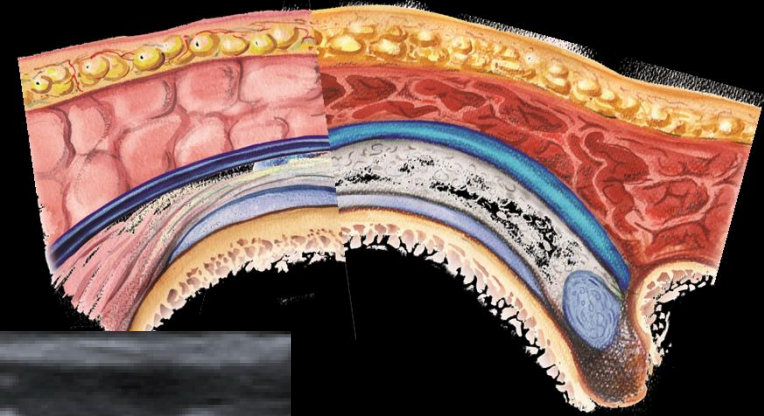
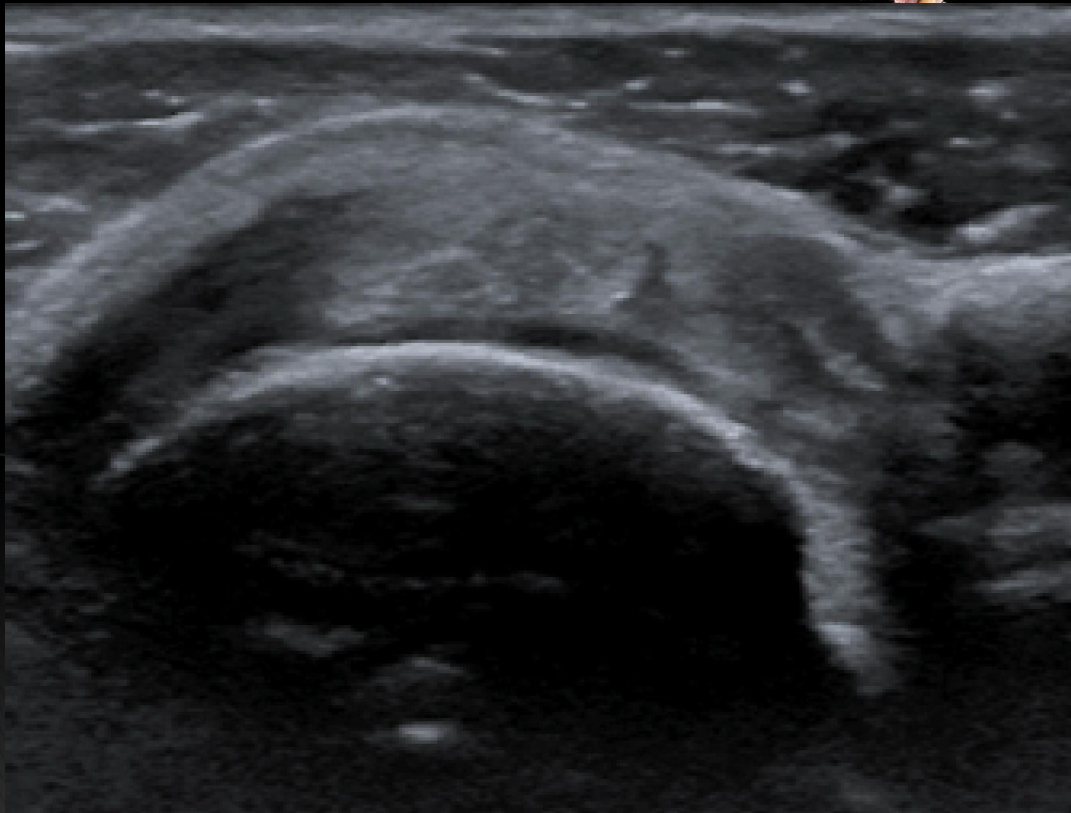
SS and IS tendons. Trans

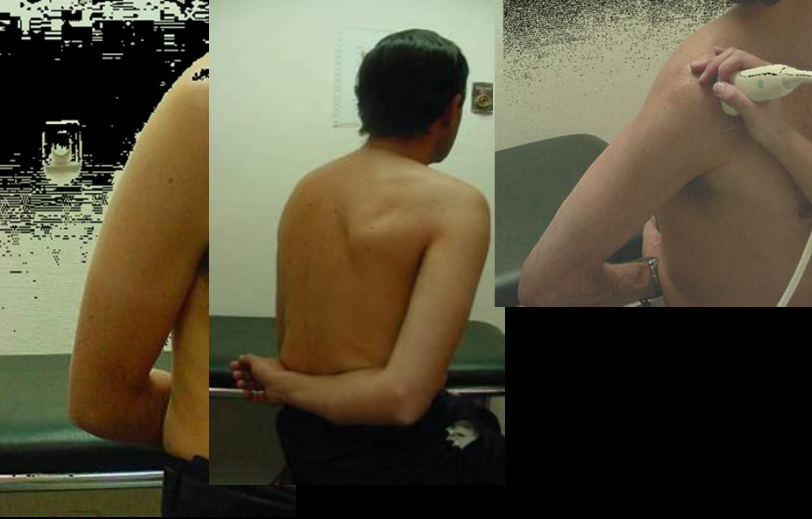
full internal rotation and adduction
Crass (1988) and Middleton (1992) position



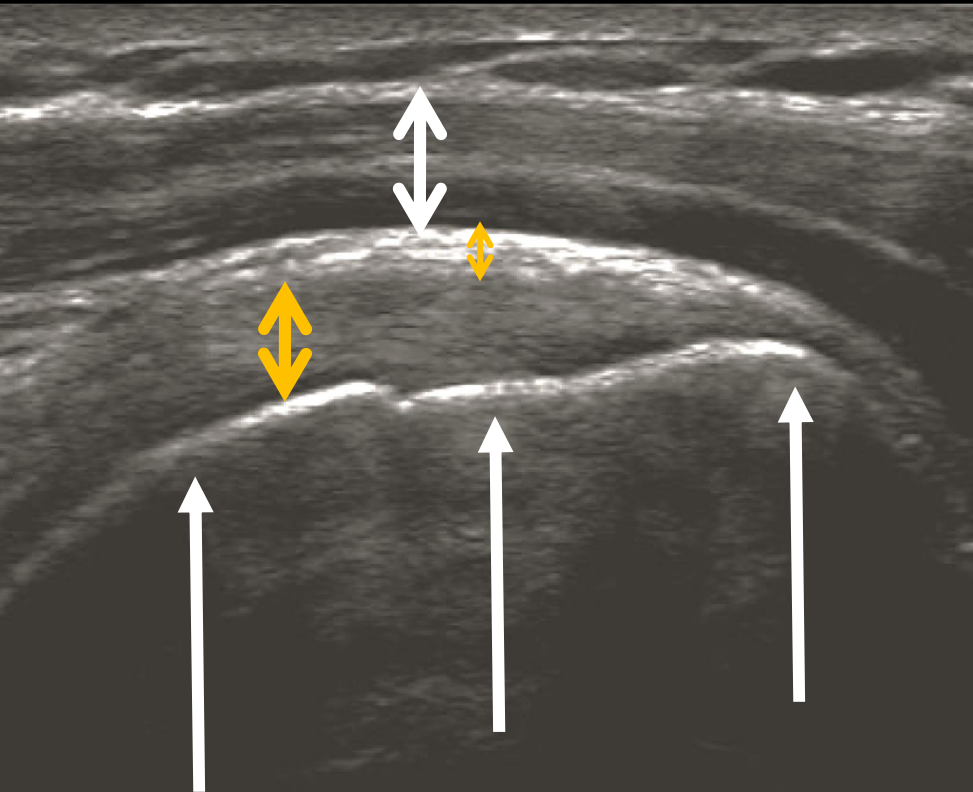
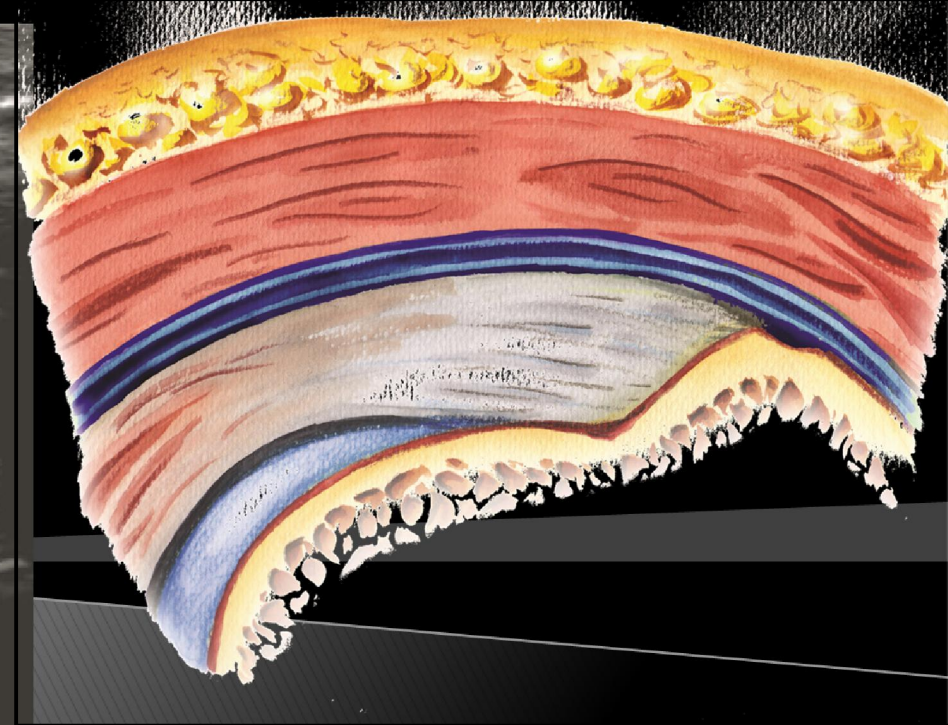
SS and IS tendons. Trans

full internal rotation and adduction
Crass (1988) and Middleton (1992) position





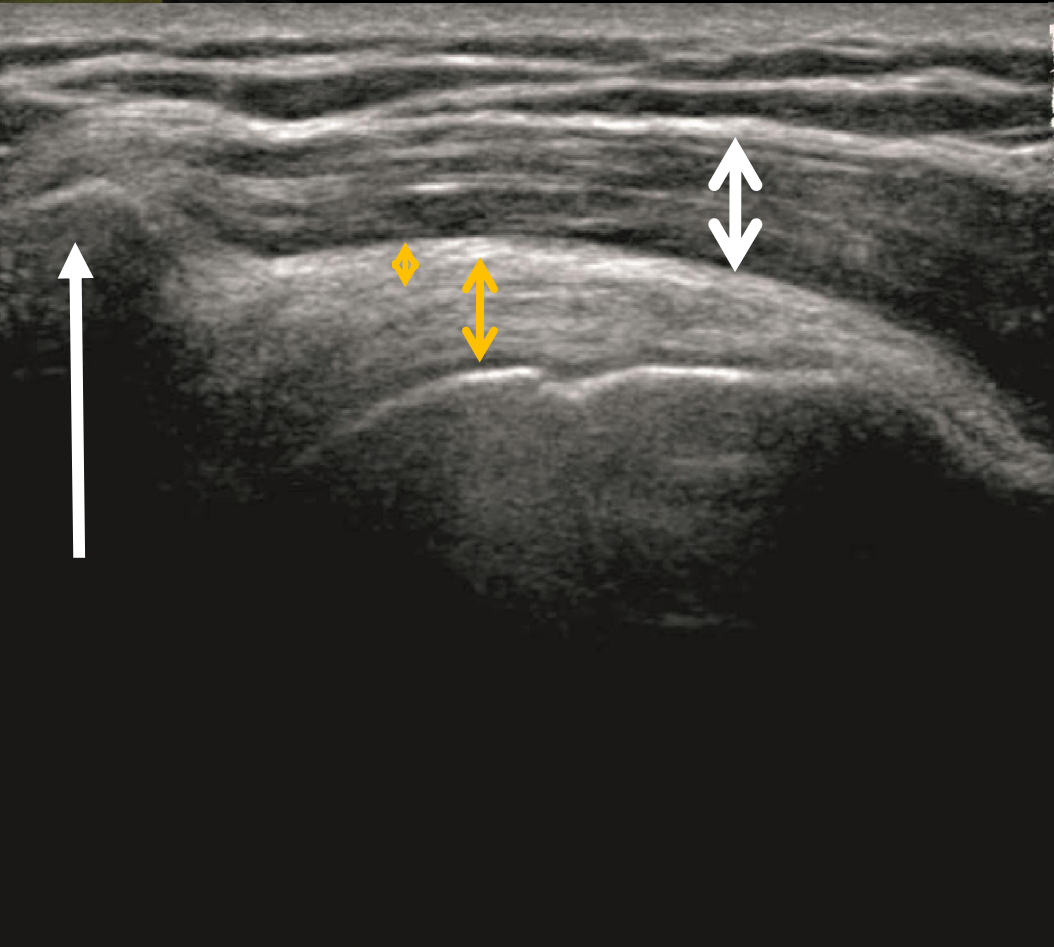
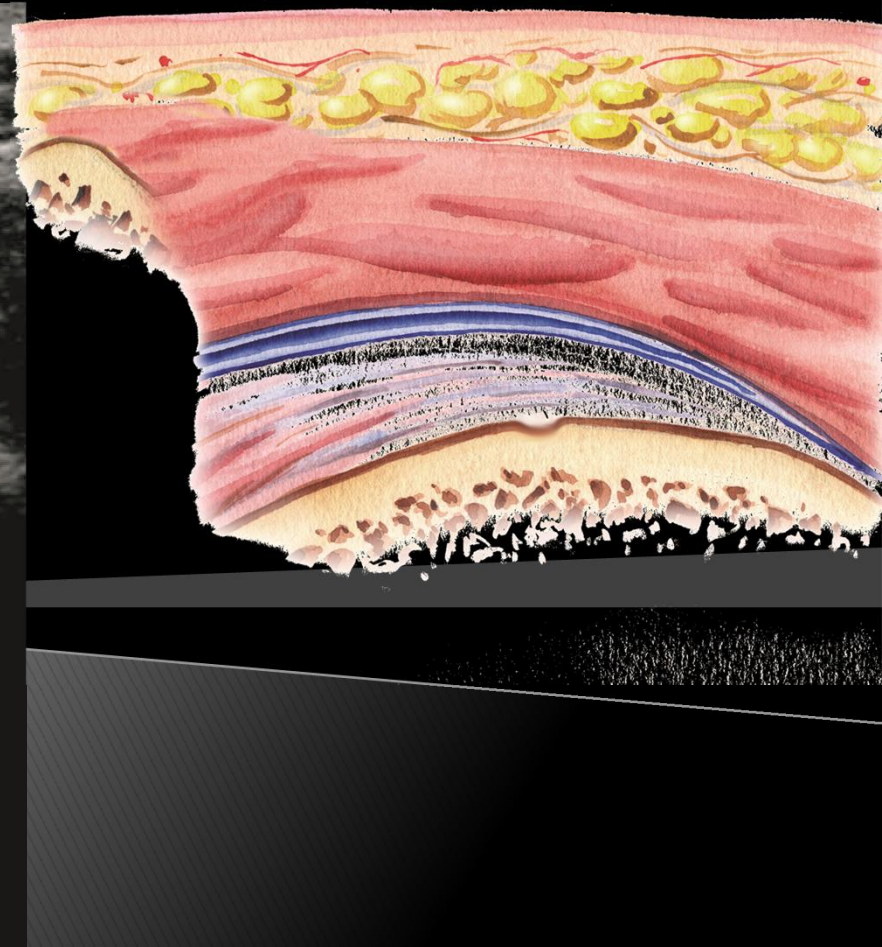
Supraspinatus tendon, long full internal rotation and adduction



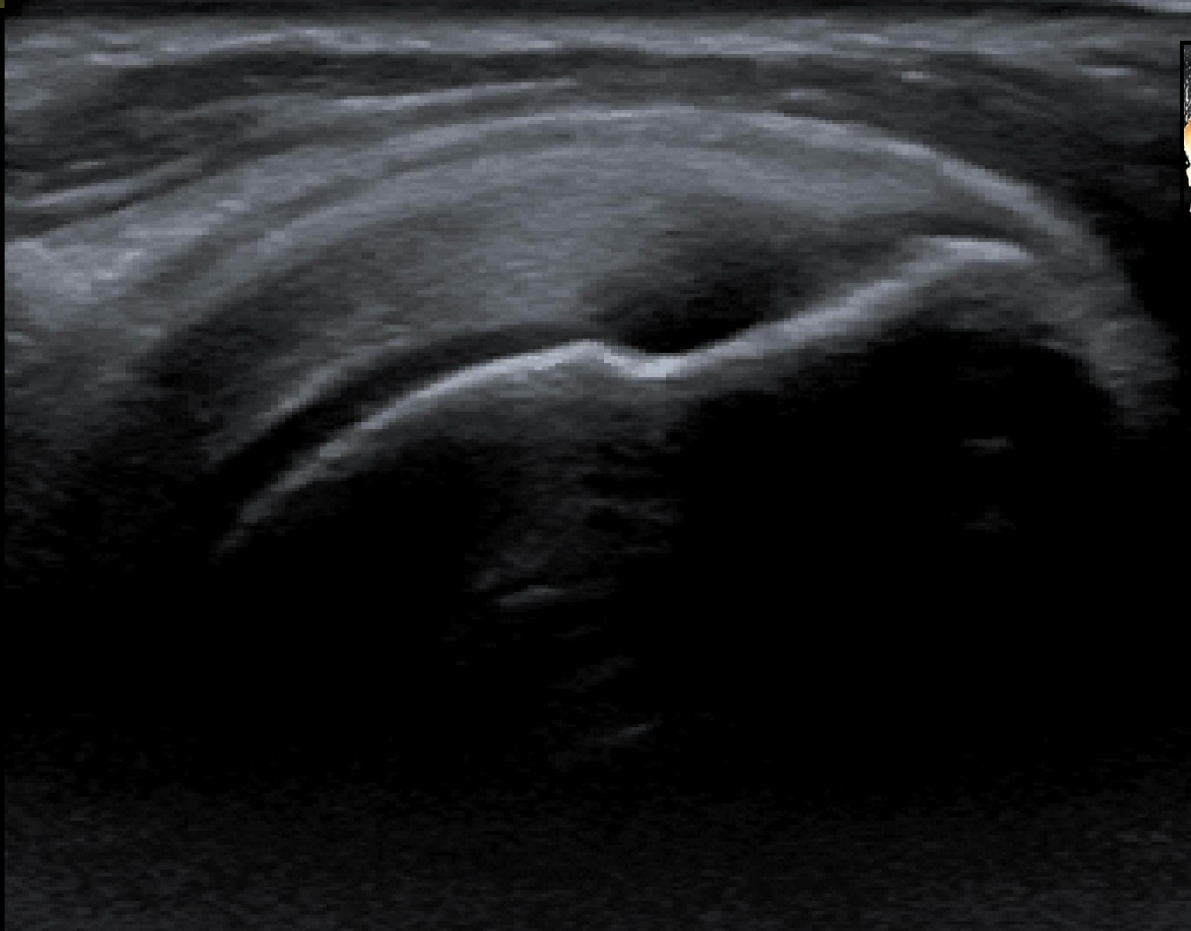
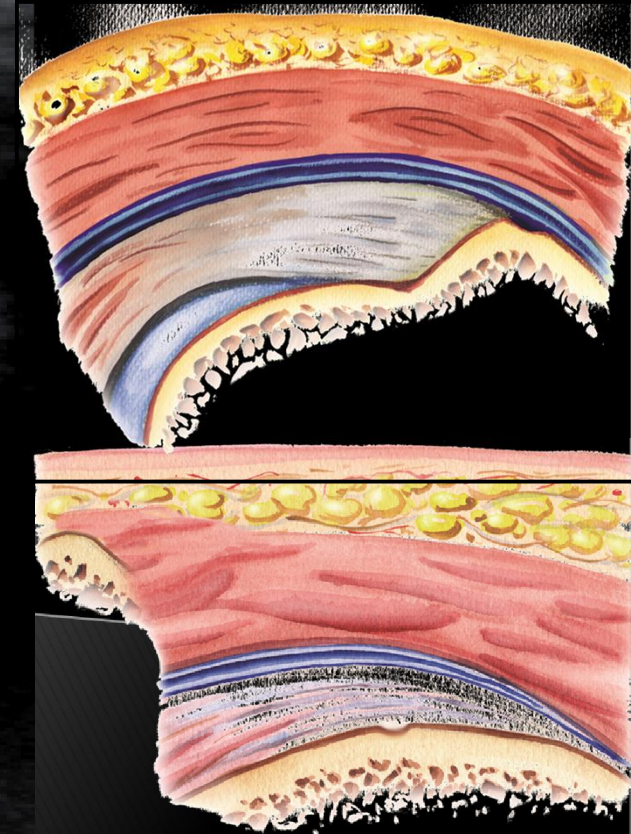


Infraspinatus tendon, long

full internal rotation and adduction

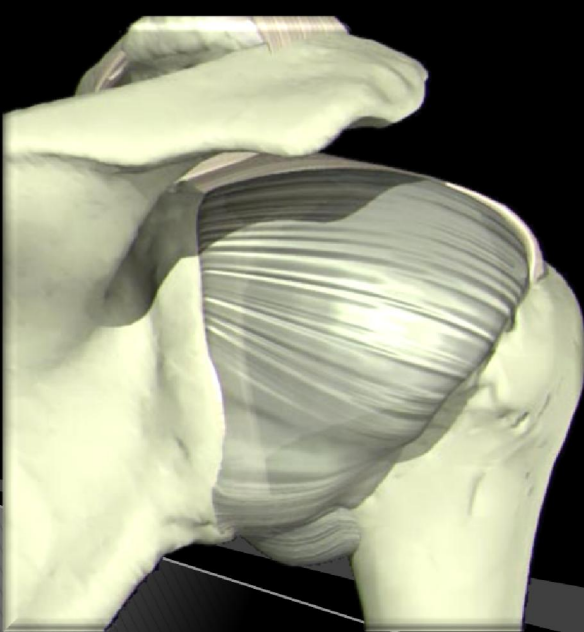
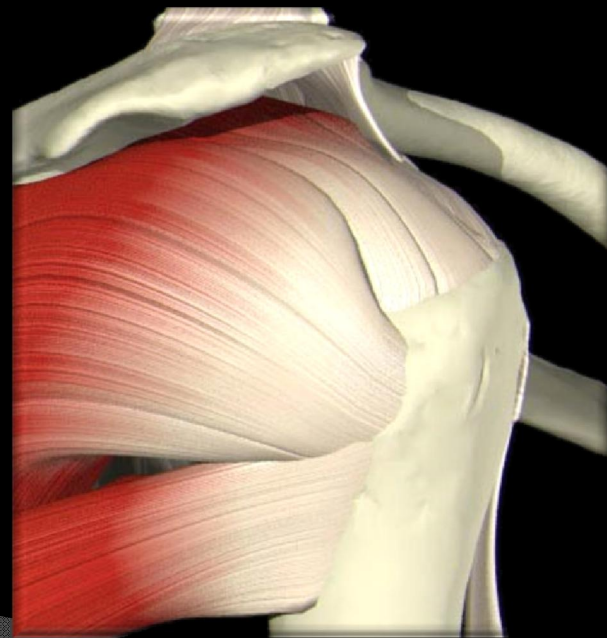


SS and IS tendons. Long full internal rotation and adduction



Posterior shoulder

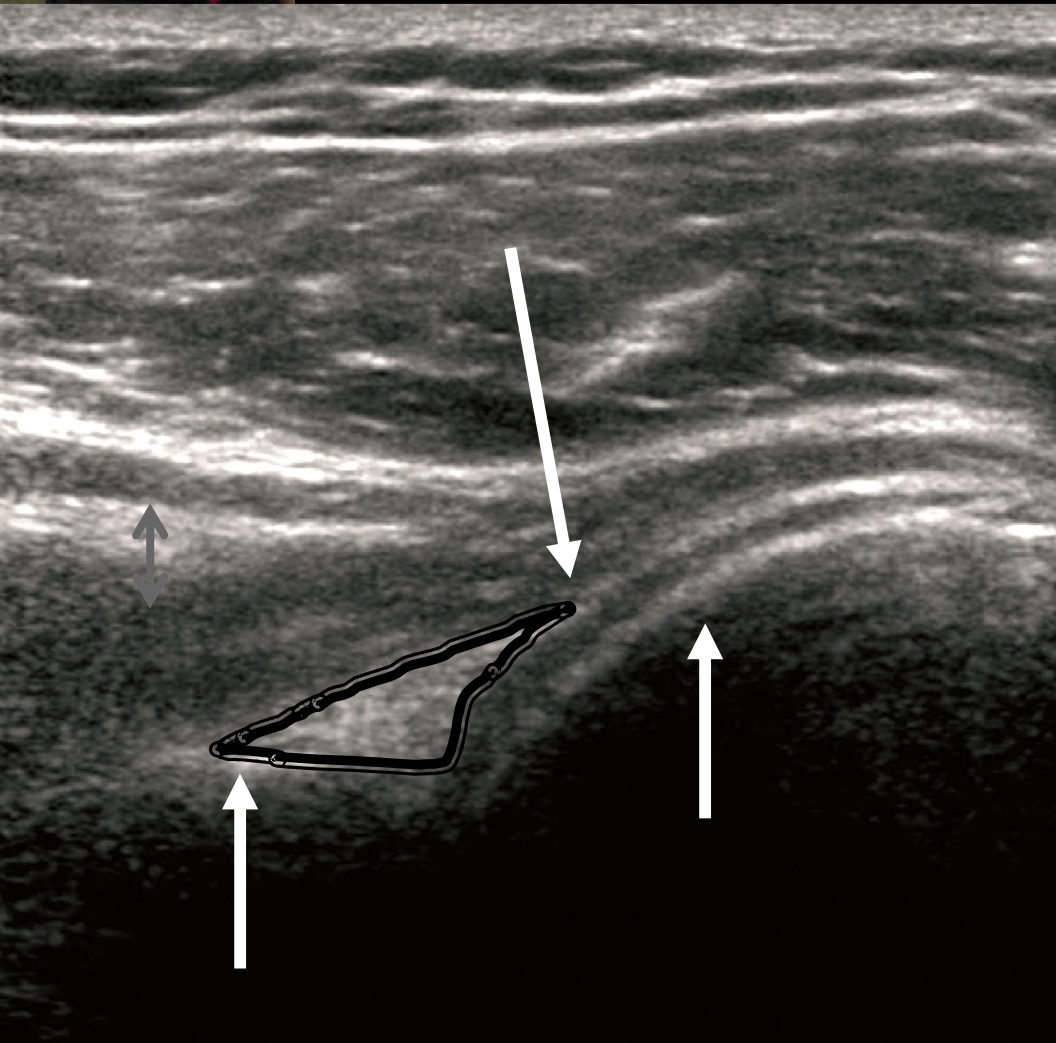
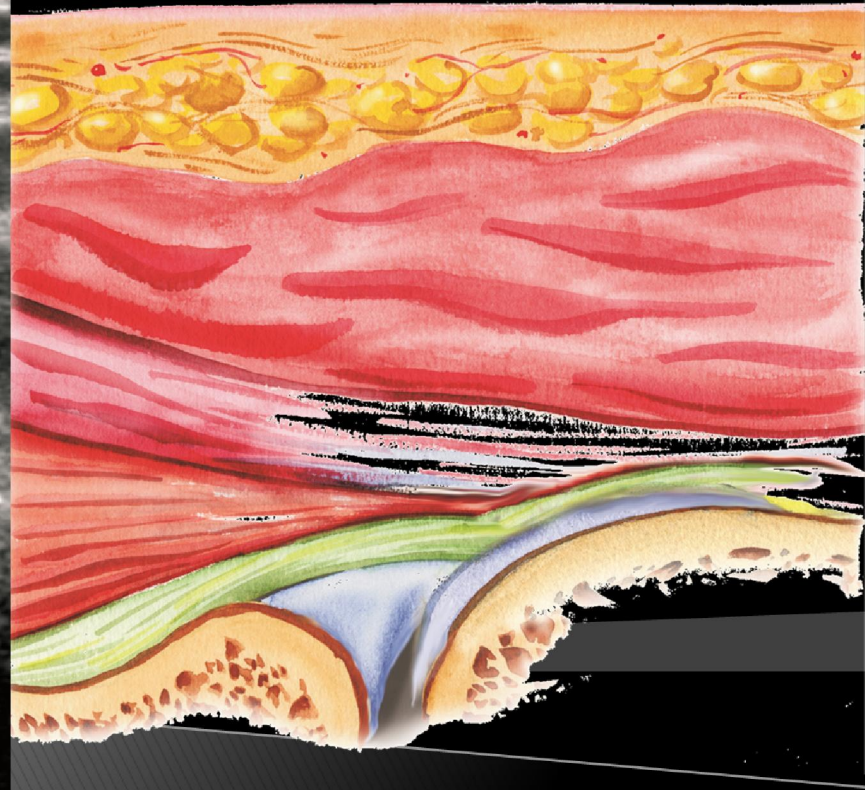
- Posterior infraspinatus and teres minor tendons
- Posterior glenohumeral recess
- Posterior labrum





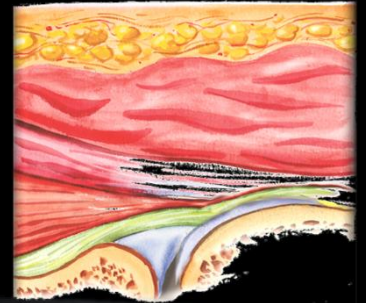
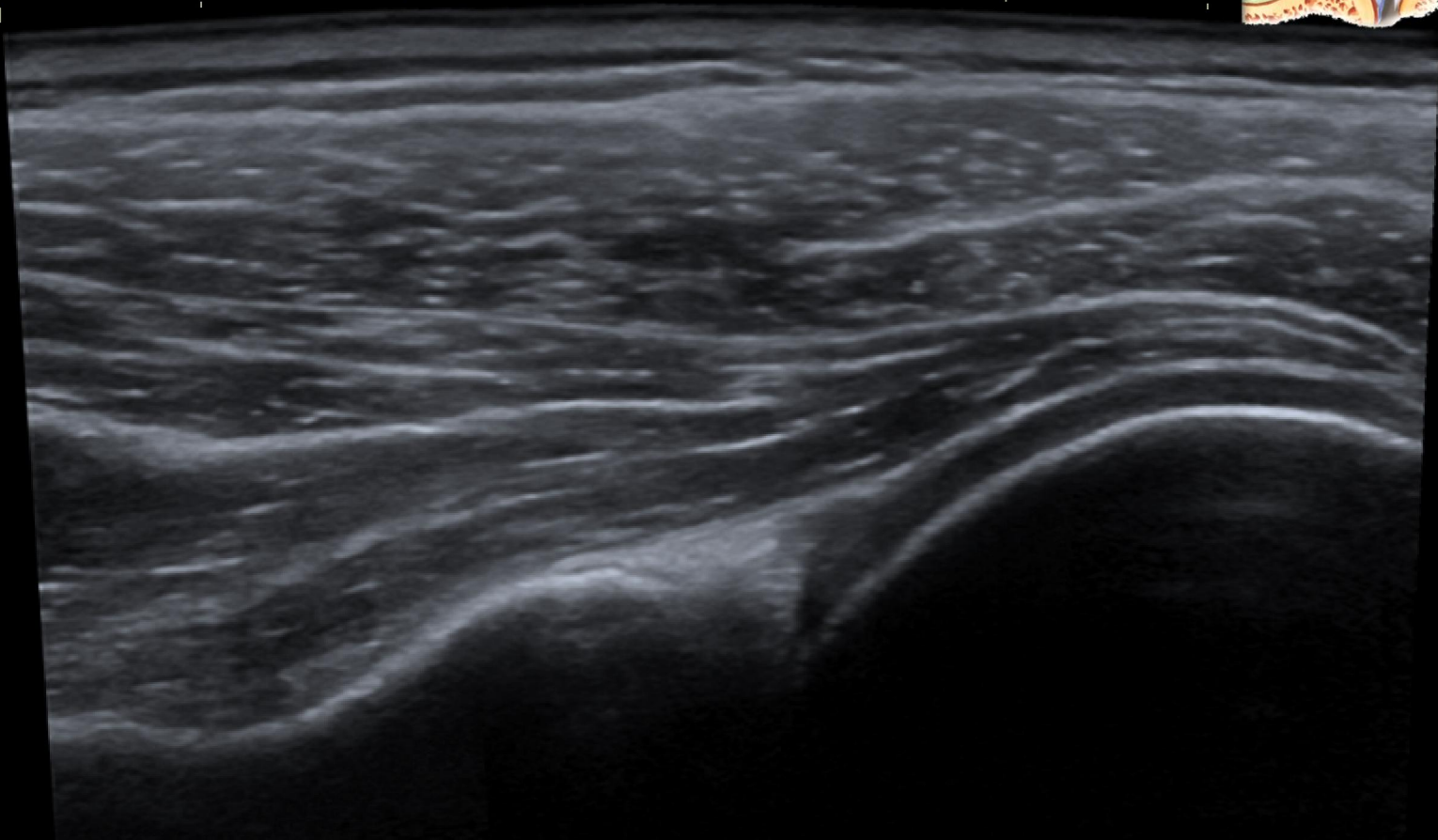
Posterior recess

facing the screen, forearm resting on lap/ hand on the opposite shoulder, dynamic external-internal rotation



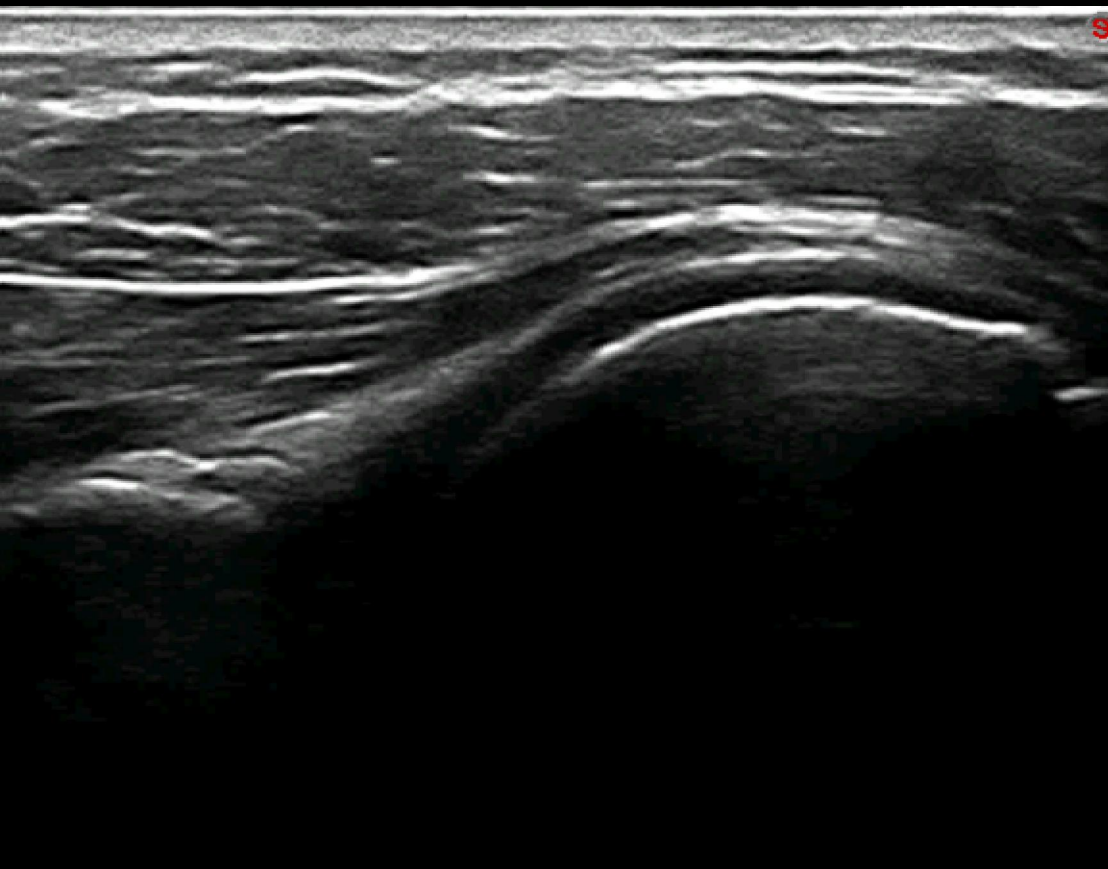
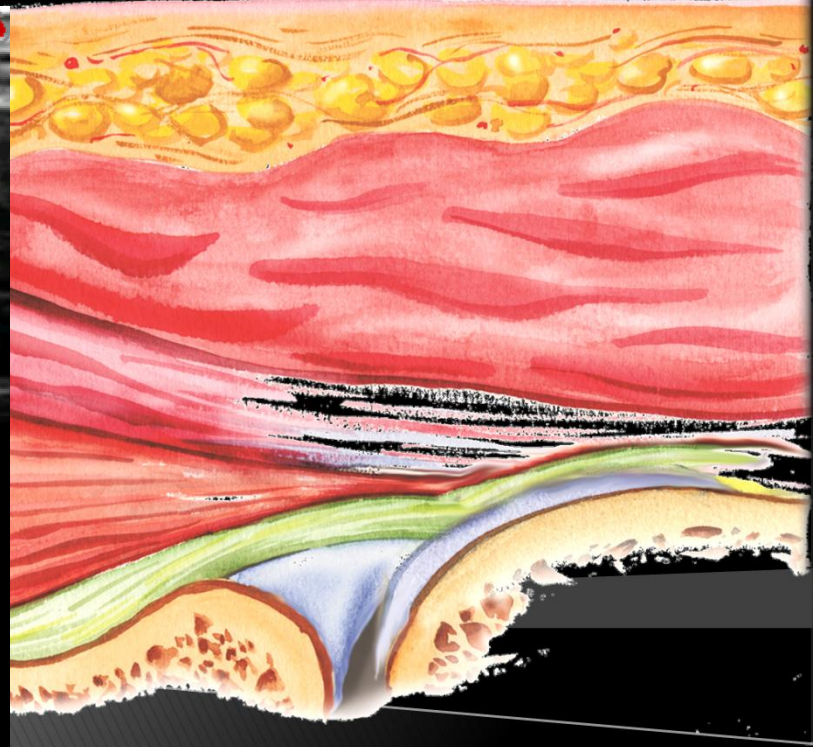
Posterior recess

facing the screen, forearm resting on lap/ hand on the opposite shoulder, dynamic external-internal rotation



Posterior recess

facing the screen, forearm resting on lap/ hand on the opposite shoulder, dynamic external-internal rotation

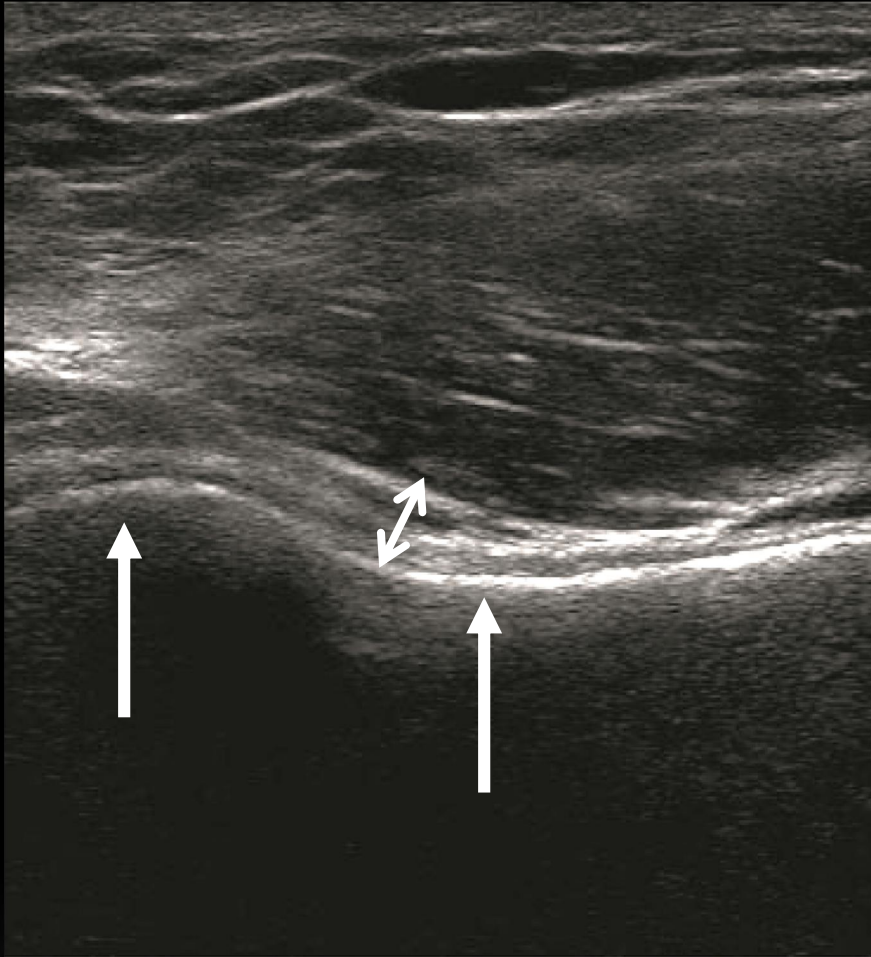
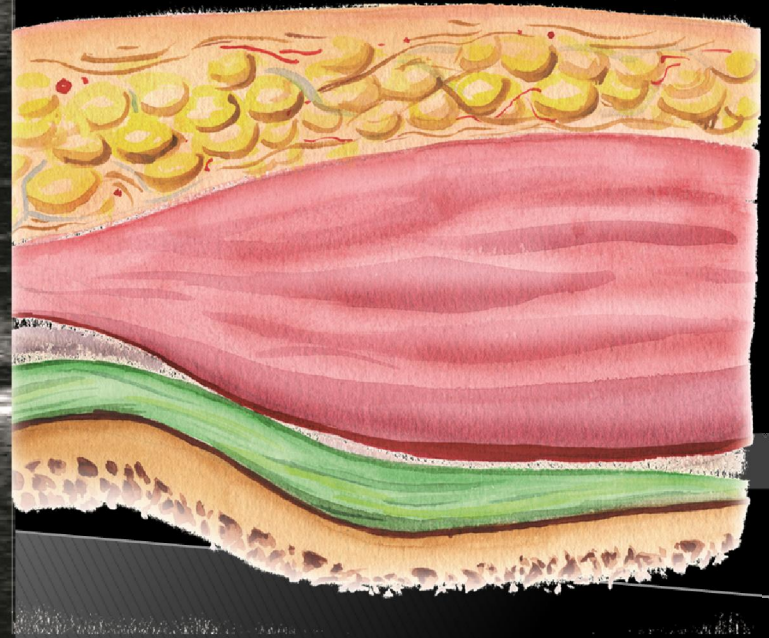




Axillary recess

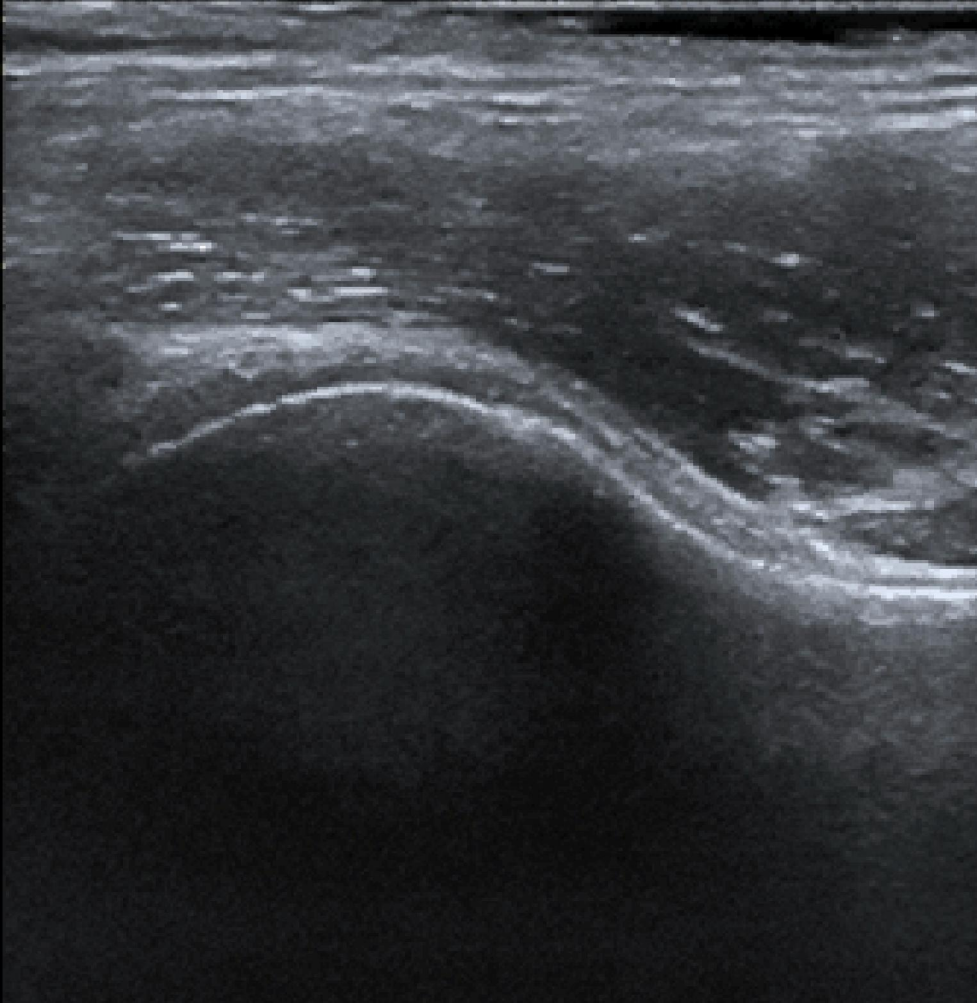
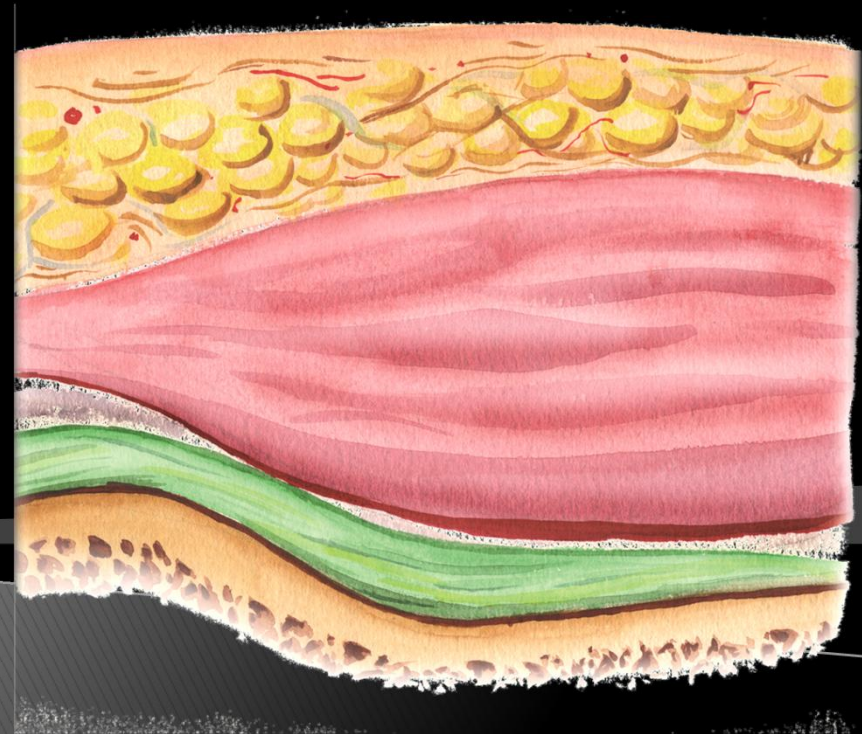
the arm in 90° of abduction, longitudinal
to the axilla

(Koski JM. *Scand J Rheumatol* 1991)



Axillary recess

the arm in 90° of abduction, longitudinal
to the axilla (Koski JM. *Scand J Rheumatol* 1991)

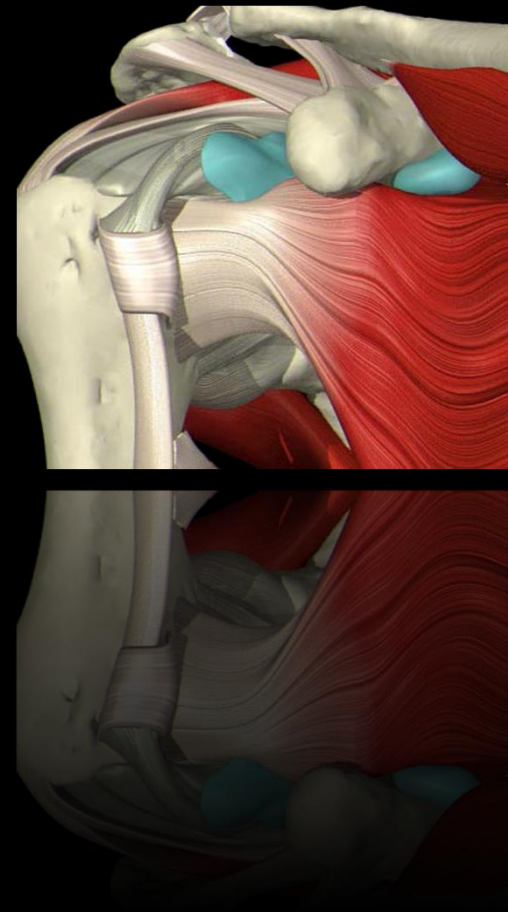


Shoulder US pathology

- **Biceps tenosynovitis**
- **Bursitis**
- **Synovitis (GH, ACRCCL)**
- **RC pathology**
- **GH erosions**
- **ACRCCL degenerative changes**

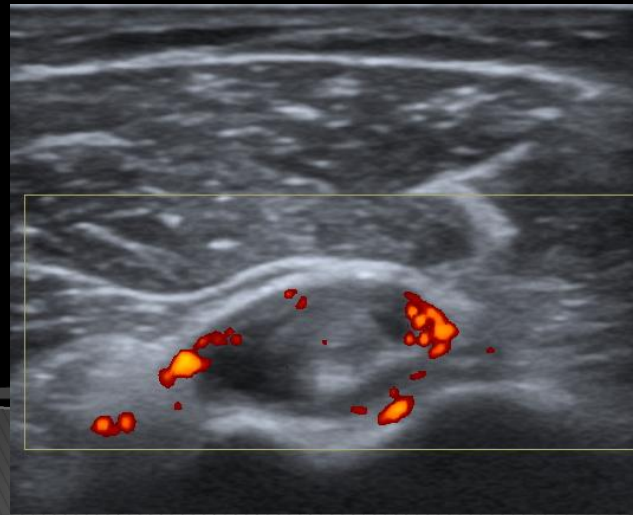
Biceps tendon pathology

- Tenosynovitis
- Rupture
- Dislocation



Tenosynovitis. Definition

● **Tenosynovitis:** hypoechoic or anechoic thickened tissue with or without fluid within the tendon sheath, which is seen in 2 perpendicular planes and which may exhibit Doppler signal

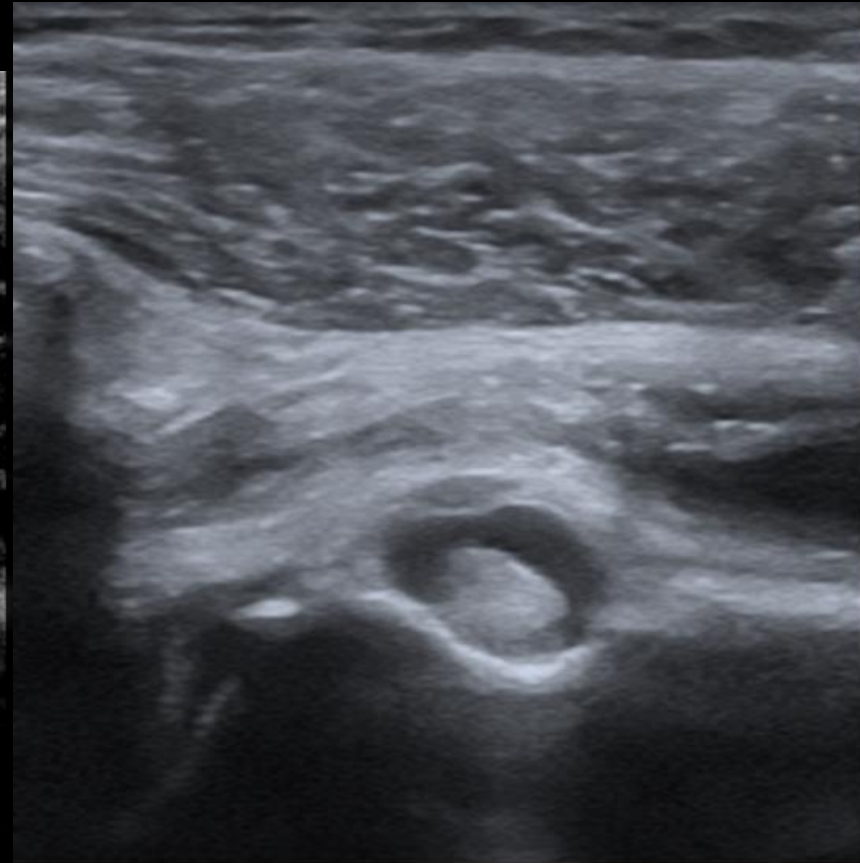


Wakefield RJ, et al. OMERACT definitions. J Rheumatol 2005

B Tenosynovitis (communicates with the GH joint)



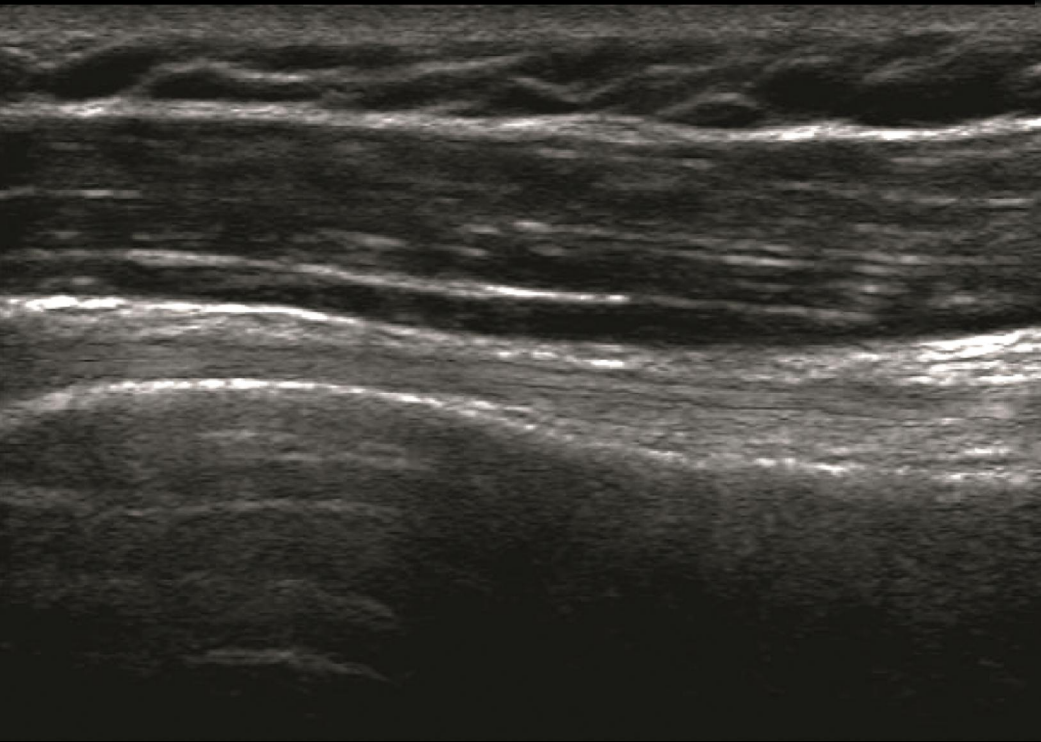
normal



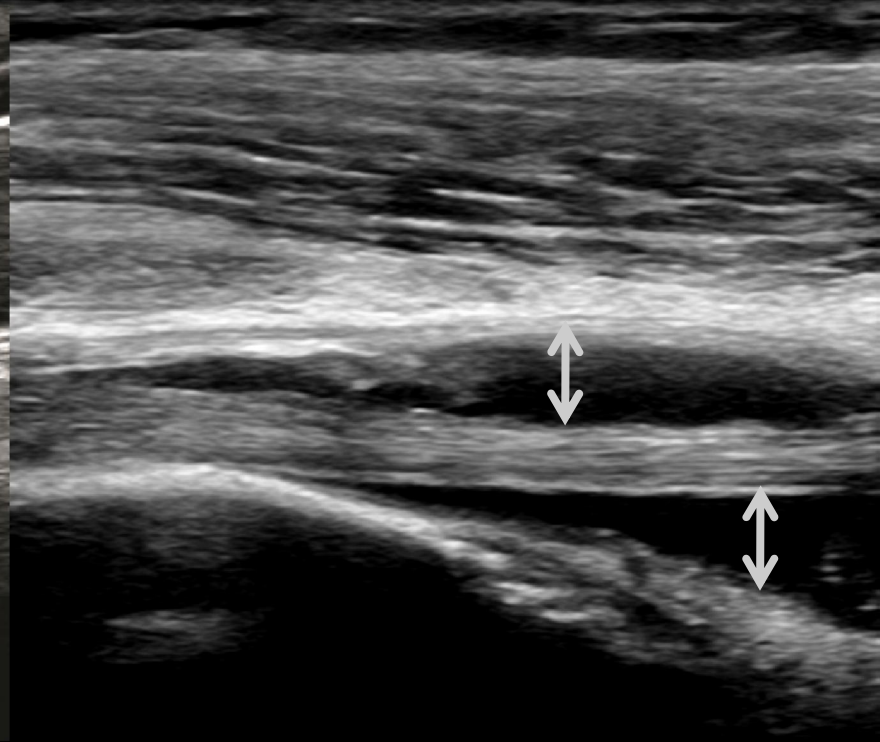
pathol

trans

BTenosynovitis



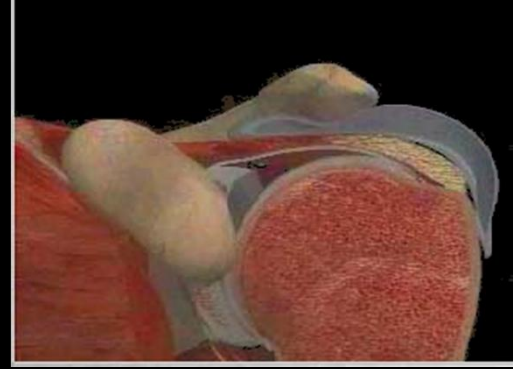
normal



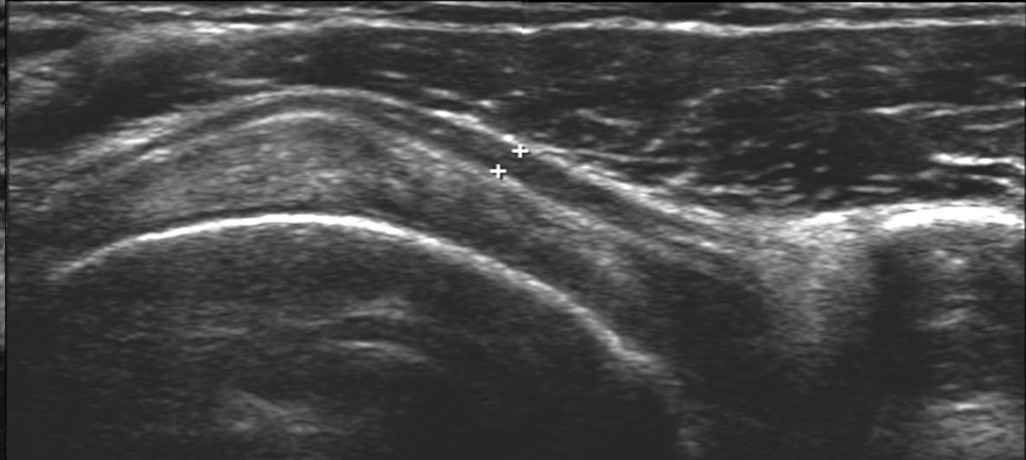
pathol

long

Bursitis (subdeltoid)



normal

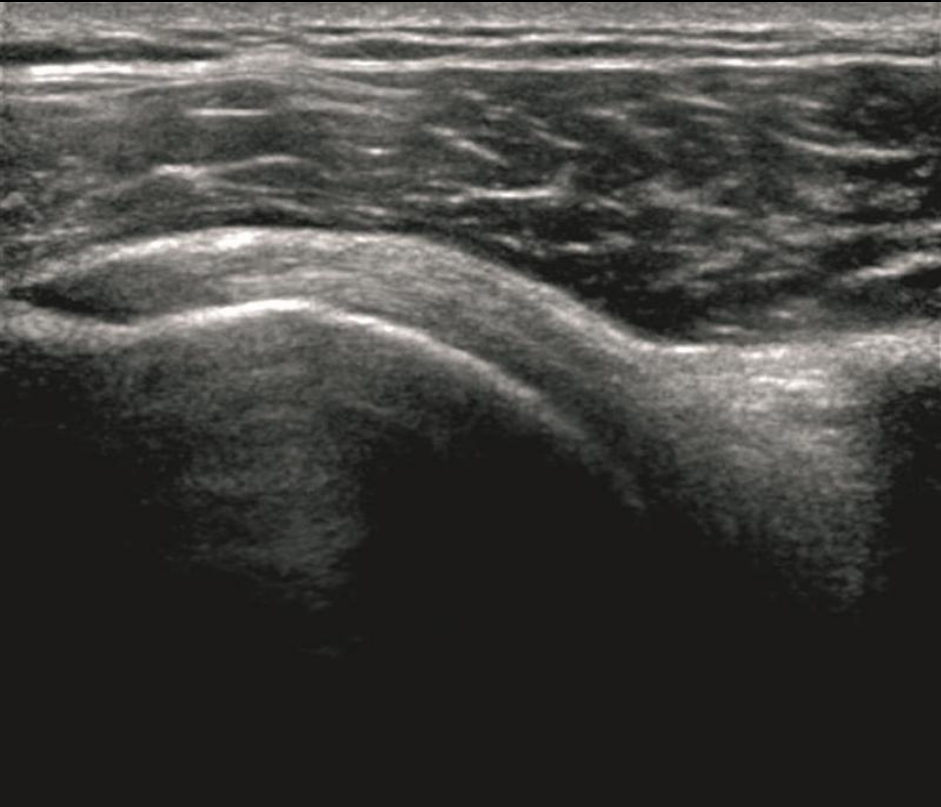


pathol

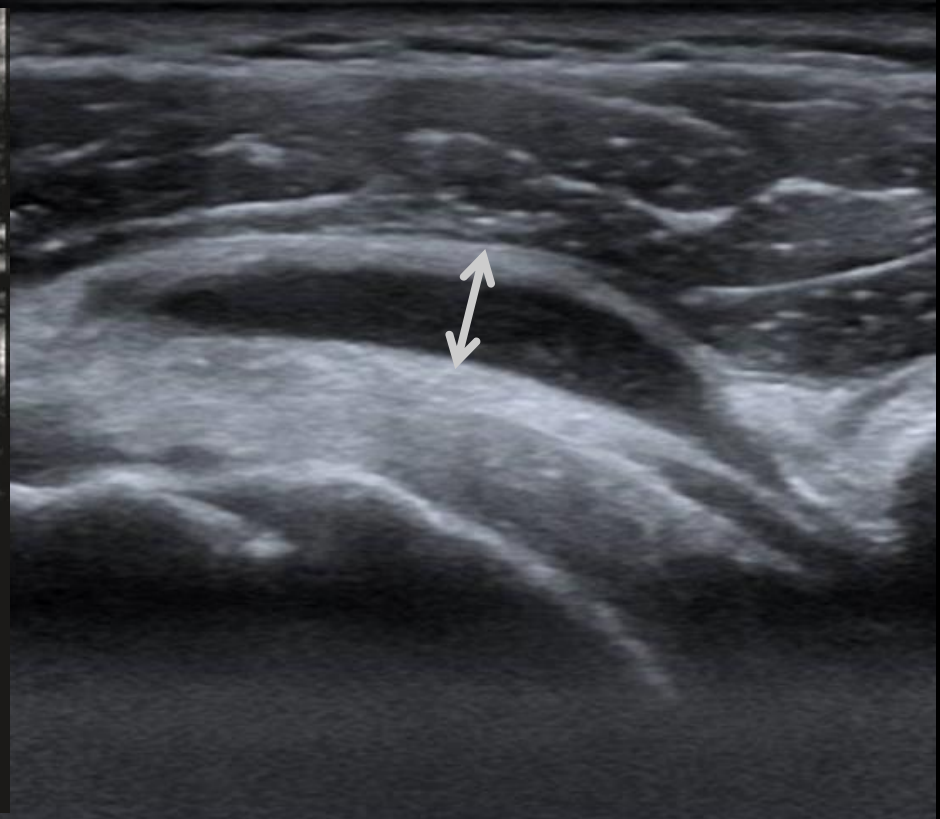
trans

degenerative-impingement

Bursitis (subdeltoid)



normal



pathol

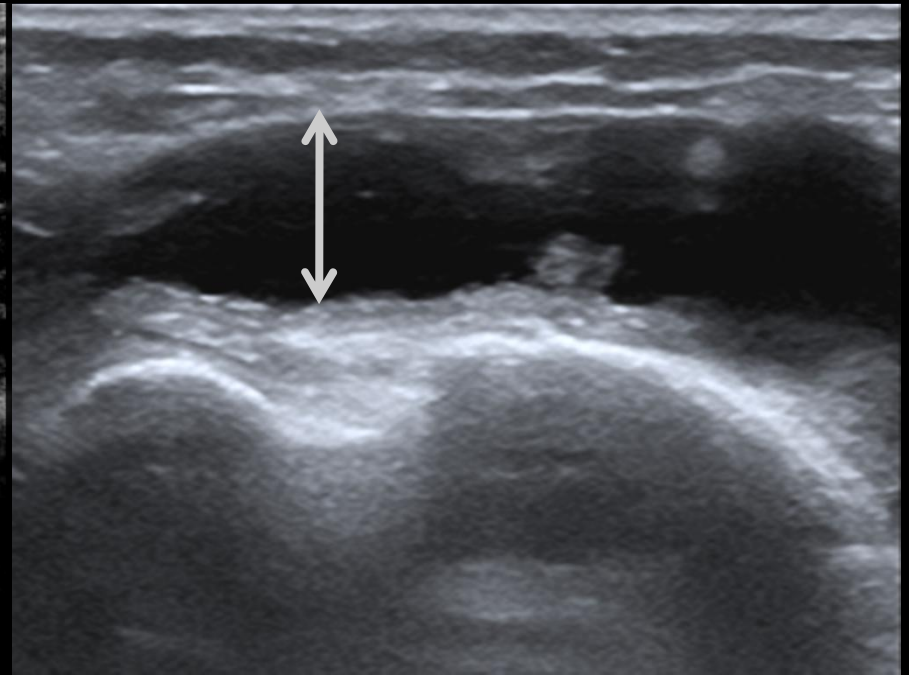
long

mechanical

Bursitis (subdeltoid)



normal



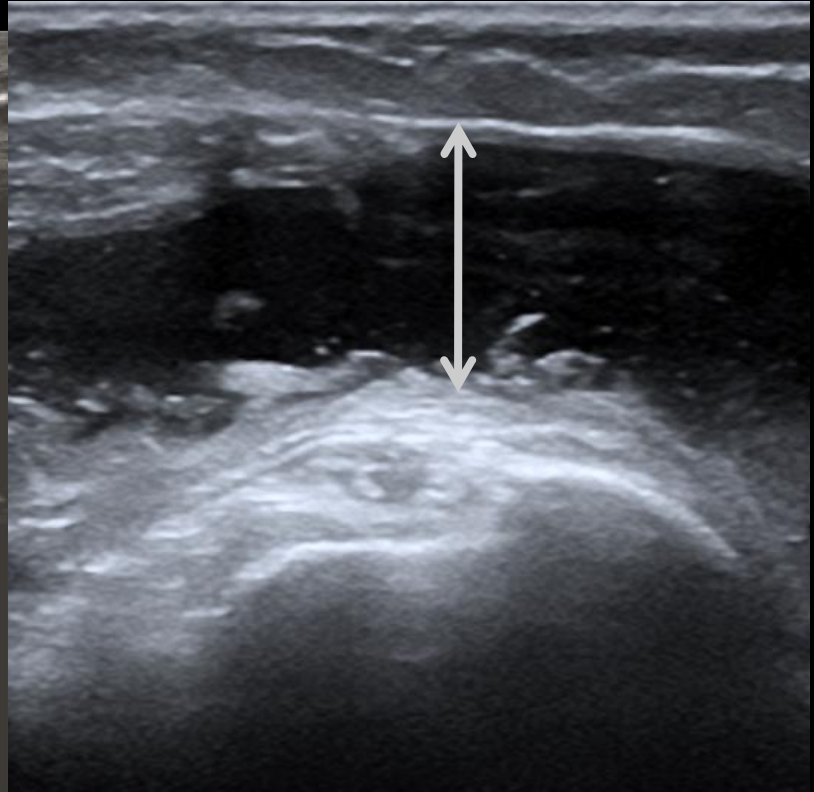
pathol

trans
inflammatory

Bursitis (subdeltoid)



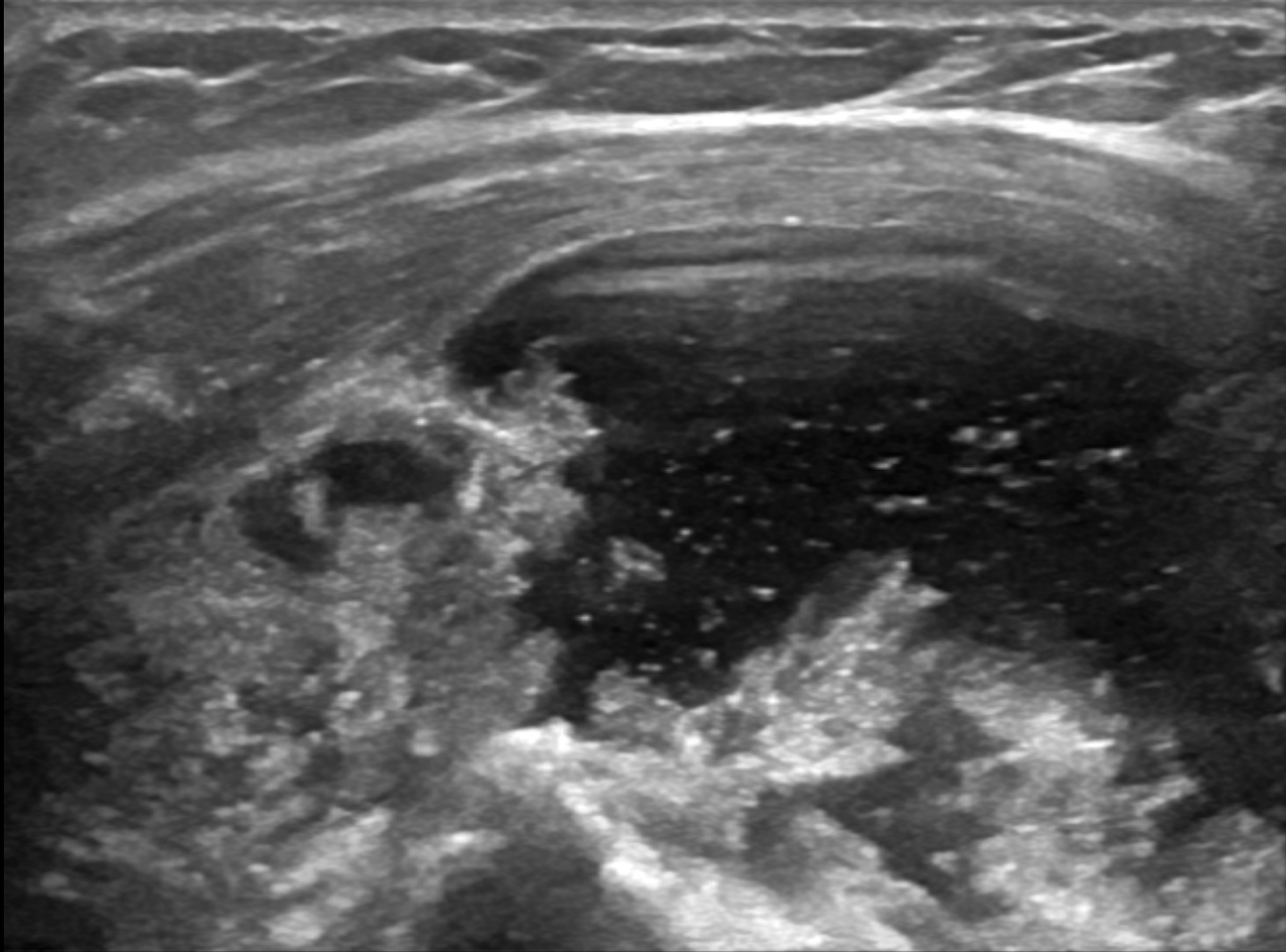
normal



pathol

long
inflammatory

Bursitis (subdeltoid)

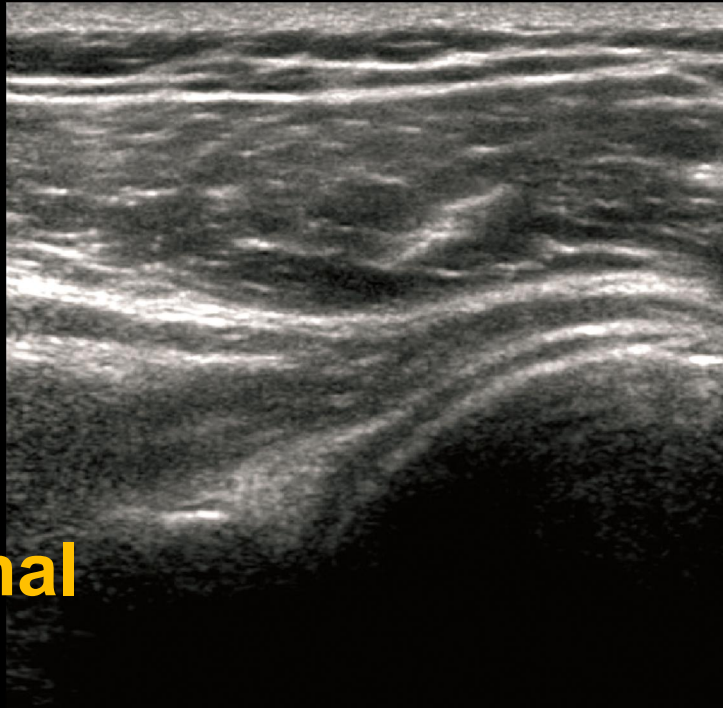


microcrystalline

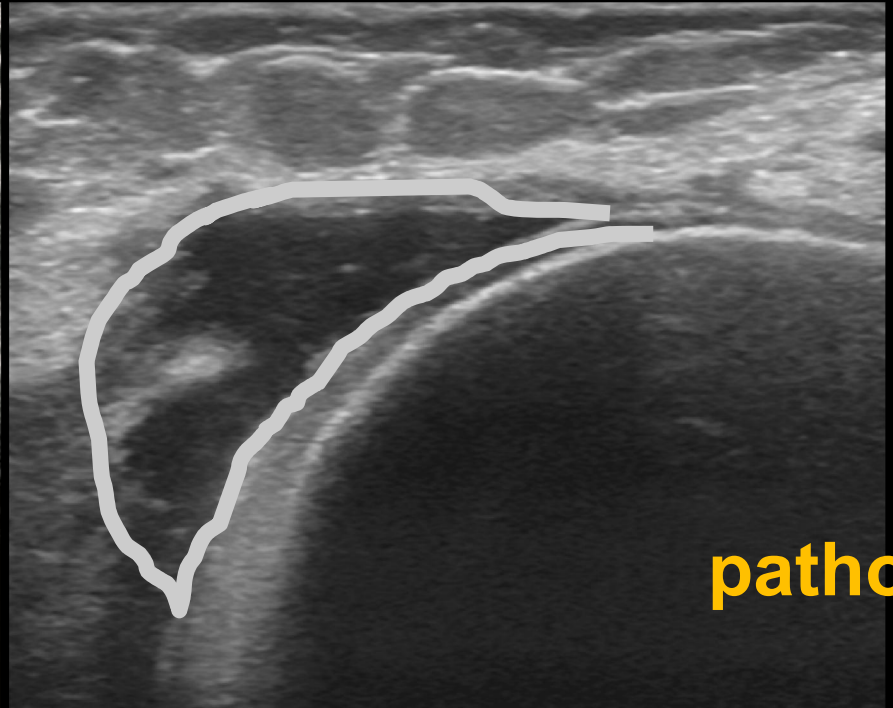
Synovitis. Definition

- **Synovial fluid (effusion): abnormal hypoechoic or anechoic intra-articular material that is displaceable and compressible but does not exhibit Doppler signal**
- **Synovial hypertrophy: abnormal hypoechoic intra-articular tissue that is non displaceable and poorly compressible which may exhibit Doppler signal**

GH synovitis. Posterior recess



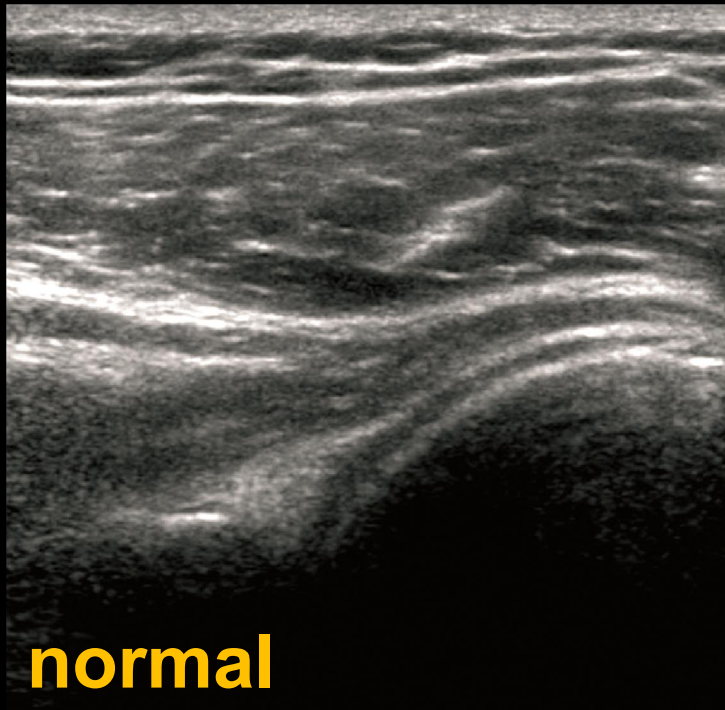
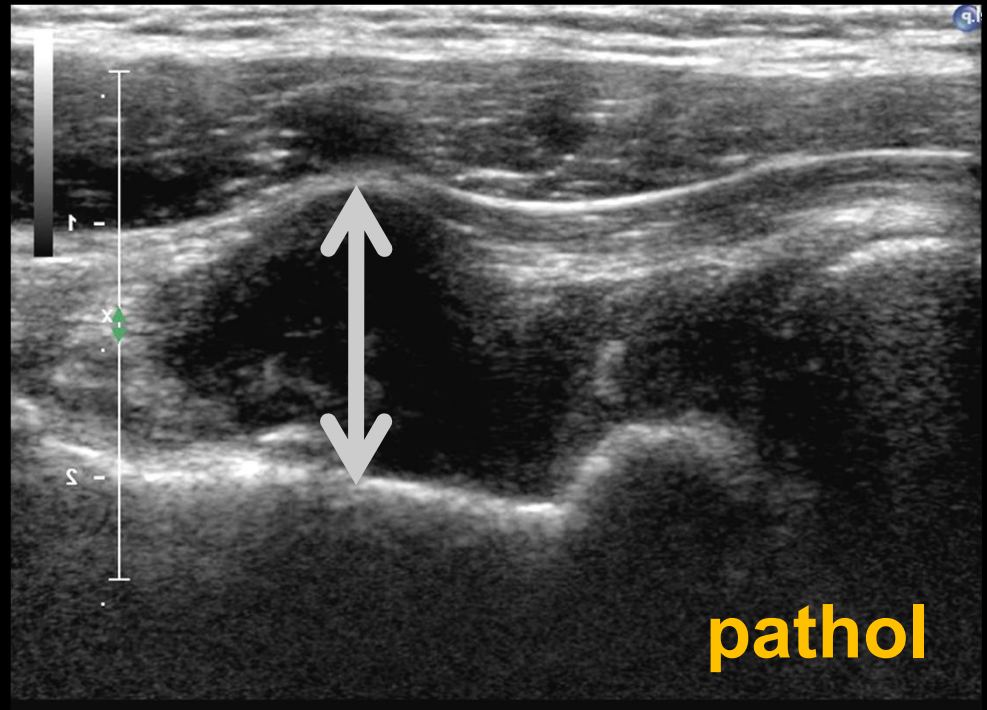
normal



pathol

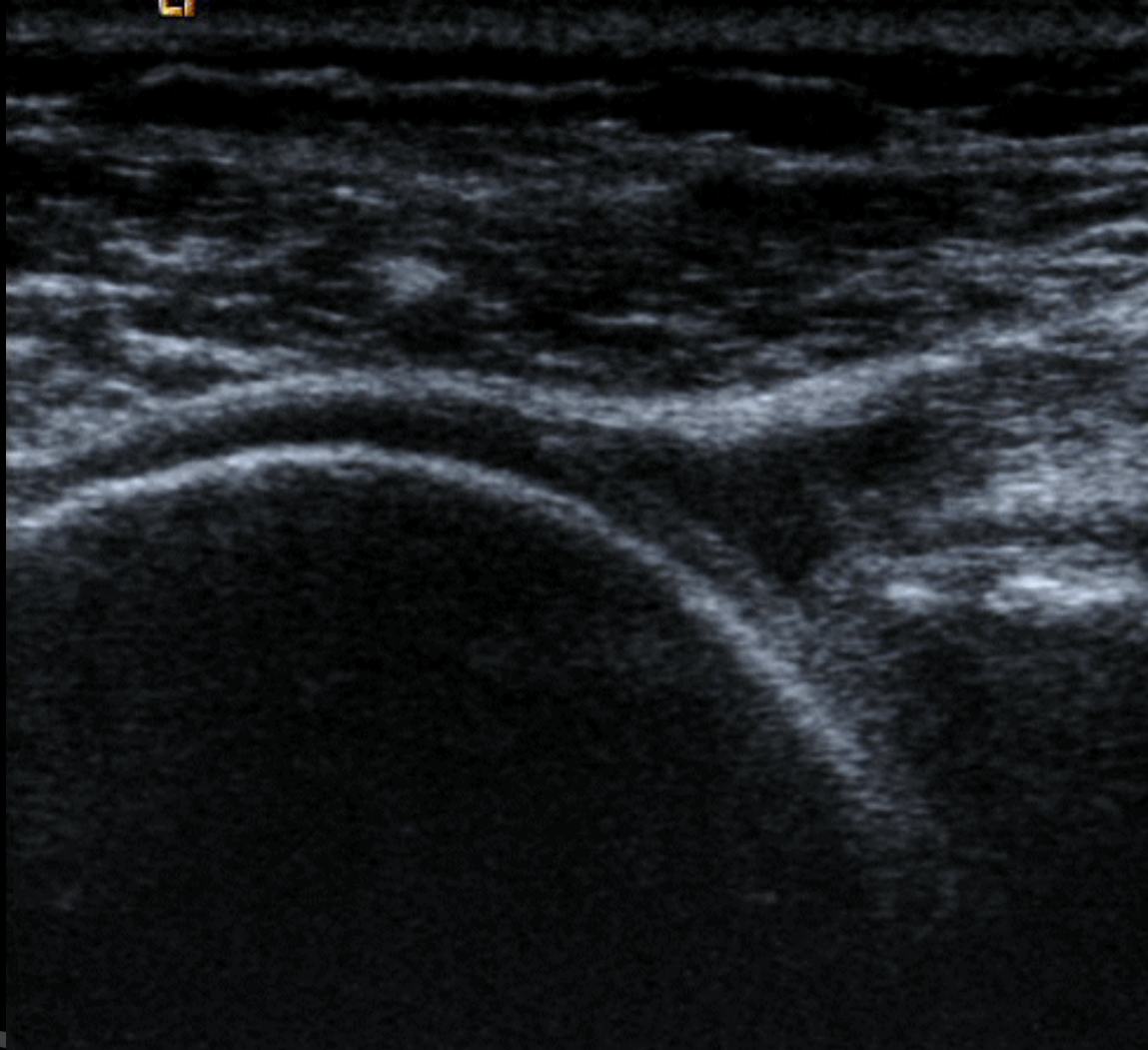
dynamic scanning:
shoulder rotation

GH synovitis. Posterior recess



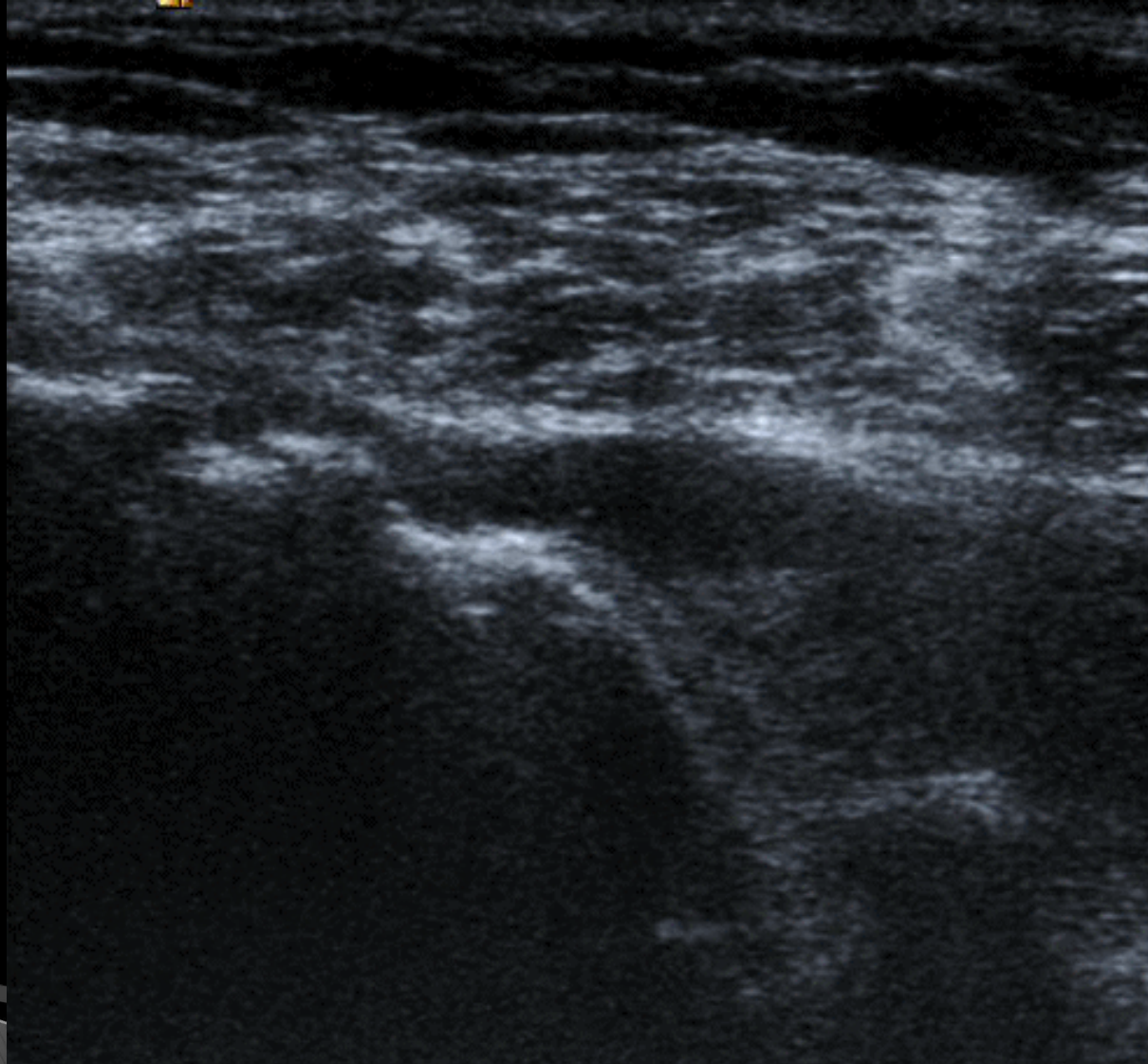
dynamic scanning:
shoulder rotation

GH synovitis. Posterior recess

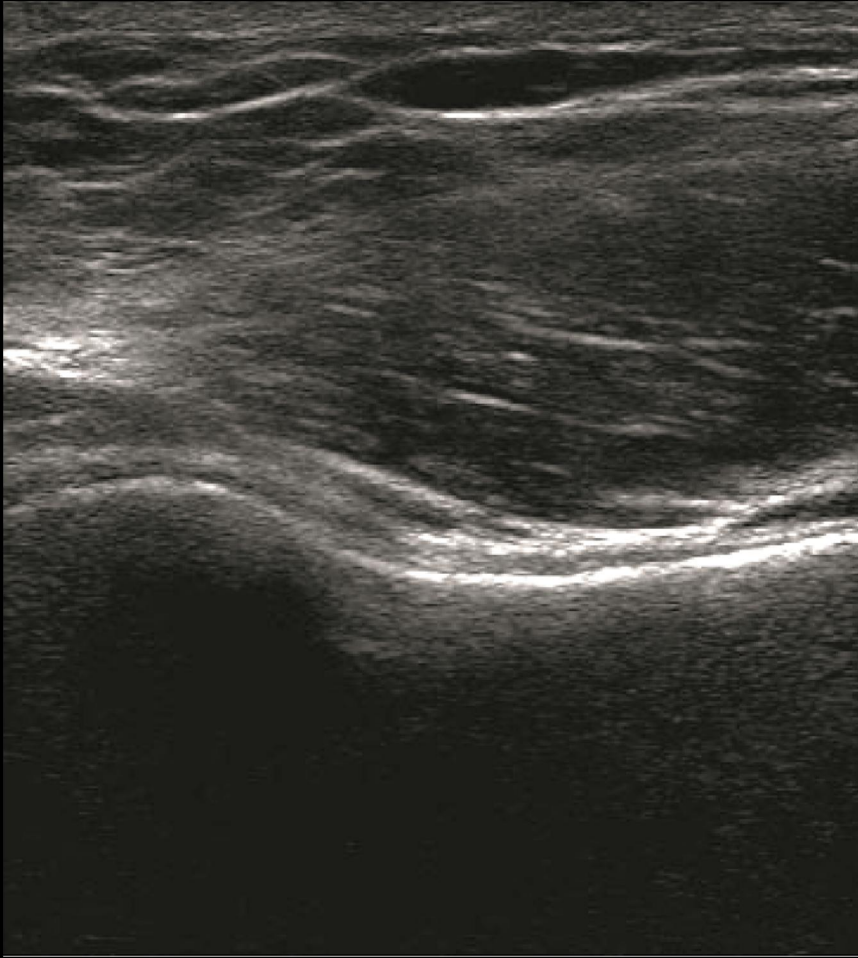


DYNAMIC
SCANNING:
SHOULDER
ROTATION

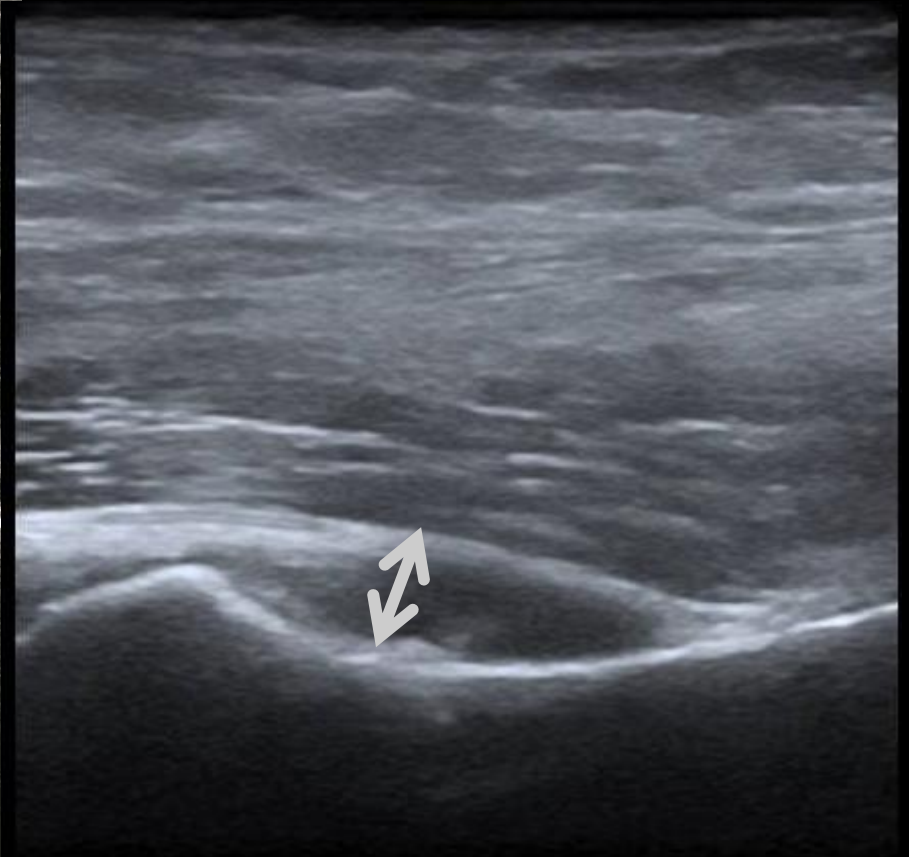
GH synovitis. Posterior recess



GH synovitis. Axillary recess



normal



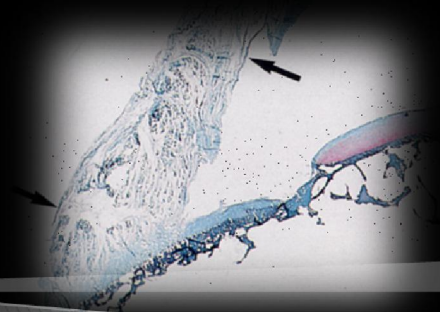
pathol

Rotator cuff pathology

- **Tendinosis**
- **Partial-thickness tear**
- **Full-thickness tear**
- **Calcification**

Tendinosis. Semiology

- **US signs: focal or global thickening and hypoechogenicity of the tendon with abnormal heterogeneous echotexture (hypoechoic areas)**



*Campbell R. Clin Radiol 2001; Martinoli C. Eur Radiol 2002;
De Maeseneer M. JBR-BTR 2009; Robinson P. AR2009*

SS tendinosis



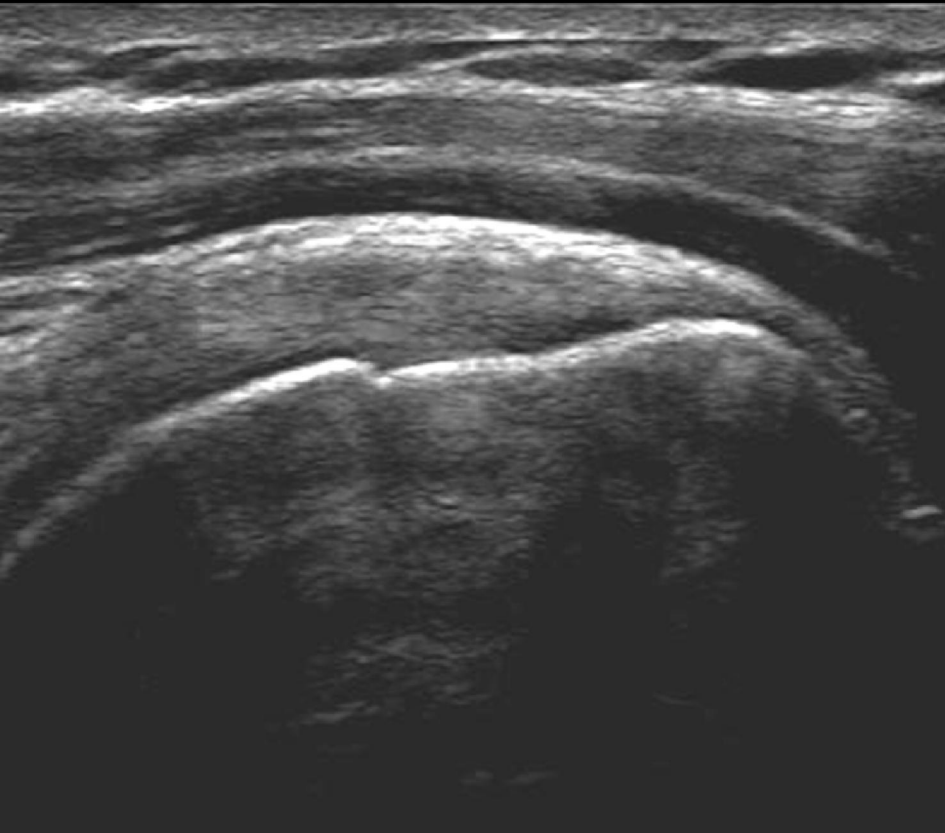
normal



pathol

trans

SS tendinosis



normal



pathol

long

Tendon tear. Semiology

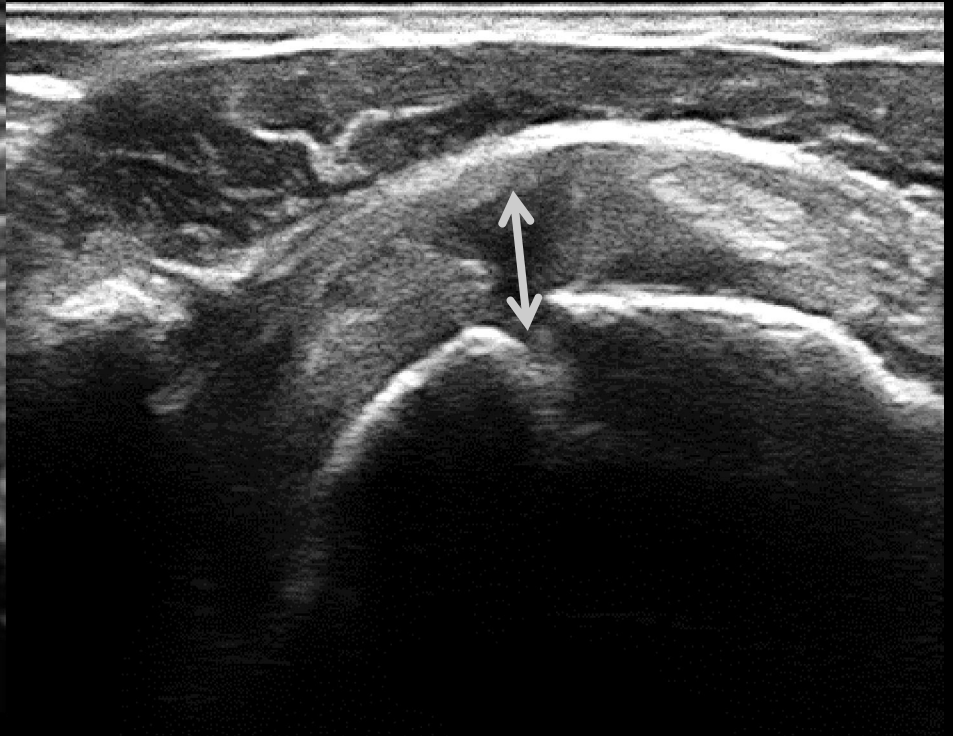
- **US signs: partial or full-thickness tendon defect/interruption of the tendon fibres. Defects are hypoechoic (fluid) in acute/recent tears. In old complete tear there is an absence of the tendon at its anatomic location.**

Campbell R. Clin Radiol 2001; Martinoli C. Eur Radiol 2002; De Maeseneer M. JBR-BTR 2009; Robinson P. AJR 2009

SS partial tear (deep surface)



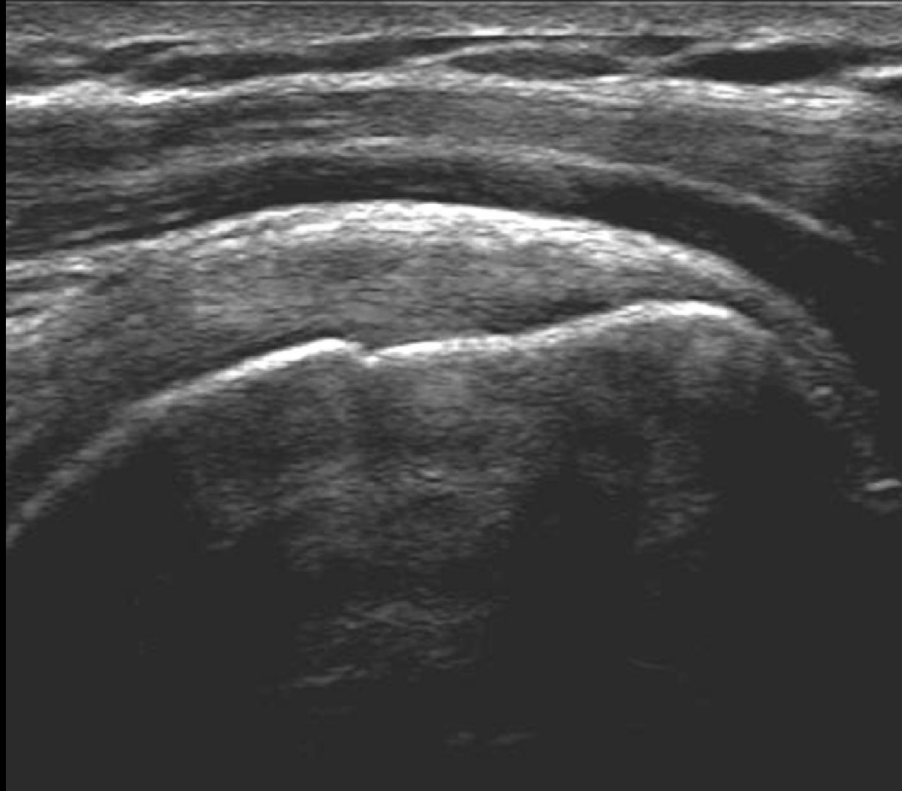
normal



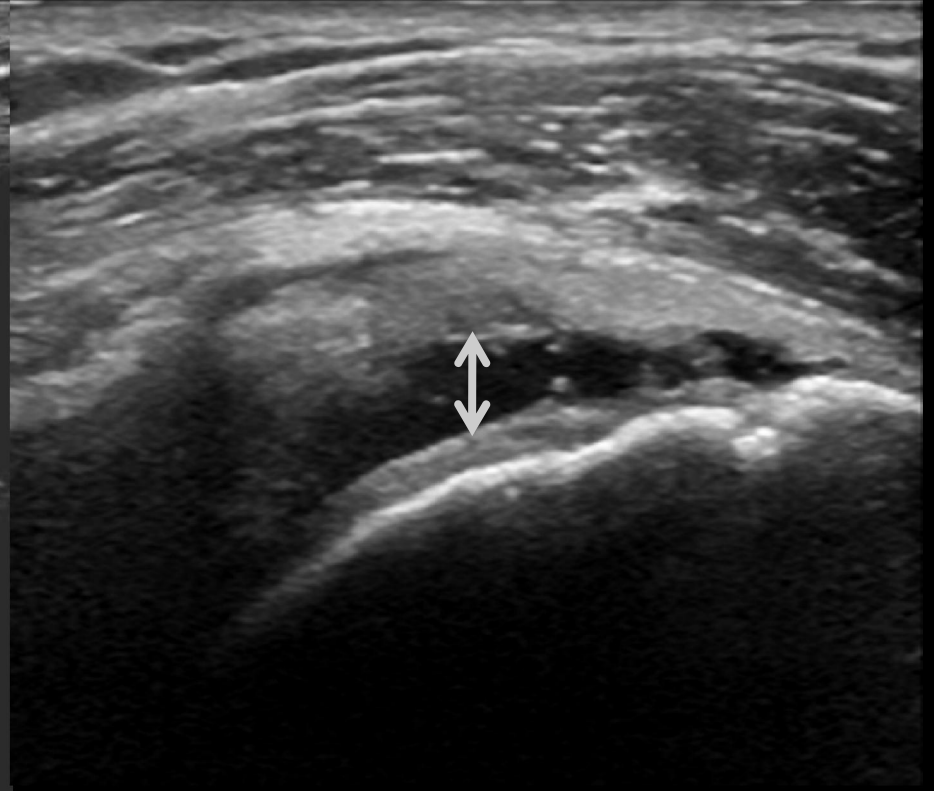
pathol

trans

SS partial tear (deep surface)



normal



pathol

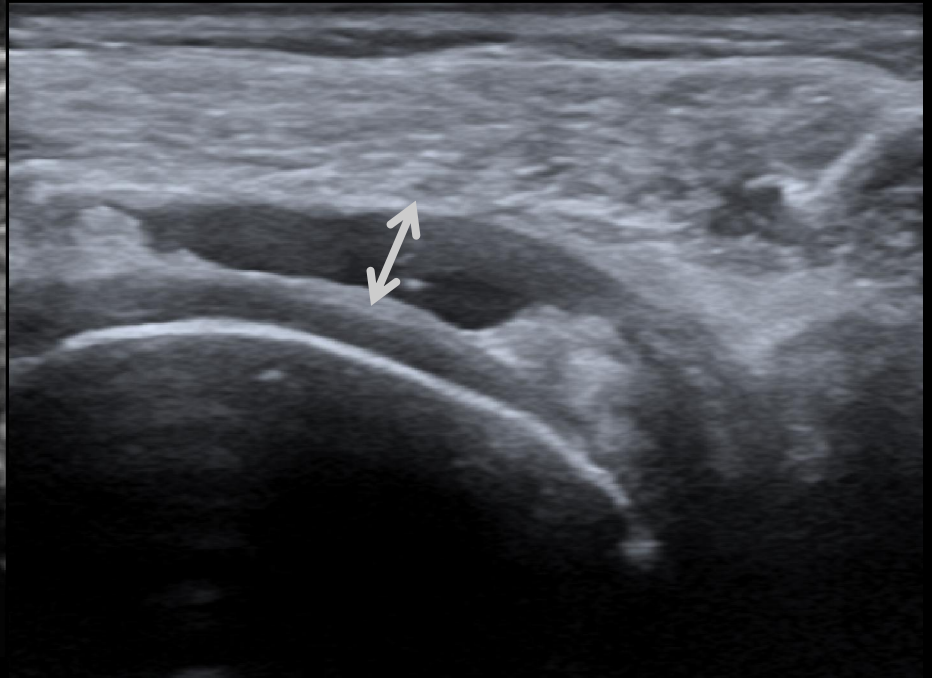
long

SS full-thickness tear

hypoechoic defect from the bursal to the humeral cartilage



normal

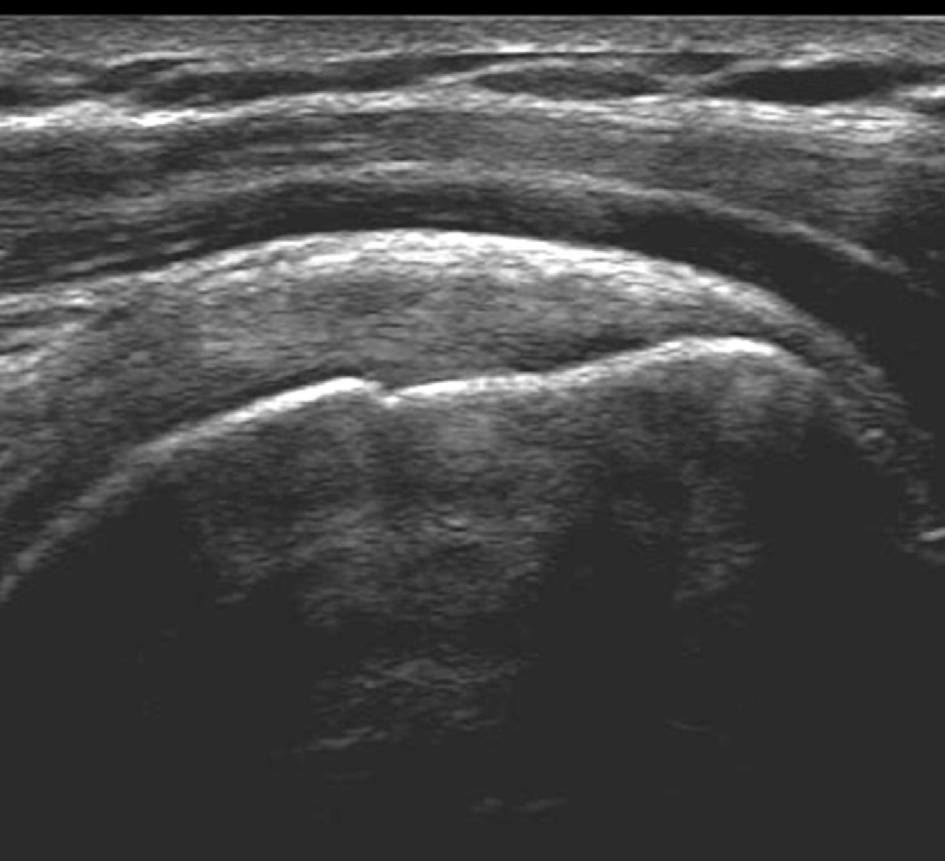


pathol

trans

SS full-thickness tear

hypoechoic defect from the bursal to the humeral cartilage



normal

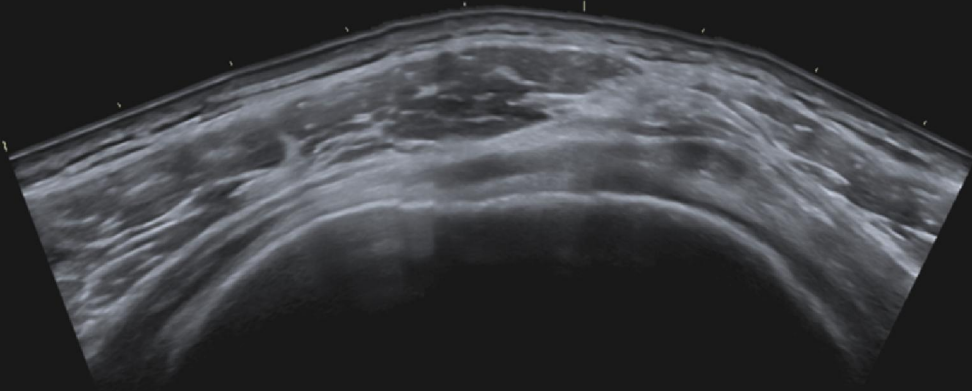


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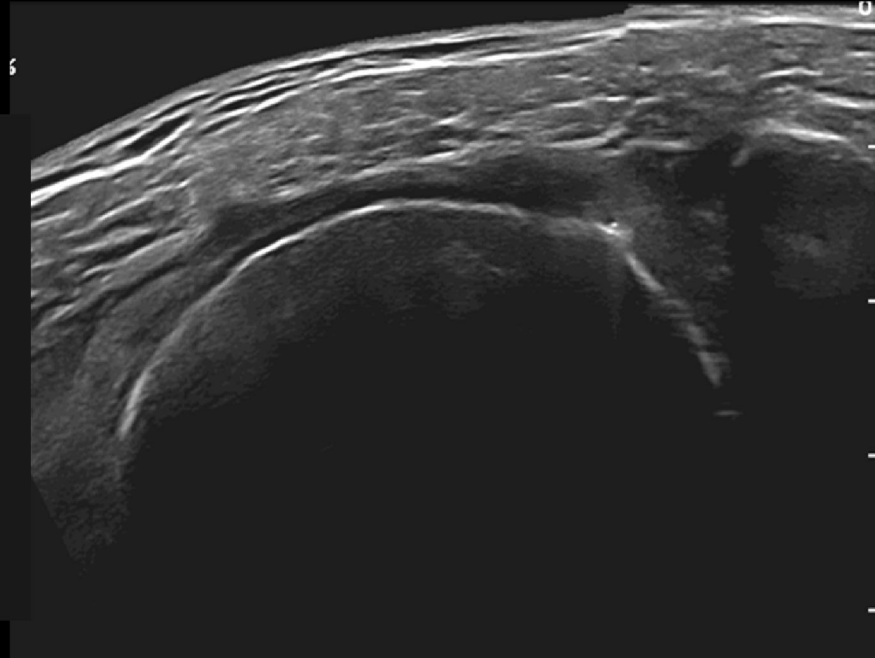
pathol

SS full-thickness tear

non-visualization of the tendon



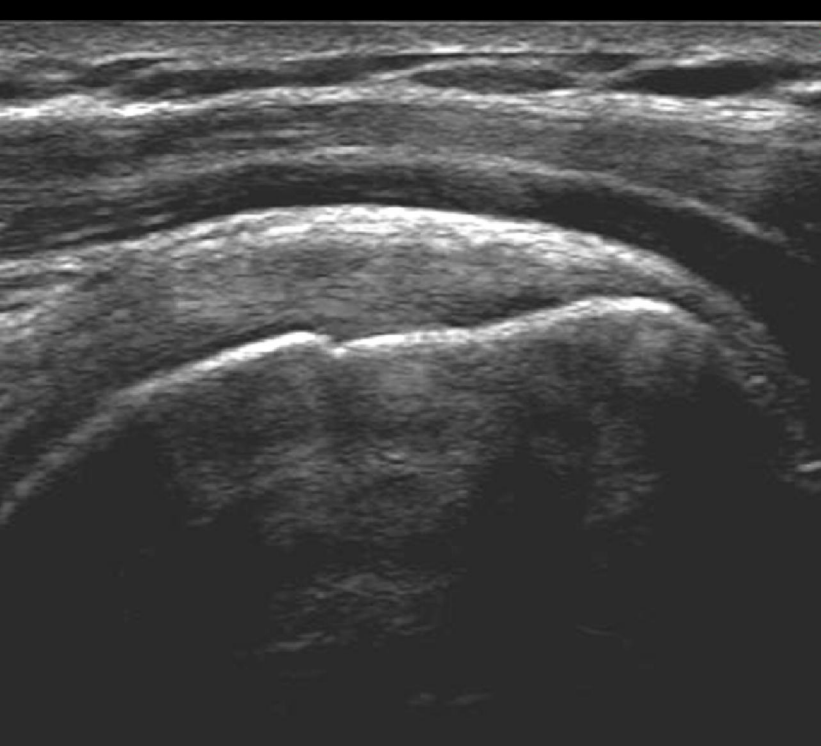
normal



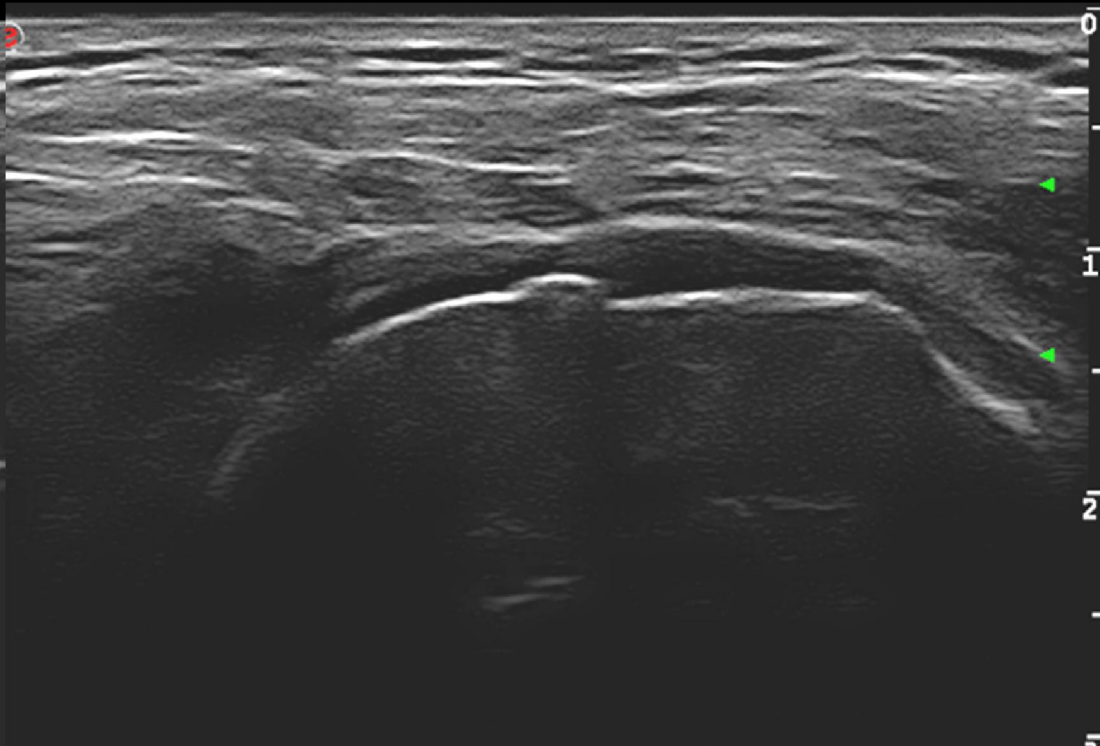
pathol

trans

SS full-thickness tear non-visualization of the tendon



normal

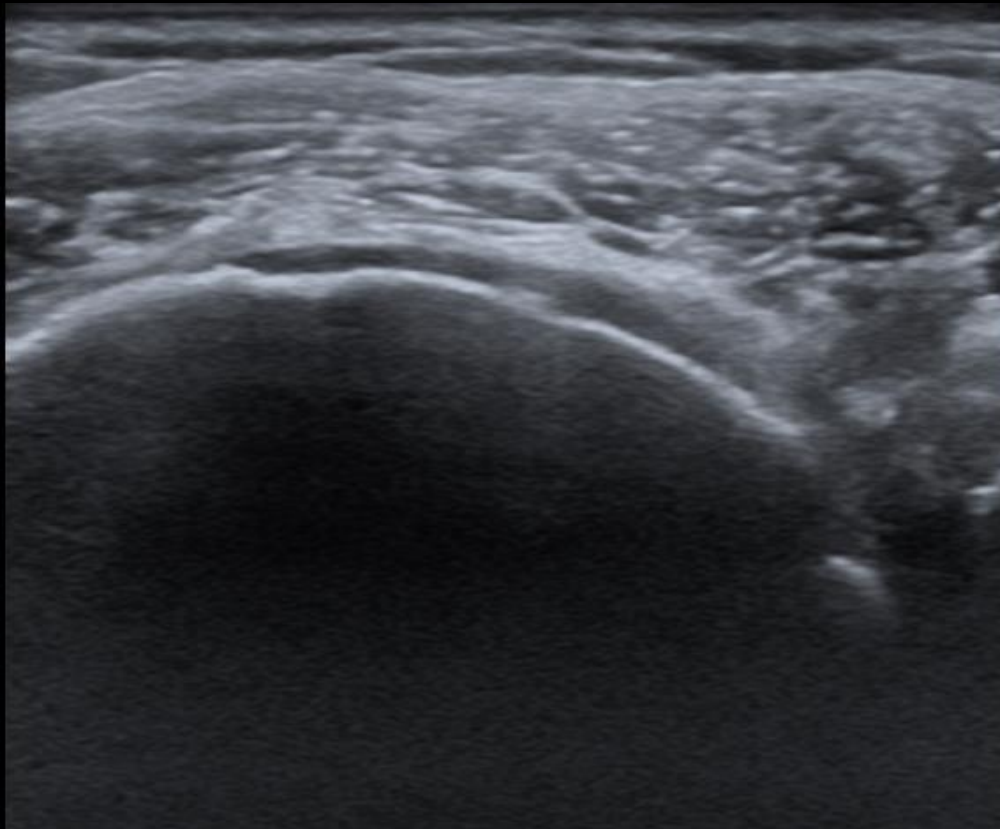


long

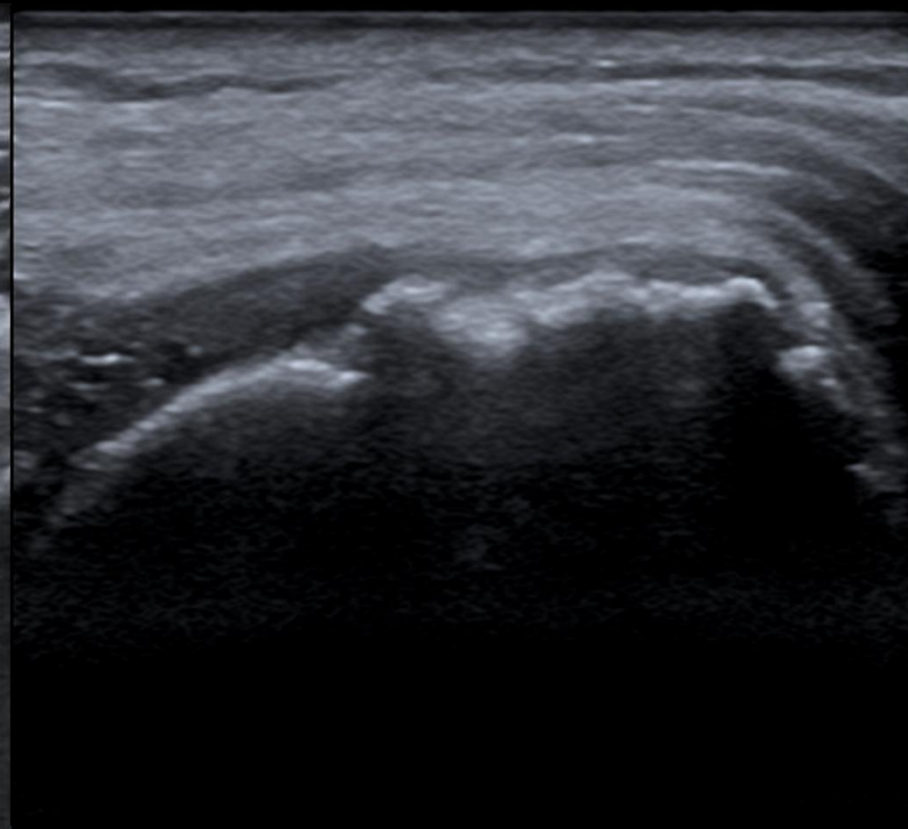
pathol

SS full-thickness tear

non-visualization of the tendon



trans

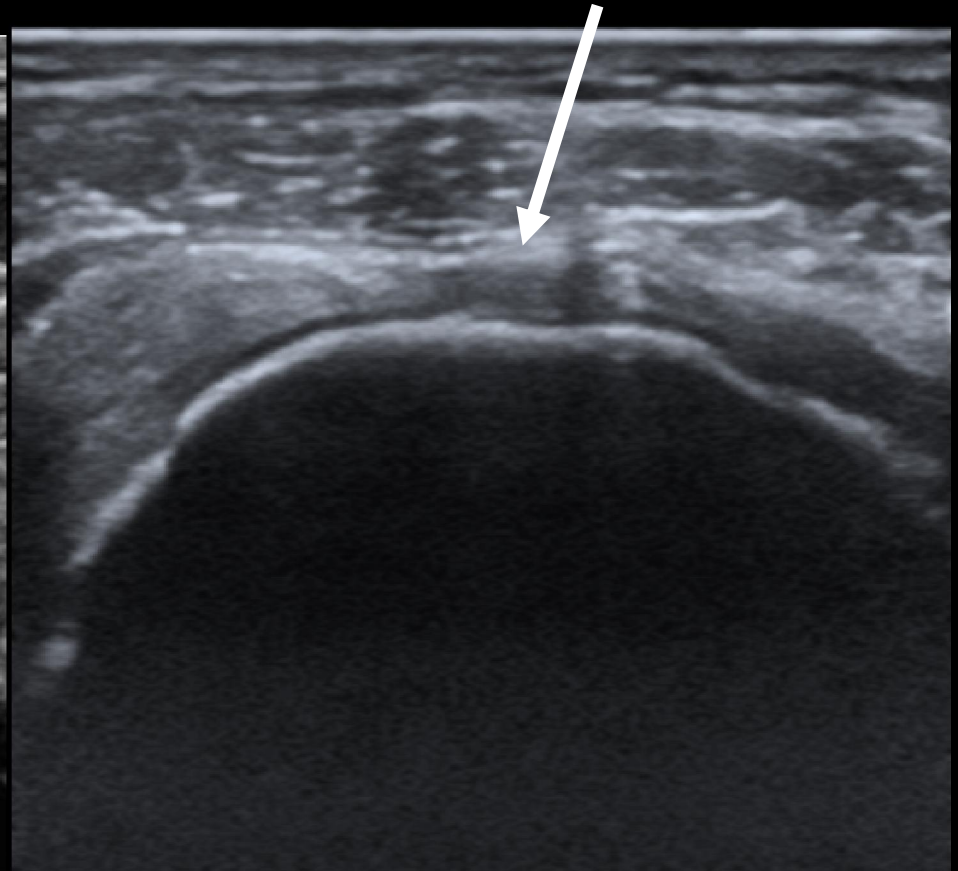


long

SS full-thickness tear loss of normal convexity



normal

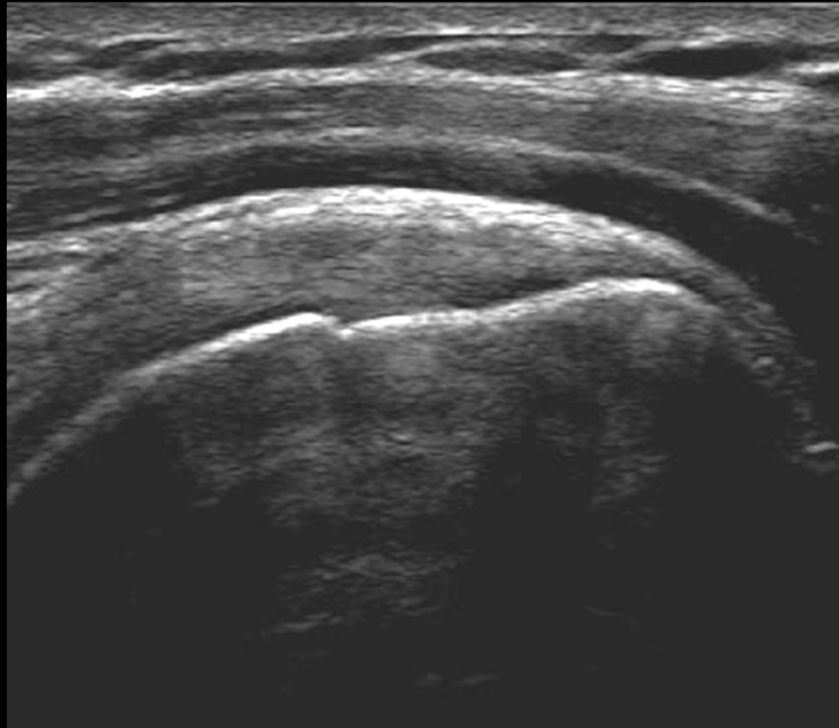


trans

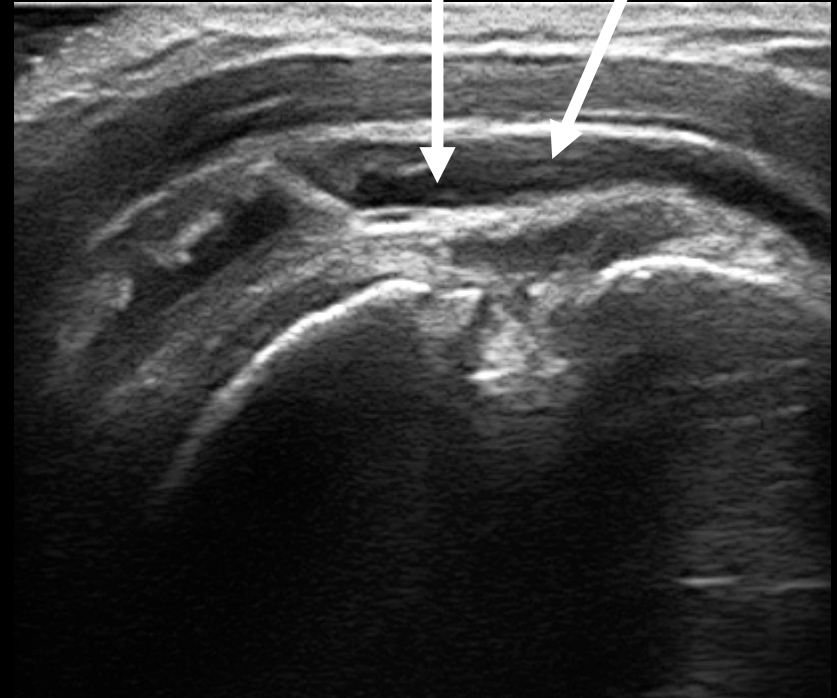
pathol

SS full-thickness tear

loss of normal convexity



normal



Burs

long

pathol

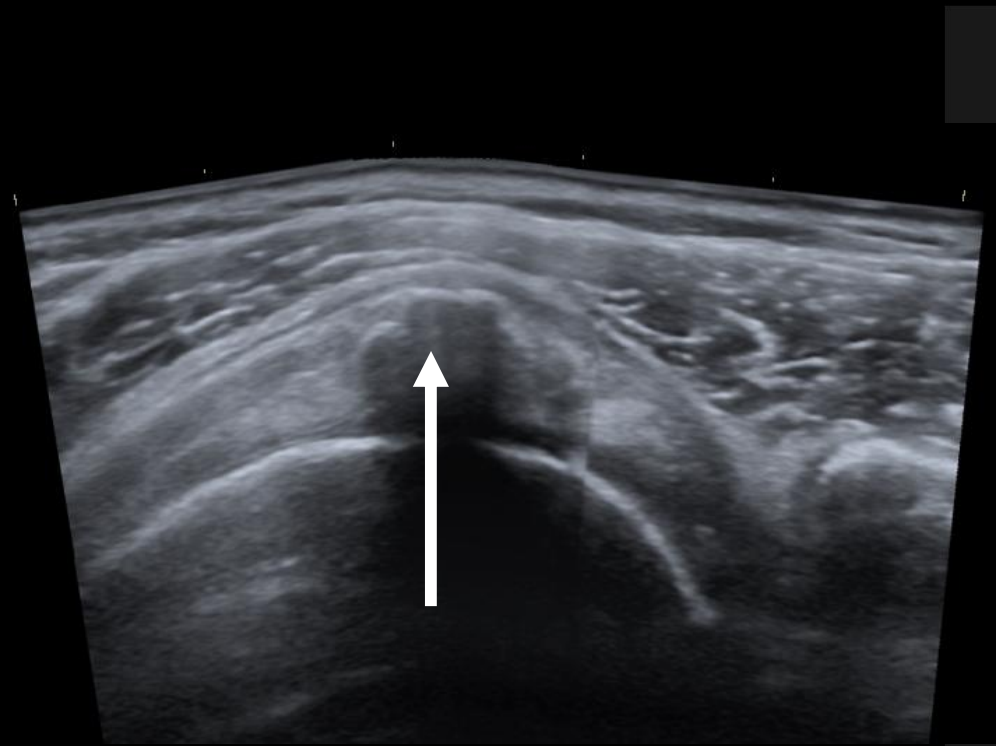
Tendon calcification. Semiology

- US signs: hyperreflective lines or foci within tendons with or without acoustic shadow (calcific tendinitis: hydroxyapatite crystals; gout: urate crystals)

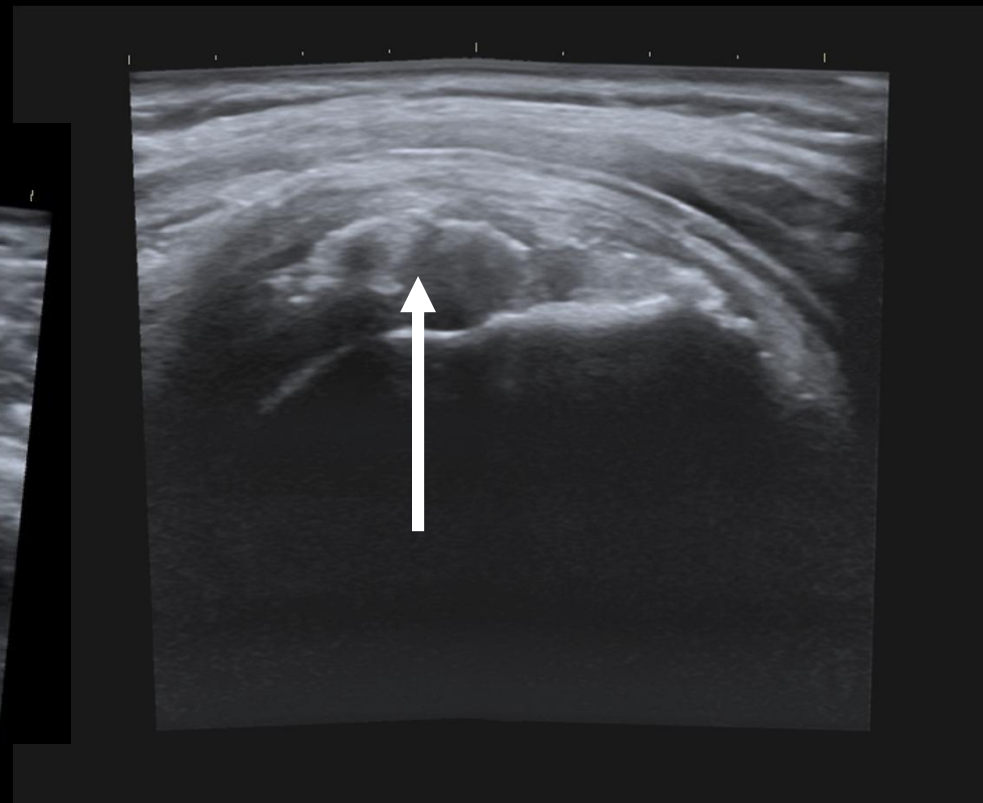


Campbell R. Clin Radiol 2001; Martinoli C. Eur Radiol 2002; De Maeseneer M. JBR-BTR 2009; Robinson P. AJR 2009

RC calcification



trans

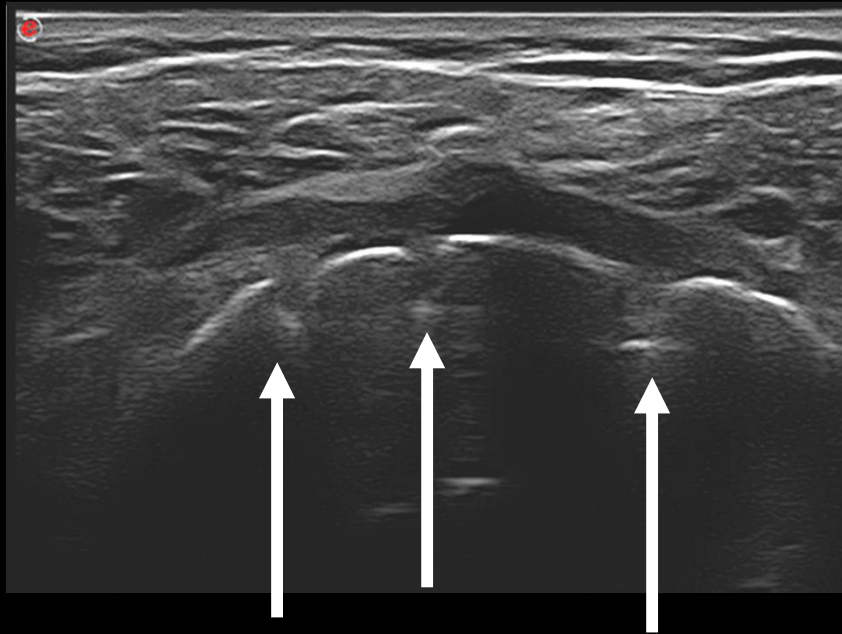


long

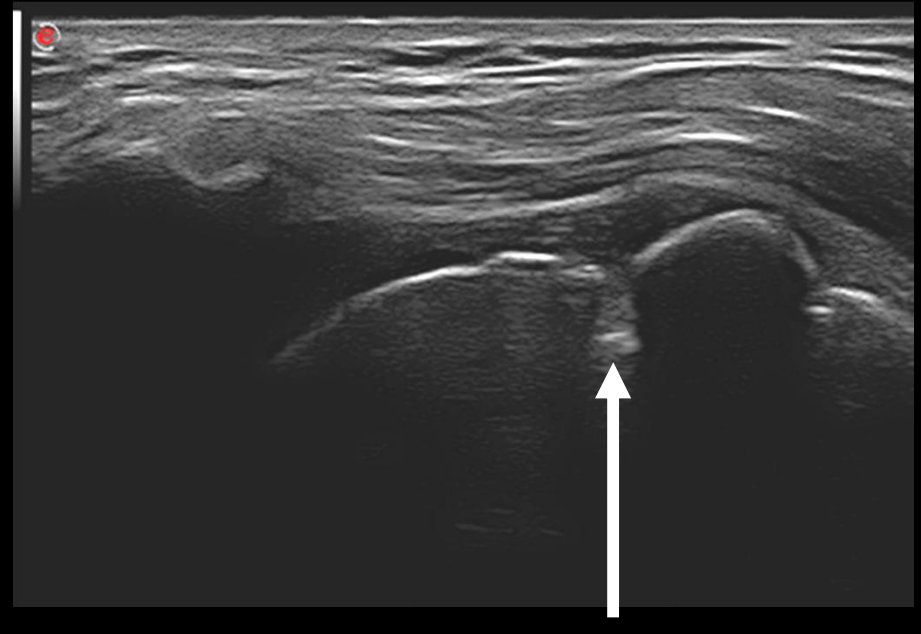
Bone erosion. Definition

- Bone erosion: an intraarticular discontinuity of the bone surface that is visible in 2 perpendicular planes

Bone erosions (humeral head)



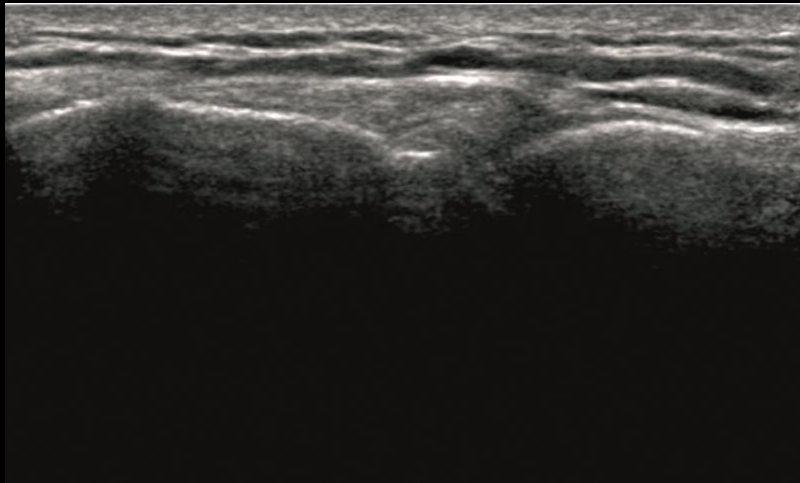
trans



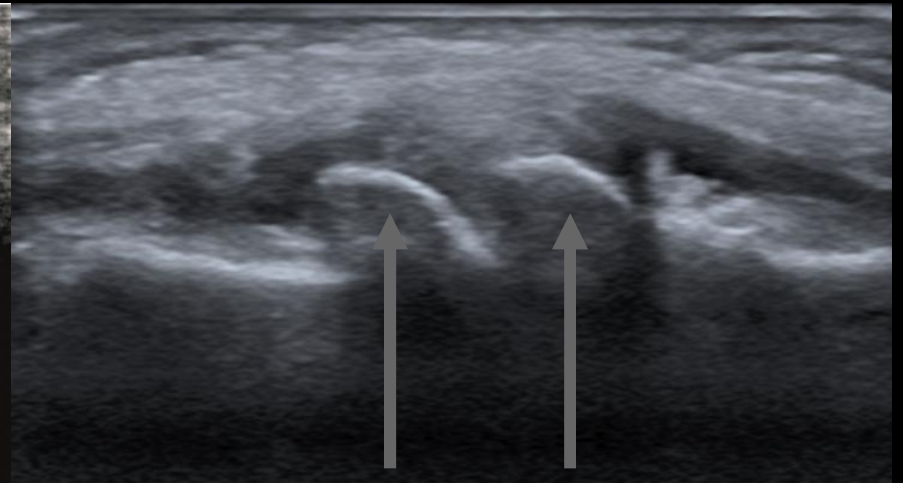
long

Bruyn GAW, et al. Ann Rheum Dis 2008

ACRCL degenerative changes



normal



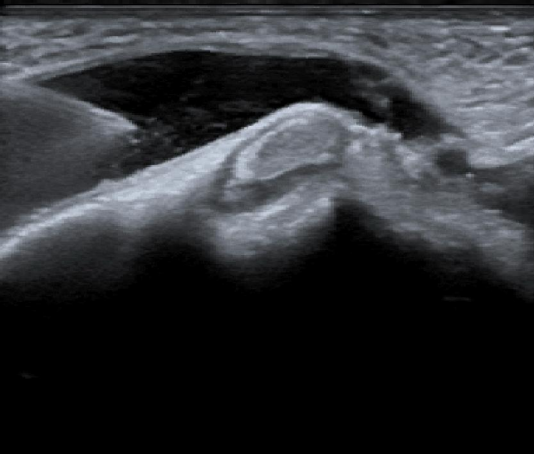
**patho
|**



GE
L7



**US: CLINICAL EVALUATION OF
INFLAMMATORY AND
DEGENERATIVE
PAINFUL SHOULDER**



Thank you!

