Disclosures

- No Conflicts regarding content of this talk
- Special Thanks to Andrea Vincent, Karen McGuigan and Sonosite
Outline

- Basics of Ultrasound – Terms and Techniques
- Benefits and Limitations of Ultrasound
- The 13 Point Shoulder Exam – Don Buford MD
- Hands on practice
Basics

• Equipment
Basics

- Knobs
Basics

- How does it work?
  - Electrical signal to transducer produces sound waves
  - Sound waves “bounce” off of soft tissue and bone back to transducer
  - The more dense and perpendicular the tissue the brighter the appearance on the screen
Basics

- Terms
  - Frequency – the range of sound waves produced by a transducer measure in (MHz)
  - Higher frequency = higher image quality but less depth of penetration
  -Deeper structure requires lower frequency to image
  -Echogenicity – how intense an image is on screen
    - Hyperechoic – very bright (dense) bone/calcium
    - Hypoechoic – very dark (less dense) air/fluid
Basics

• Terms
  • Longitudinal – along the length of the structure
  • Transverse – across the width of the structure
  • Anisotropy – Abnormal imaging of a normal structure where it appears hypoechoic but really is hyperechoic – related to not being perpendicular to imaged structure

![Supraspinatus](image_url)
Basics

- Technique
  - Hold Probe in same hand as the extremity being evaluated (Pt left examiner left) NOT your dominant hand
  - Rest ulnar aspect of examiners hand on extremity being examined
Benefits of Ultrasound

- Immediate results for both patient and physician
- Improved patient satisfaction
- Can use on entire body
- Allows visualization with hardware in place (anchors, hemi, total, reverse)
- Cheaper than MRI and contrast CT
- Patients unable to have MRI (pacer, stents, spinal stimulators, claustrophobia)
- Image guided injections
- Dynamic exams
- No Radiation
- Use on Sideline
- Billable procedure
Limitations of Ultrasound

- Intraarticular anatomy
  - Labrum (Limited posterior only)
  - Cartilage
  - Biceps anchor

- If using in multiple areas in body need multiple probes

- May slow clinic times especially in beginning

- Dependent on examiner experience
Point 1
Primary Structure - transverse long head biceps tendon

Patient Position: shoulder neutral, hand on thigh, palm up
Ultrasound depth range: 2-5 cm
MRI Equivalent = Axial bicipital groove
The Exam

Point 2
Primary Structure - longitudinal long head biceps tendon

Patient Position: hand on thigh, palm up
Ultrasound depth range: 2-5 cm
MRI Equivalent = Sagittal biceps tendon
The Exam

Point 3
Primary Structure - longitudinal subscapularis tendon

Patient Position: shoulder externally rotated, hand on thigh, palm up
Ultrasound depth range: 3-5 cm
MRI Equivalent = Axial subscapularis
The Exam

Point 4
Primary Structure - transverse subscapularis tendon

Patient Position: shoulder externally rotated, hand on thigh, palm up
Ultrasound depth range: 3-5 cm
MRI Equivalent = Sagittal subscapularis

Front View
The Exam

Point 5
Primary Structures - coracoid, longitudinal subscapularis tendon

Patient Position: shoulder externally rotated, hand on thigh, palm up
Ultrasound depth range: 3-6 cm
MRI Equivalent = axial subscapularis
The Exam

Point 6
Primary Structure - longitudinal anterior supraspinatus tendon

Patient Position: hand on posterior hip, elbow adducted
Ultrasound depth range: 3-5 cm
MRI Equivalent = Coronal supraspinatus
The Exam

Point 7
Primary Structure - longitudinal posterior supraspinatus tendon

Patient Position: hand on posterior hip, elbow adducted
Ultrasound depth range: 3-5 cm
MRI Equivalent = Coronal supraspinatus
The Exam

Point 8
Primary Structure - transverse anterior supraspinatus tendon

Patient Position: hand on posterior hip, elbow adducted
Ultrasound depth range: 3-5 cm
MRI Equivalent = Sagittal supraspinatus
The Exam

Point 9
Primary Structure - transverse posterior supraspinatus tendon

Patient Position: hand on posterior hip, elbow adducted
Ultrasound depth range: 3-5 cm
MRI Equivalent = Sagittal supraspinatus
The Exam

Point 10
Primary Structure - longitudinal infraspinatus tendon

Patient Position: hand on medial thigh
Ultrasound depth range: 3-5 cm
MRI Equivalent = Axial infraspinatus

Supraspinatus
Teres minor
The Exam

Point 11
Primary Structure - transverse infraspinatus tendon

Patient Position: hand on medial thigh
Ultrasound depth range: 3-5 cm
MRI Equivalent = Sagittal infraspinatus
The Exam

Point 12
Primary Structures - posterior G-H joint, longitudinal infraspinatus tendon

Patient Position: hand on medial thigh
Ultrasound depth range: 3-5 cm
MRI Equivalent = Axial infraspinatus

Extra-articular zone of labrum
Intra-articular zone of labrum
Joint capsule
The Exam

Point 13

Primary Structure - Acromioclavicular Joint

Patient Position: hand on thigh, palm up
Ultrasound depth range: 2-4 cm
MRI Equivalent = Coronal AC joint
References

• **Recommended Text**
  
  • “Fundamentals of Musculoskeletal Ultrasound” Jon A. Jacobson 2007

• **Course available by Don Buford M.D.**
  
  • [www.sonosite.com](http://www.sonosite.com)
  • Shoulder, elbow, hip, knee, ankle
Thanks