SHEAR WAVE IMAGING IN MODERATE TO SEVERE ACHILLES TENDINOPATHY

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Achilles Tendinopathy

- Largest and strongest tendon in the human body
- High percentage of all athletic injuries \(^1\)
- Significantly more common in elderly \(^2\)
- Occurs due to acute or chronic micro-tears over time
- Leads to pain, disability and increased likelihood of complete tear

Current Diagnosis

- Clinical Exam
- MRI
- Ultrasound

*imaging often does not correlate with symptoms

Shear Wave Imaging (SWI)

- New elastographic ultrasound imaging technique
- Uses focused ultrasound beams to produce a supersonic shear wave
- Rate of propagation of the shear wave is related to Young’s Modulus
- Therefore not operator dependent, unlike strain elastography

Generation of the supersonic shear source: the source is sequentially moved along the beam axis, creating two plane- and intense-shear waves.

Purpose of Study

- SWI is already an inexpensive and simple method for detection of cancer in other parts of the body\(^1\)
- Modality is promising, but poorly studied in the musculoskeletal system
- Can SWI provide an objective, operator-independent method of diagnosing mod-to-severe Achilles tendinopathy?

Methods

- Data used from another IRB approved prospective study
- 12 subjects with unilateral moderate-to-severe Achilles tendinopathy* (42-65 y.o., 75% men)
- Imaging performed on both the contralateral and affected sides
- Measures of thickness, echogenicity, hyperemia and Shear Wave Speed

*defined by Grade 2-3 hypoechogenicity, Grade 2-3 hyperemia and tendon thickening > 7 mm
Average Thickness (mm)

Echogenicity Score (1-3)\textsuperscript{1}

Grade:

Shear Wave Speed (m/s)

- **Normal**
  - Shear Wave Speed (SWS) comparison:
    - Normal vs. Tendinopathy:
      - SWS: 14 m/s ± 0.5 m/s
      - Statistical significance: P < 0.01

- **Tendinopathy**
  - SWS: 10 m/s ± 1 m/s

- **Normal**
  - SWS: 16 m/s ± 2 m/s

- **High SWS**
  - SWS: 12 m/s ± 0.3 m/s

- **Low SWS**
  - SWS: 8 m/s ± 0.2 m/s
SWI Diagnostic Ability

- At a threshold of 12 m/s, the test sensitivity is 92% and specificity is 83% to diagnose moderate to severe Achilles tendinopathy.

- This study validates that SWI can be a sensitive and specific means of diagnosing moderate-to-severe Achilles tendinopathy and may be a more objective method for diagnosis and treatment.
Limitations

- The control side was not “normal” on average.
- Small study (n=12)
- Analysis is potentially sensitive to tendon tension during ankle dorsiflexion
THANK YOU!

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