OBJECTIVES

Be able to:

• Identify the ultrasound images of the following normal structures of the shoulder:
  Rotator cuff tendons; Acromioclavicular joint; Subacromial/Subdeltoid bursa; Glenoid labrum
• Become familiar with the normal appearance of rotator cuff tendons in short axis and long axis views
• Identify the rotator cuff tendons that insert into the greater and lesser tuberosity of the humeral head
• Understand how various arm and body positions and transducer placement are used to optimize an ultrasound image of the shoulder

MSK ULTRASOUND

• There is a steep learning curve
• There is a small acoustic window: “you are looking at an elephant thru a keyhole”
• Need an extensive knowledge of musculoskeletal anatomy
• Hand-eye coordination needed for appropriate transducer placement
• Ultrasound is operator dependent (but so is life in general!!)

IDENTIFY THE FOLLOWING STRUCTURES

• BICEPS TENDON
• SUBSCAPULARIS TENDON
• SUBACROMIAL/SUBDELTOID BURSA
• A/C JOINT
• SUPRASPINATUS TENDON
• INFRASPINATUS TENDON
• POSTERIOR GLENOHUMERAL JOINT

ULTRASOUND APPEARANCE OF STRUCTURES IN THE SHOULDER

• TENDON: Hyperechoic/fibular
• MUSCLE: relatively hypoechoic
• BONE CORTEX: Hyperechoic with posterior shadowing
• FLUID: Simple (hypoechoic) or complex (mixed echogenicity)
• HYALINE CARTILAGE: Hypoechoic
• FIBROCARTILAGE: Hyperechoic

Shoulder Anatomy

Netter: Orthopedic Anatomy
Shoulder Anatomy

Nefer: Orthopedic Anatomy

SHOULDER ULTRASOUND EXAM

- Is a standardized exam (based on AIUM guidelines)
- Standardized approach will allow examiner to maximize efficacy and reproducibility
- Each muscle/tendon unit is examined in both long axis and short axis
- Know bony landmarks:
  a. Intertubercular groove (biceps tendon)
  b. Lesser tuberosity (subscapularis insertion)
  c. Greater tuberosity (supraspinatus and infraspinatus insertion)
  d. Acromio-clavicular joint
  e. Coracoid (site of anterior impingement)
  f. Acromion (site of subacromial impingement)
  g. Posterior glenoid (site of posterior impingement)

POSITION ONE

- Patient seated. Arm in neutral rotation.
- Hand in lap with palm upwards
- In this position the following can be assessed:
  a. Biceps tendon
  b. A/C joint
  c. Subacromial/Subdeltoid bursa
  d. Subacromial impingement

Biceps tendon

Red: tendon
Blue: transverse humeral ligament

Appears oval in transverse
Normal echogenicity
Fibrillar pattern in long axis
Should sit in bicipital groove
Minimal fluid

Acromioclavicular joint

ESSR MSK Ultrasound Technical Guidelines

- Typically has smooth margins
- Thin capsule
- Sweep anterior to posterior
- May see RC deep in joint
Subacromial impingement

**POSITION TWO**

- Arm held at patient side; flexed at elbow; forearm in supination
- Glenohumeral joint in external rotation
- This position can be used for:
  a. Evaluation of subscapularis tendon
  b. Dynamic view of biceps tendon
  c. Evaluation of anterior impingement

Subscapularis tendon

**POSTION THREE** (Crass position)

- Arm in full internal rotation (hand in mid-back)
- Hand/forearm is supinated (palm up)
- Used to assess supraspinatus tendon
- In this position:
  a. The supraspinatus tendon is in full tension
  b. Long axis view: transducer perpendicular to floor
  c. Short axis view: transducer parallel to floor
  d. Biceps tendon not well seen in short axis view
Supraspinatus: Crass position

- **Long axis view:**
  - Uniform echogenicity
  - Fibrillar pattern
  - Tapered insertion on footprint/GT
  - Smooth bone/cartilage interface
  - Look at SAD bursa

- **Short axis view:**
  - Echogenic and curvilinear
  - Uniform thickness (6mm)
  - "Tire on a rim"
  - SS/red/IS (yellow) interface

POSITION THREE (Modified Crass)

- Arm held in partial internal rotation
- Arm held in partial internal rotation
- Tell patient to reach into their same side back pocket
- Easier for patient to tolerate
- Used to assess supraspinatus tendon
- In this position:
  a. Long axis view of SS obtained by putting transducer parallel to humerus
  b. Easier to ID biceps tendon in short axis (rotator cuff interval)

Supraspinatus: modified Crass position

- Red: Supraspinatus tendon
- Blue: Biceps tendon
- Yellow: Subscapularis tendon

Rotator cuff overlap

From: Fundamentals of MSK Ultrasound
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ESSR MSK Ultrasound Technical Guidelines
POSITION FOUR

- Arm held in neutral rotation
- Forearm flexed; hand palm up
- Transducer over posterior shoulder
- This position used to evaluate:
  a. Infraspinatus and Teres minor
  b. Posterior labrum
  c. Posterior glenohumeral joint
  d. Muscle atrophy
  e. Posterior impingement

Infraspinatus and Teres minor tendon

TAKE HOME POINTS

- Shoulder MSK ultrasound is an extension of the history and physical
- Best results are obtained when the examiner uses a systemic approach
- It is important to:
  a. Look at each tendon in long axis and short axis view
  b. Scan the entire width and length of each structure
  c. Perform dynamic maneuvers (Biceps tendon, impingement)