Ultrasound in Sports Medicine

CASES AND USES

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The Primary Care Approach to Treating the Injured Athlete
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Financial Disclosures/Conflicts of Interest

None
Background

Growing interest in sports/musculoskeletal applications for ultrasound

Advantages

◦ Non-invasive
◦ Point of care, potentially portable
◦ No radiation
◦ Better spatial resolution than MRI
◦ Good evaluation of soft tissue
◦ Targeted exam

http://www.24x7mag.com/2016/03/diagnostic-ultrasound-pocket/
Outline

Ultrasound - the basics
Cases
Other applications
Scanning demonstration
Ultrasound- The Basics

Sound waves = energy waves
- Travel through a medium

Ultrasound
- Pressure waves above frequency of human hearing

Piezoelectric crystals in probe
- Electric current $\rightarrow$ ultrasound waves
- Ultrasound waves $\rightarrow$ electric current

Generates echoes
Ultrasound- The Basics

Areas described based on **echogenicity**
- Amount of ultrasound reflected relative to the area around it

Echoes show up as white on screen
- Hypoechoic
- Hyperechoic
- Anechoic
- Isoechoic

NOT density
Bone and tendon are hyperechoic, but so are fat and gas!

Sayed AA 2012
Ultrasound - The Basics

Screen image is generated based on
  ◦ Degree of echogenicity
  ◦ Time for echo to return
    ◦ Longer time to return = deeper structure
Ultrasound - The Basics

Superficial

Deep
Ultrasound - The Basics

Superficial

Deep
Artifacts - Posterior Acoustic Shadowing
Superficial structures seen better
Difficult to evaluate deep to hyperechoic tissues
Artifacts - Anisotropy
Ultrasound- The Basics

Advantages
- Non-invasive
- Point of care, potentially portable
- No radiation
- Better spatial resolution than MRI
- Good evaluation of soft tissue
- Targeted exam

Disadvantages
- Extremely user dependent
- False positives, false negatives
- Much better for superficial structures
- Poor visualization with larger body habitus
- May not preclude need for further imaging
Cases
A pain in the ankle

55 y/o active male presents 3 days after right ankle injury
- Playing soccer, made a quick turn
- Felt a sharp pain in posterior ankle
- Weakness with toe-off in walking

Physical Exam
- 4/5 right plantar flexion
- Palpable defect at Achilles tendon
A pain in the ankle

Factors that affect surgical planning
- Complete or incomplete
- Location
  - Myotendinous junction
  - Midportion
  - Insertion
Surgery or no surgery?

Prospective study of 125 patients

- Acute Achilles rupture (<7d)
- 5 mm or less gap in maximal plantar flexion
  - Cast in plantar flexion x6 weeks
  - Boot x2 weeks
- > 5 mm gap → surgery
- Same PT
- No significant difference in rate of re-rupture
  - 3.4% non-operative vs. 1.5% operative
A crushing blow

16 y/o F presents 3 weeks after left foot injury
- Horse slipped and fell on her foot
- Able to WB

Physical Exam
- Normal strength and sensation
- TTP 4th and 5th TMT

https://www.equestrianempire.com/20-craziest-horse-falls-all-time/
Other Applications in Sports Medicine

Procedure guidance
- Prior “failed” injection
- Deep structure/ body habitus
- PRP, prolotherapy

Diagnosis of soft tissue injuries

Foreign bodies

Splenomegaly in mononucleosis (Hosey et al 2008)

Focused echocardiography for pre-participation cardiac screening (Gleason et al 2017)
Scanning Demo
References


