

Week 6, Lecture 3

Ultrasonography





Lecture Outline

1. Introduction
2. Uses
3. Ultrasound production
4. Examples
5. Summary

1. Introduction

- ∩ Becoming more widely used
- ∩ No radiation dose
- ∩ Relatively cheap
- ∩ Performed relatively fast
- ∩ Few limitations
- ∩ Real-time viewing (i.e. can view movement)

2. Uses

- ∞ Demonstrates boundaries between soft tissue structures
- ∞ As well as internal structure
- ∞ High resolution \Rightarrow superficial structures
- ∞ Muscles, tendons, ligaments & vessels
- ∞ Poor for bone lesions

Use in the foot and ankle

∩ Tendon pathology

- tendon tears
- tendonitiis, peritendonitis, tenosynovitis

∩ Plantar fasciitis/plantar fascial rupture

∩ Neuromas

∩ Bursitis

∩ Ligament injuries

3. Ultrasound production

- ∴ Similar to vascular Doppler ultrasound
- ∴ 7.5-10 Mhz transducer
- ∴ Sound waves emitted
- ∴ Higher frequency gives higher resolution
- ∴ However, attenuated more easily

Image production

- ∞ Ultrasound waves interact with different tissues
- ∞ Reflected back (echo)
- ∞ Returning echoes converted to a grey scale (1-64 shades of grey)
- ∞ Projected onto a monitor (image is also converted to a static film)

Terminology

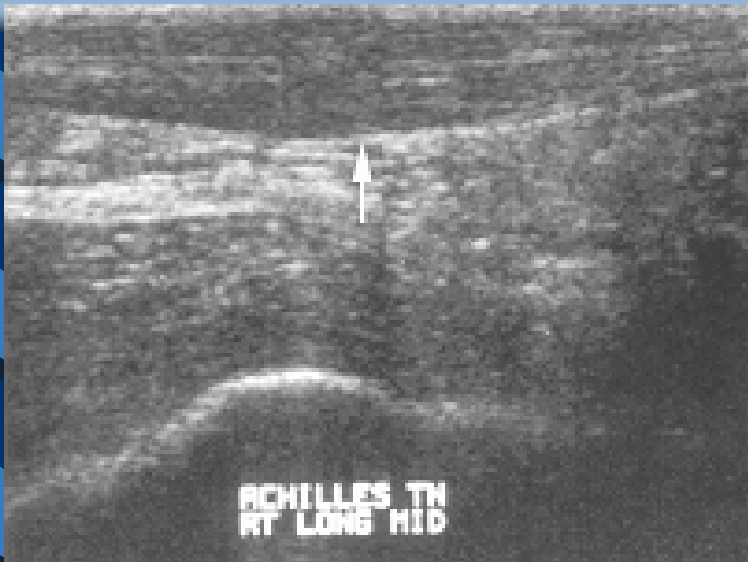
∞ Echo-free vs. echogenic

- Fluid is echo-free (dark grey/black)
- Tissue is echogenic (light grey/white)
- Mixed lesions \Rightarrow mixed echogenicity

∞ Hypoechoic \Rightarrow low echogenicity

∞ Hyperechoic \Rightarrow high echogenicity

4. Examples



Achilles tendonitis
Note: swelling of
Achilles tendon



Achilles tendonitis complicated
by either cystic degeneration
or an intrasubstance tear
Note: hypoechoic area



Note: retrocalcaneal bursitis on
plain film and ultrasound

Sensitivity and specificity

Ω Kainberger et al (1990), *Am J Radiology*

- Assessed diagnostic potential of Ultrasonography for Achilles tendon injury
- Sensitivity 0.72, Specificity 0.83
- Swelling, abnormal structure, rupture, peritendinous lesions

5. Summary

- ∞ Increasingly accepted and used for soft tissue injuries
- ∞ Good sensitivity and specificity for foot and ankle soft tissue injuries
- ∞ In particular, appropriate for tendon injuries of the foot and ankle
- ∞ Relatively cheap and easy to access