




ULTRASOUND OF THE FOOT AND ANKLE

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Financial Disclosures/Conflicts of Interest

None

Outline

- Ultrasound Basics
- Anterior Ankle Exam
- Medial Ankle Exam
- Lateral Ankle Exam
- Posterior Ankle Exam
- Foot Exam
- Selected Pathology

Why Ultrasound?

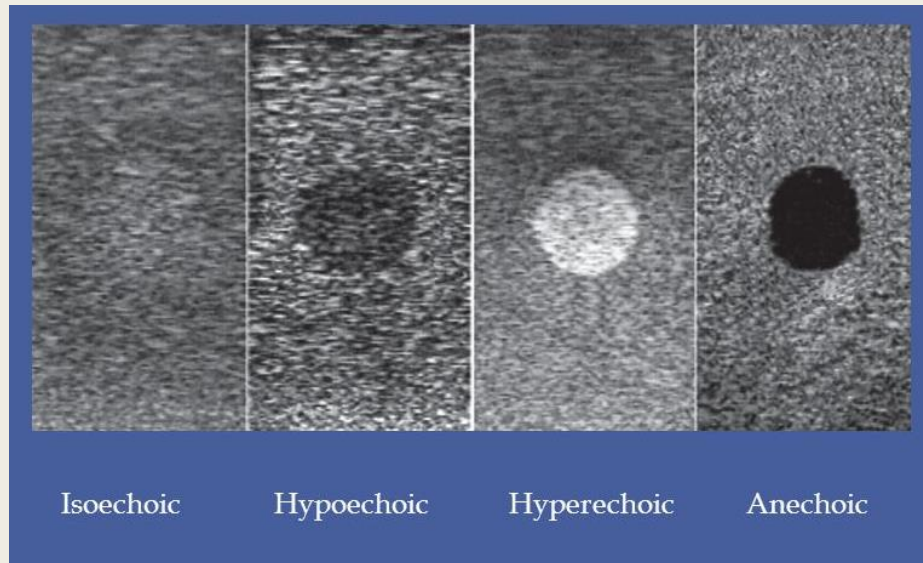
- Non-invasive
- Point of care
- Inexpensive
- Better spatial resolution than MRI
- Targeted exam
- Dynamic exam

Ultrasound Basics

- Ultrasound
 - *Pressure waves vibrating at a frequency above the sound of human hearing*
- Piezoelectric crystals
 - *Electric current \leftrightarrow ultrasound waves*
- Orientation

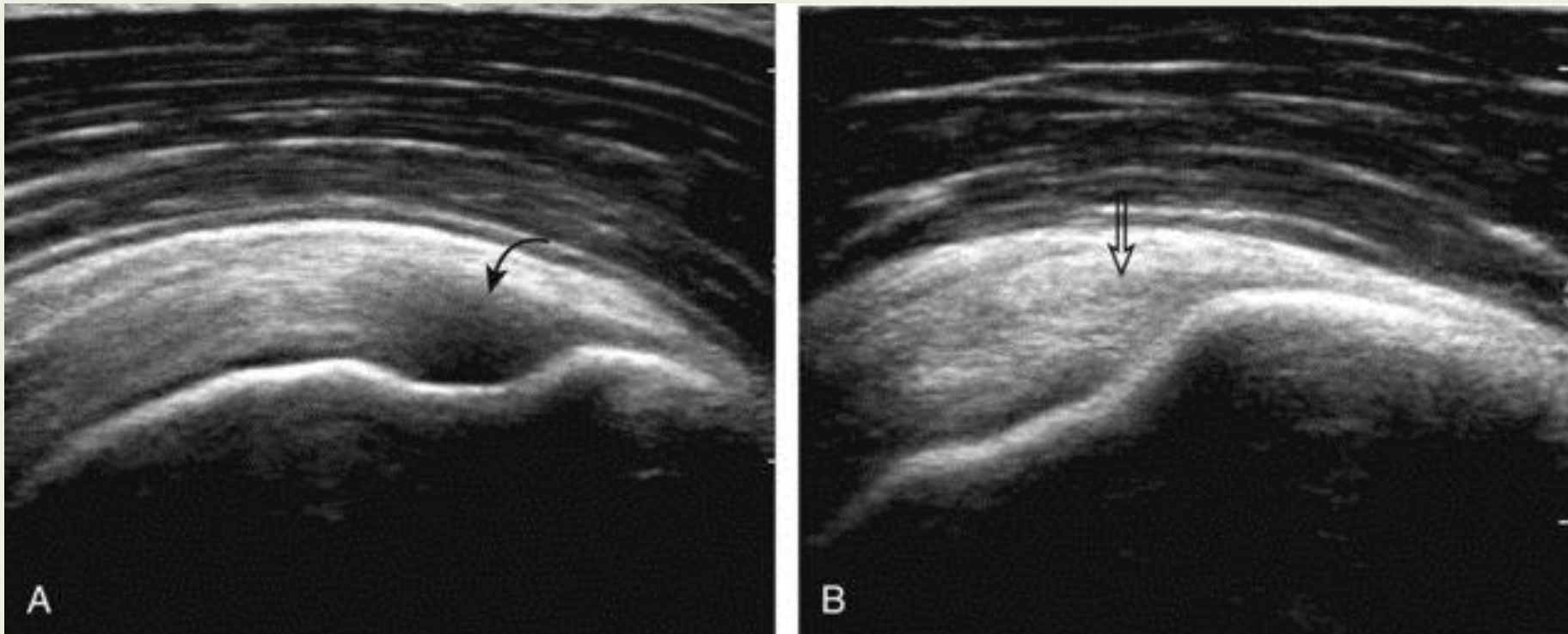


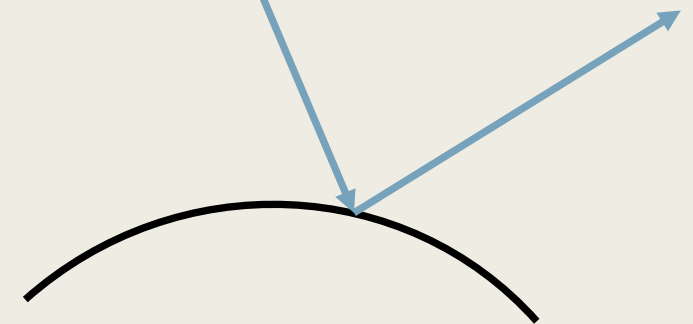
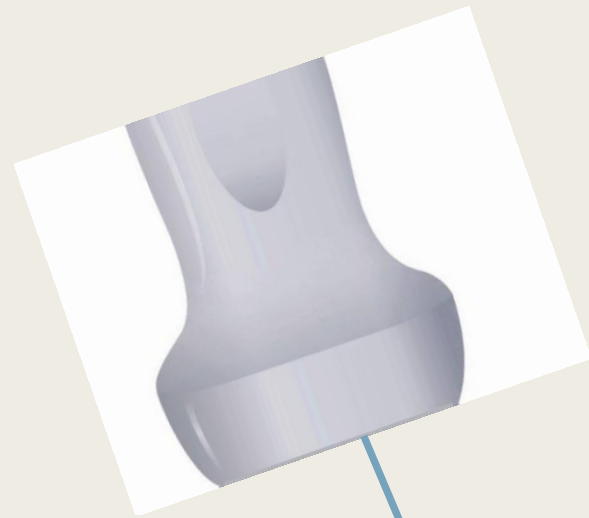
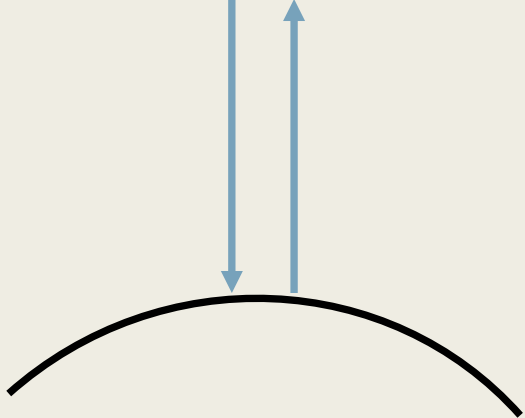
Ultrasound Basics

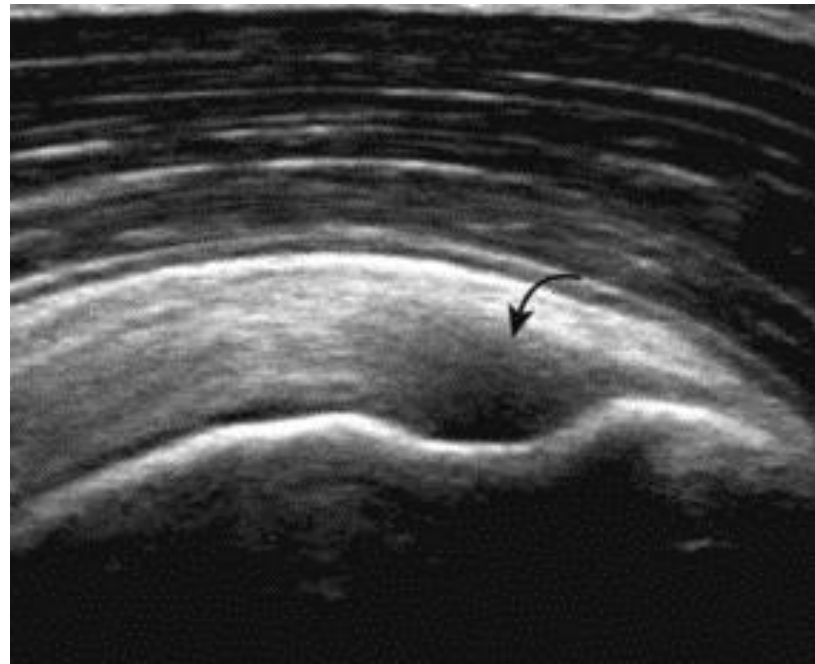
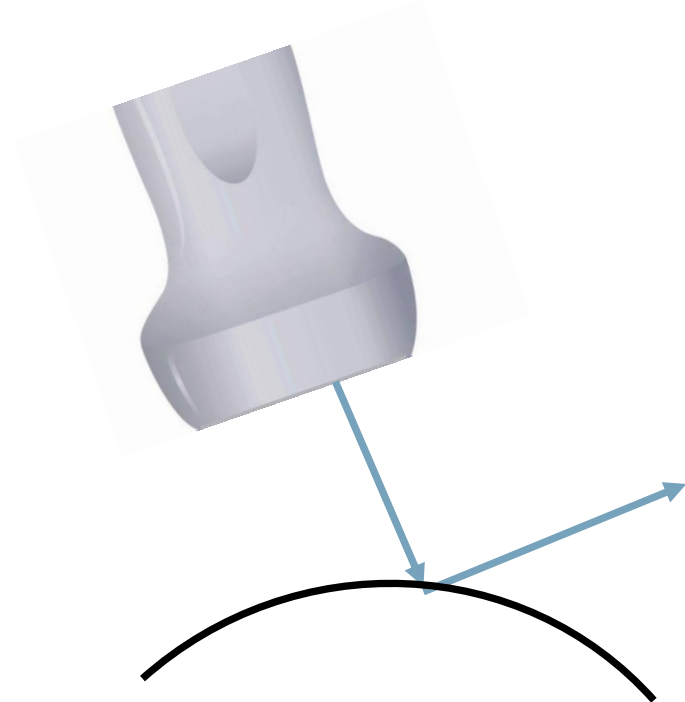
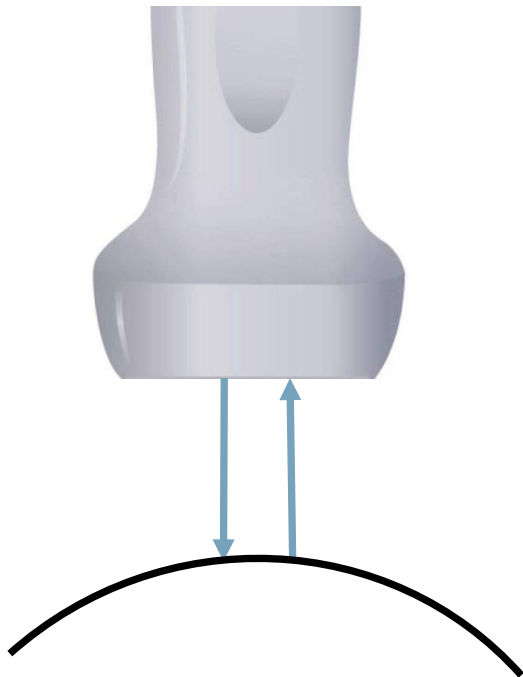


- Echogenicity
- Artifacts
 - *Anisotropy*

Ultrasound Basics



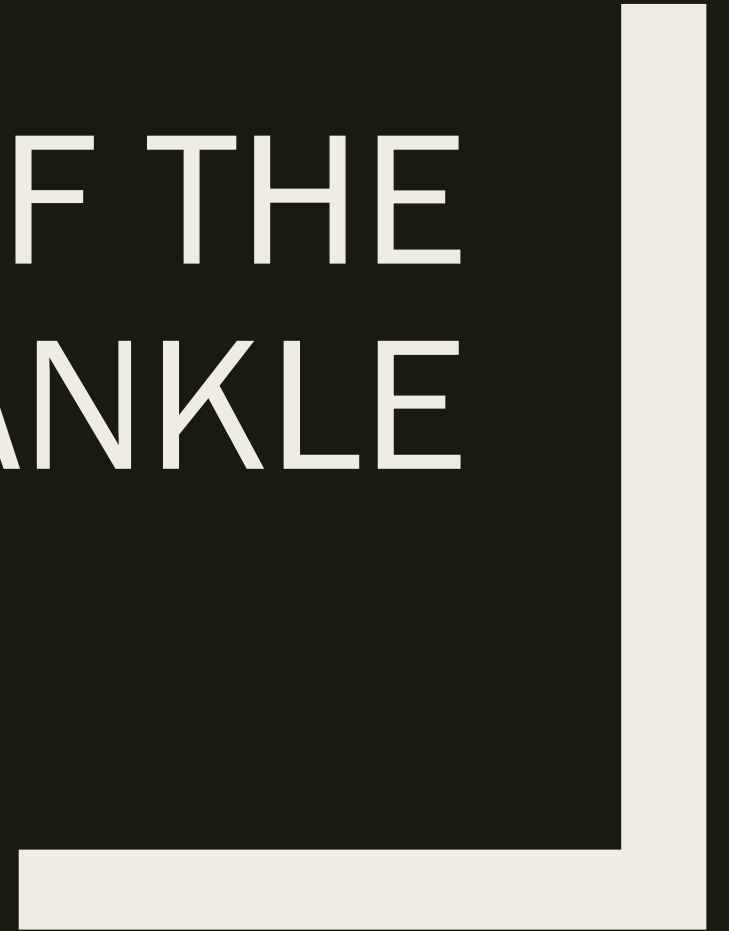




Evaluating a Structure

- Two orthogonal planes
 - *Long axis*
 - *Short axis*
- Along the length and width of the structure

EVALUATION OF THE FOOT AND ANKLE

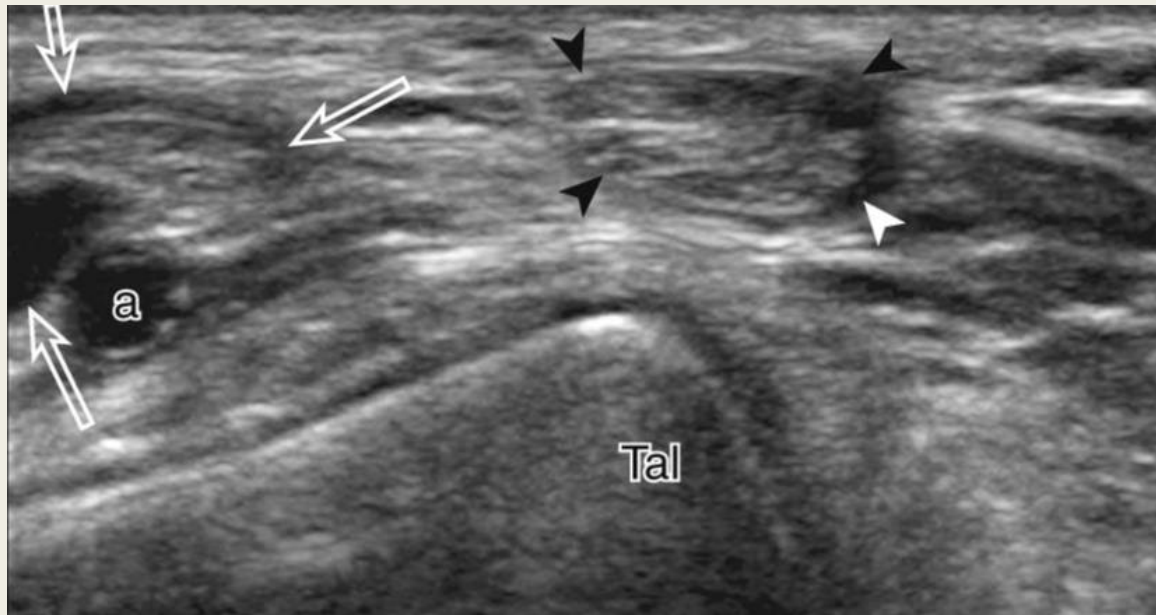


Anterior Evaluation

- Sagittal probe orientation
- Anterior Joint Recess
 - *Effusion*
 - *Hyaline cartilage abnormalities*



Anterior Evaluation



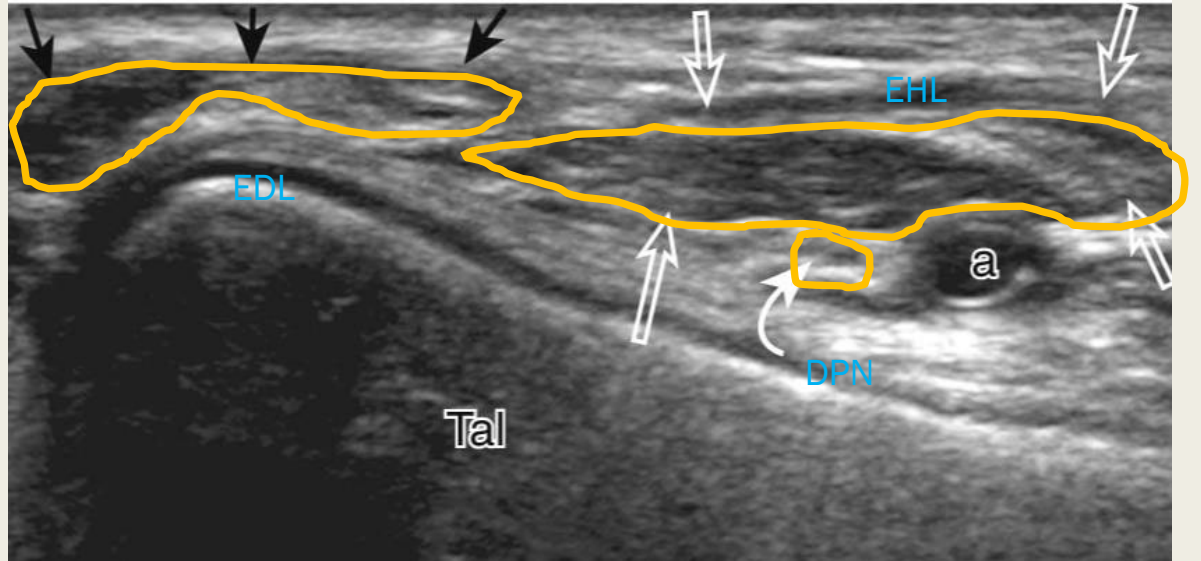
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- Transverse probe orientation
- Anterior Structures
 - *Tibialis Anterior*
 - *Extensor hallucis longus*
 - *Dorsalis pedis artery*

Anterior Evaluation

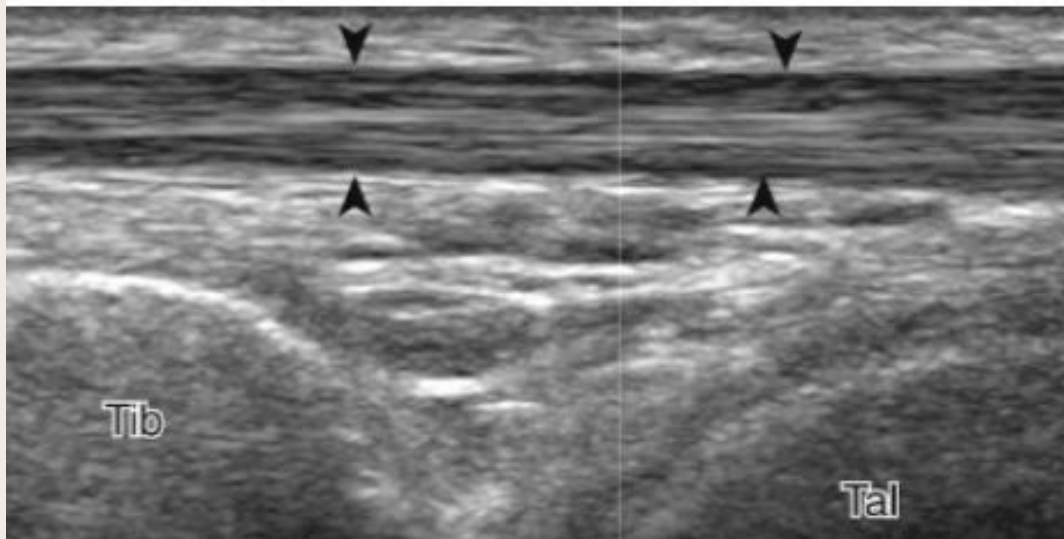
- Anterior Structures, cont.
 - *Deep peroneal (fibular) nerve*
 - *Extensor digitorum longus*
 - *Peroneus (fibularis) tertius*

Lateral→Medial: FEET



Jacobson 2013

Anterior Evaluation

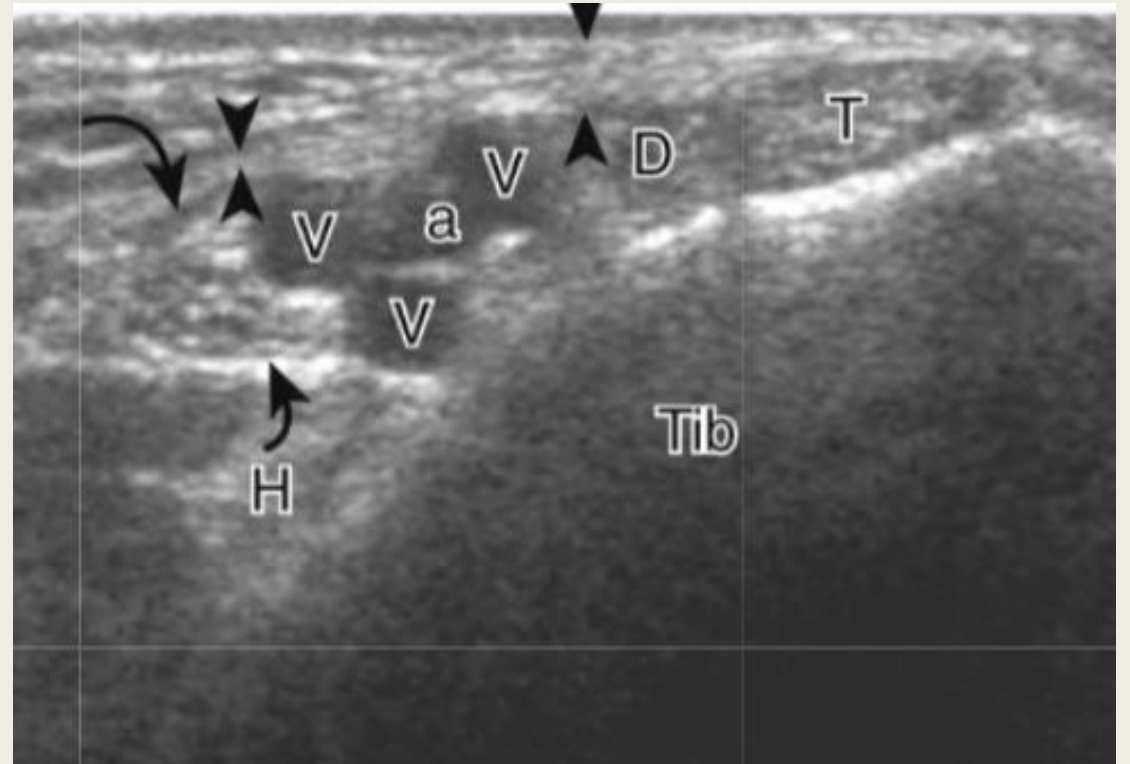


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- Long axis evaluation

Medial Evaluation

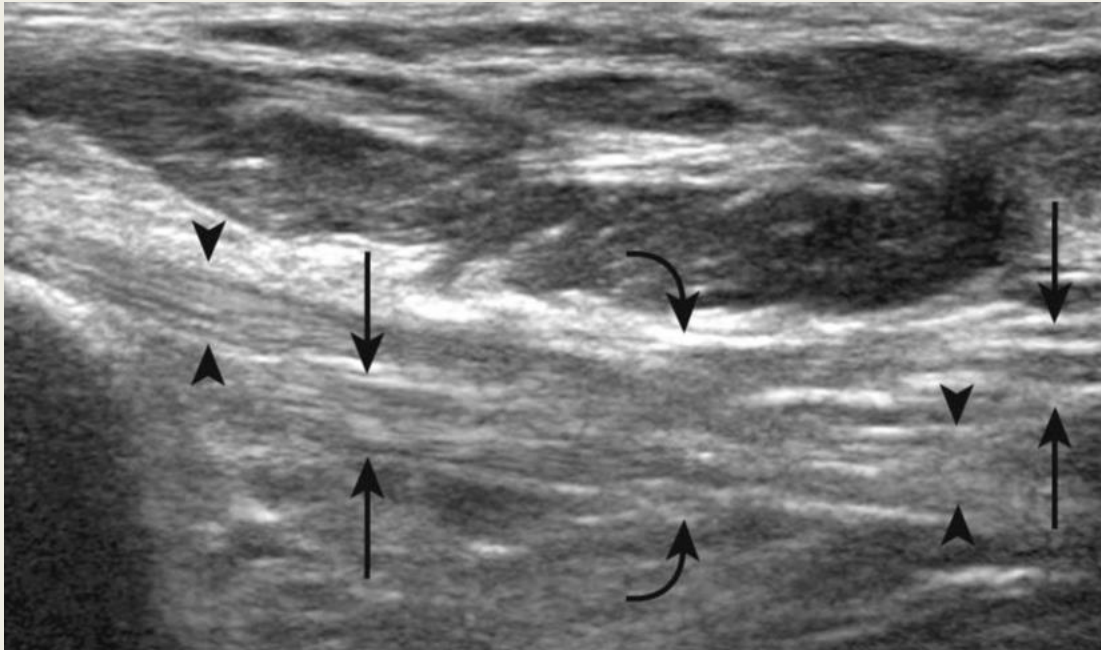
- Probe transverse/short axis
- Tibialis posterior
 - (*Accessory navicular*)
- Flexor digitorum longus
- Posterior tibial artery
- Posterior tibial vein
- Tibial nerve
- Flexor hallucis longus



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Tom, Dick, And a Very Nervous Harry

Medial Evaluation

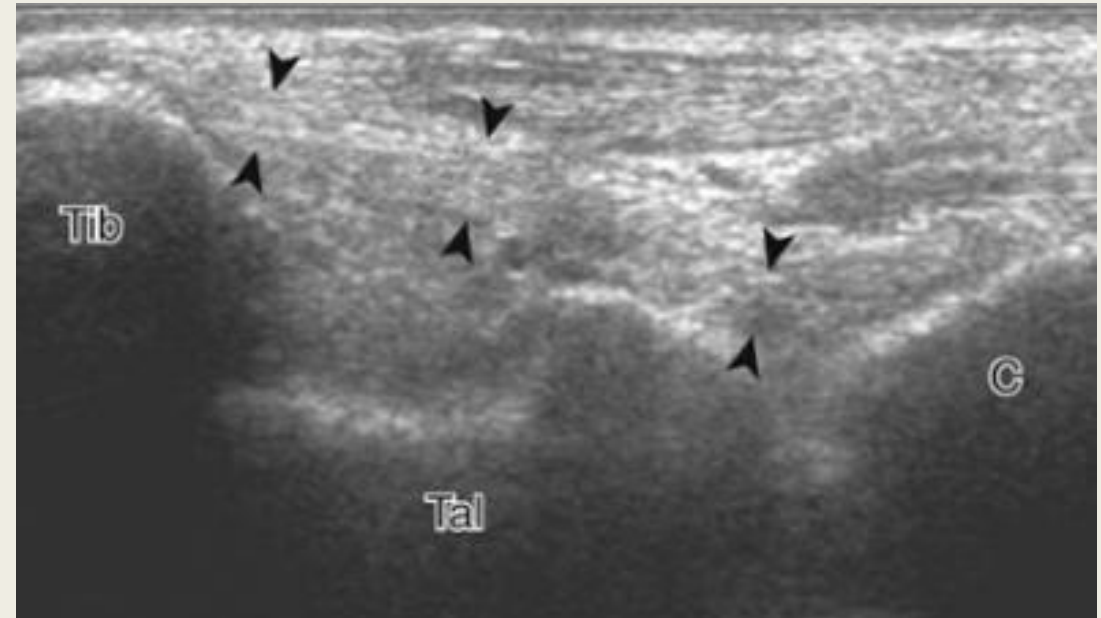


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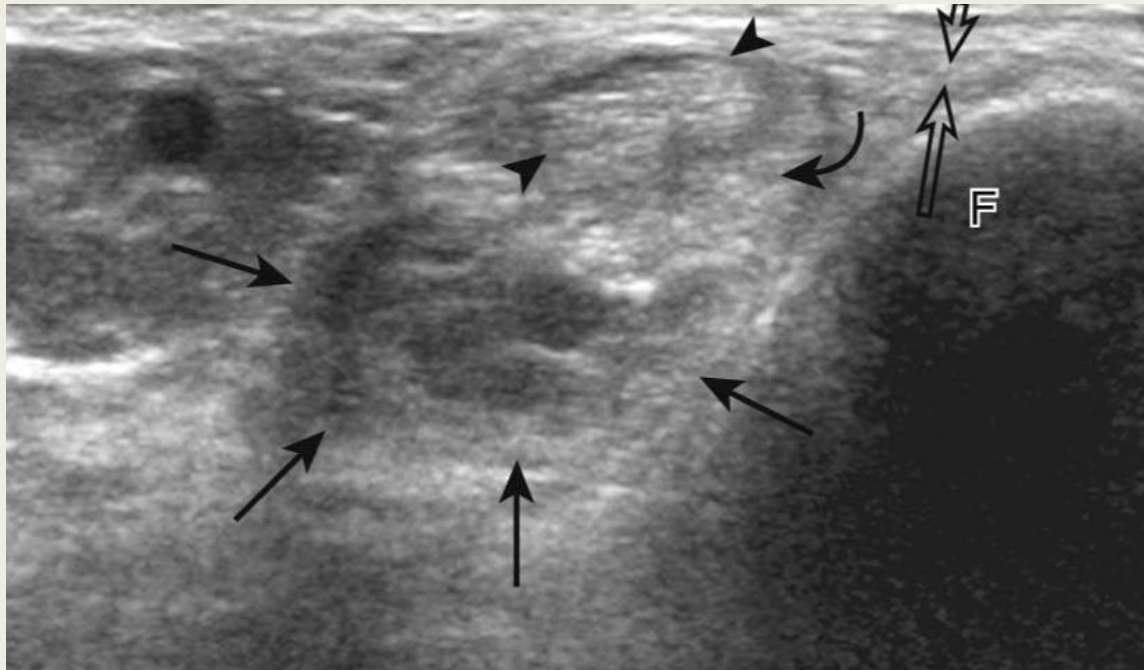
- Follow tendons of interest in long axis
 - *Tibialis posterior*
 - Thickening
 - Hypoechoogenicity
 - Fluid
- Knot of Henry
 - *FDL crosses superficially over FHL*

Medial Evaluation

- Deltoid ligament
 - *Coronal orientation*
 - *Tibiocalcaneal*
 - *Tibionavicular (superficial)*
 - *Anterior tibiotalar*
 - *Posterior tibiotalar*



Lateral Evaluation

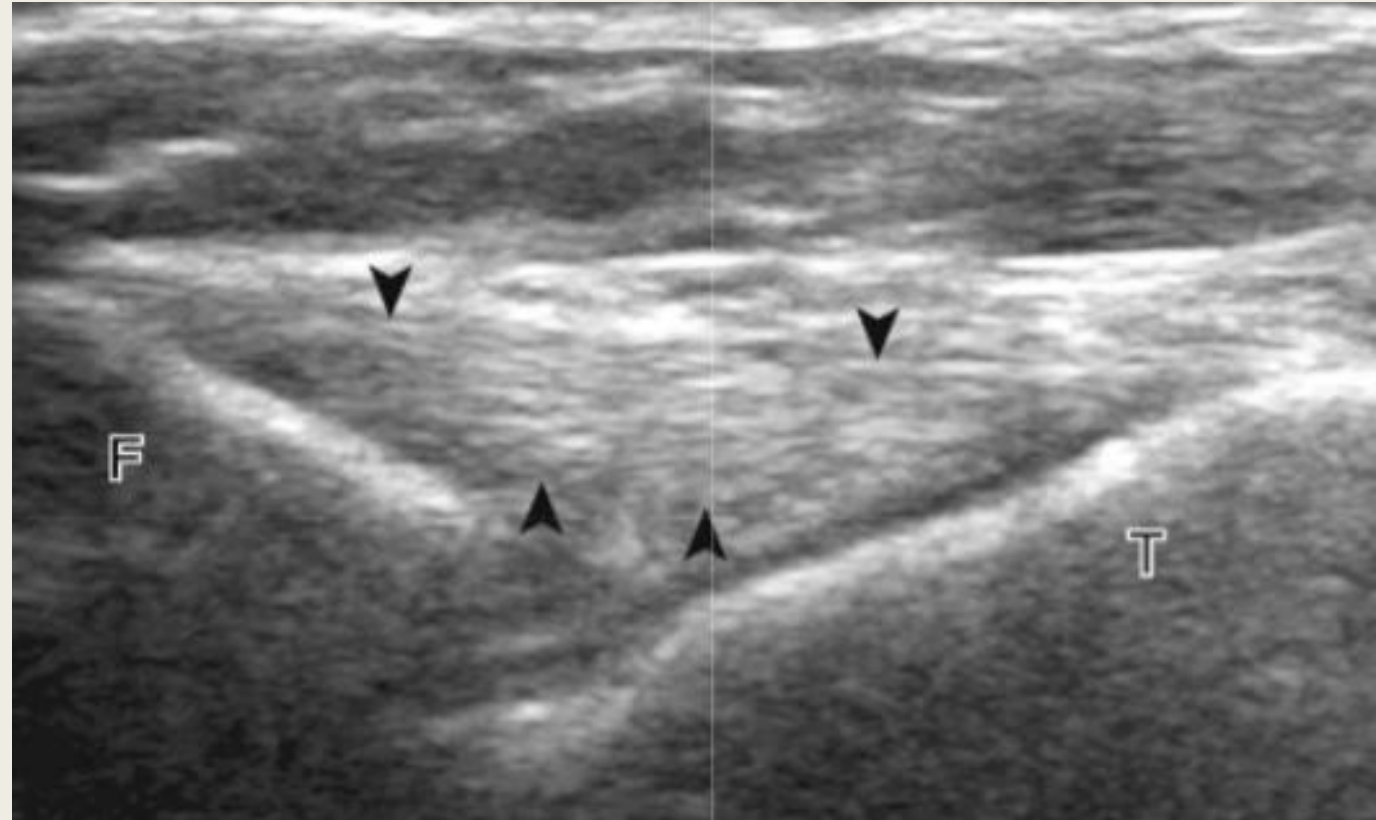


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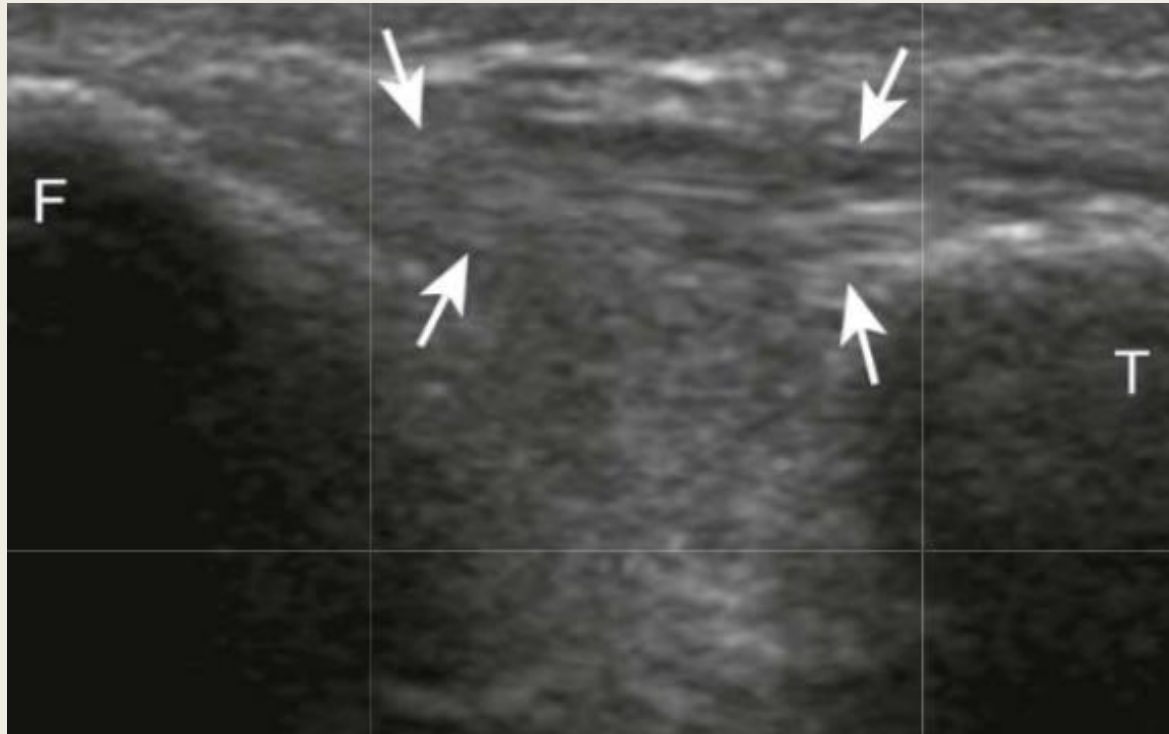
- Supramalleolar, transverse
- Peroneus brevis
 - *5th metatarsal base*
- Peroneus longus
 - *Medial cuneiform*
 - *1st metatarsal base*
 - *Os peroneum*
- Short axis evaluation

Lateral Evaluation

- Anterior talofibular ligament
 - *Most commonly sprained ankle ligament*
- Calcaneofibular ligament



Lateral Evaluation



- Anterior inferior tibiofibular ligament

<https://www.orthobullets.com/pediatrics/4028/tillaux-fractures>

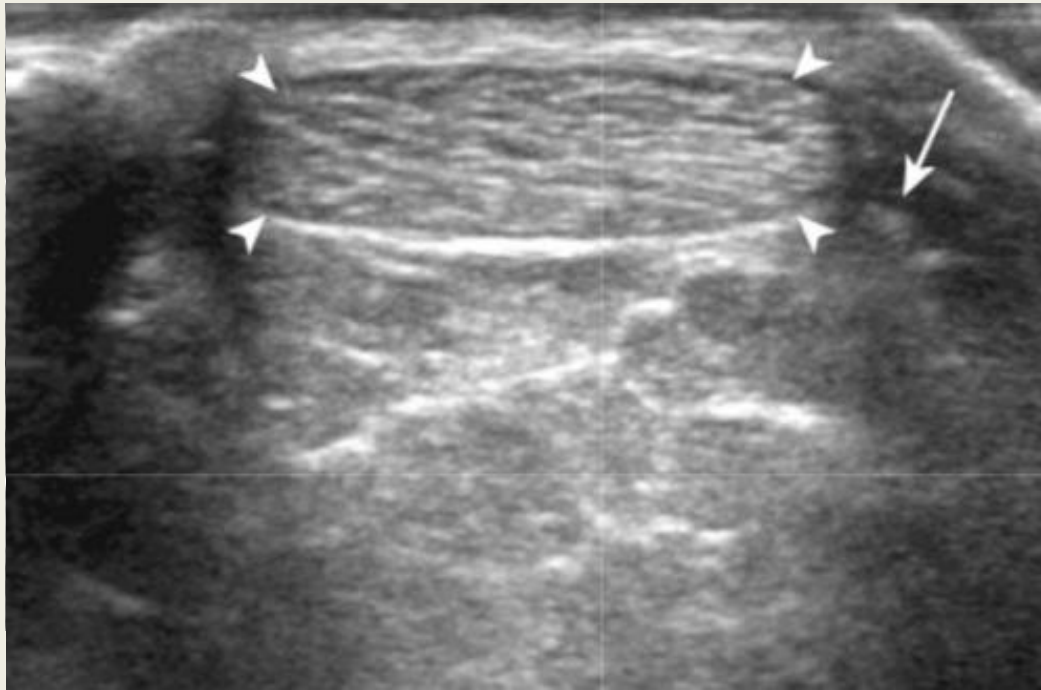
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Lateral Evaluation

- Interosseous membrane
 - *If AITFL injured, evaluate this*



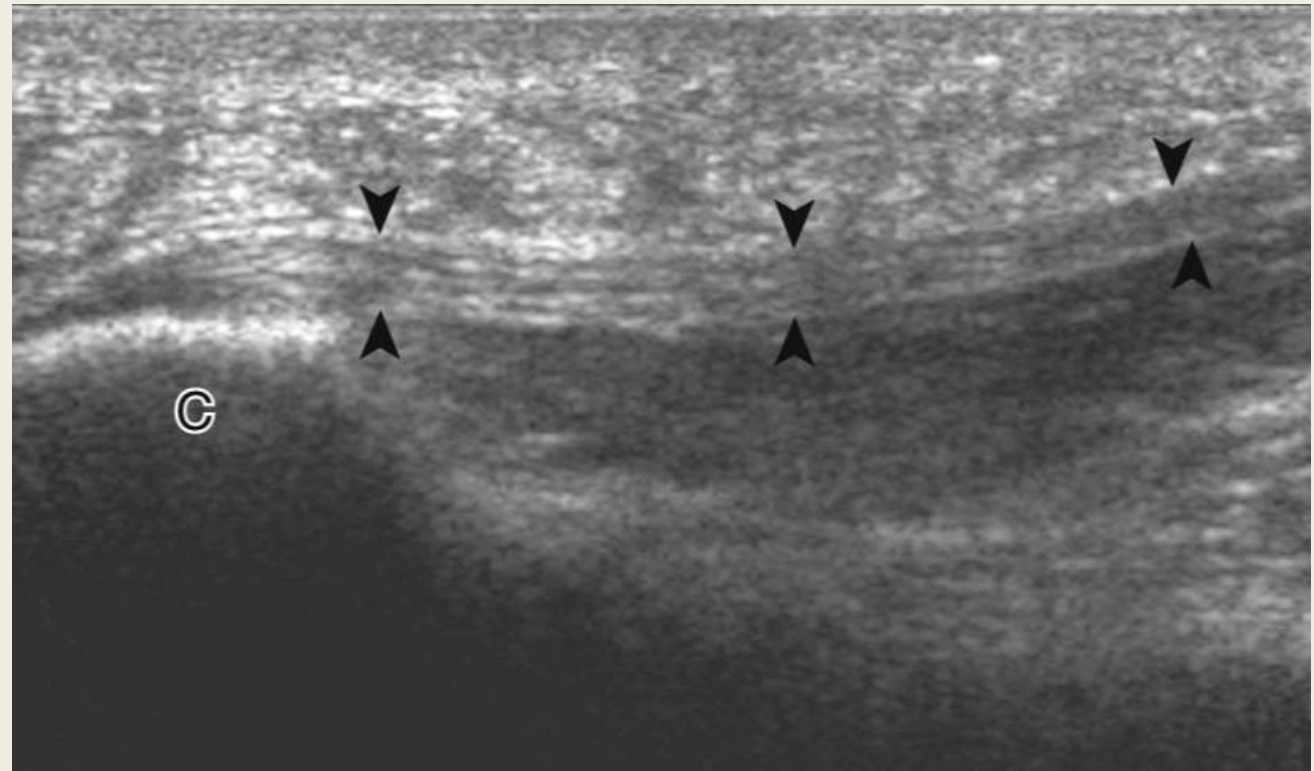
Posterior Ankle Evaluation



- Achilles tendon
- Kager fat pad
- Retro-Achilles bursa

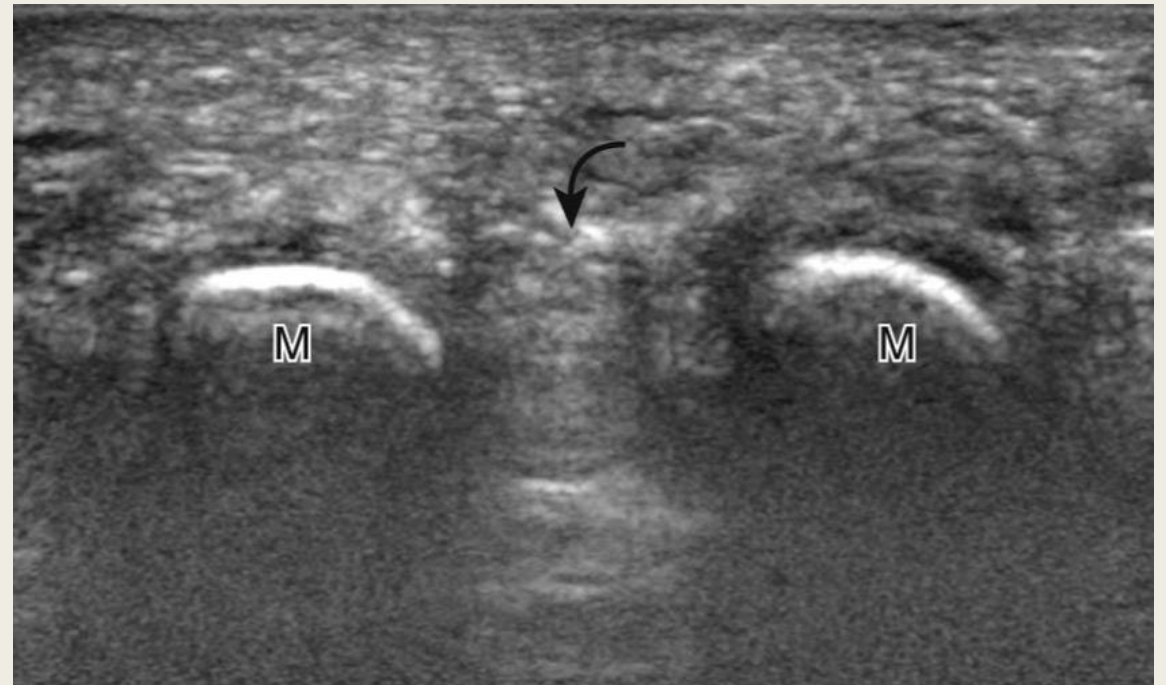
Heel Evaluation

- Plantar aponeurosis



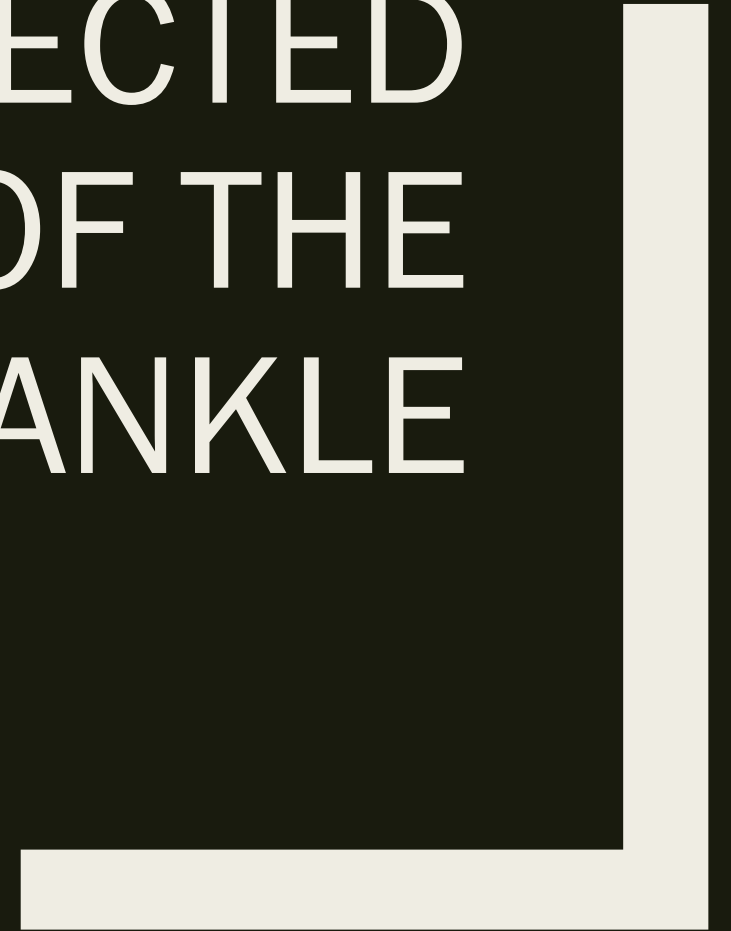
Forefoot Evaluation

- Guided by symptoms
 - *Bone*
 - *Tendon*
 - *Joint*
- Morton neuroma

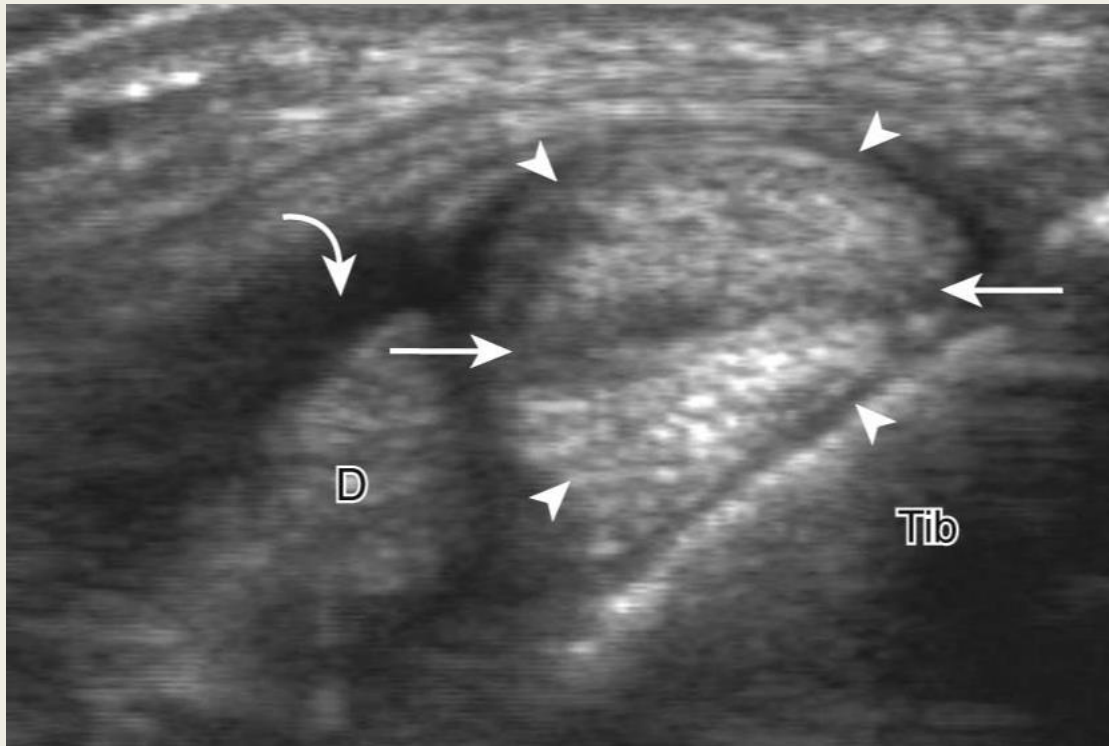


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SELECTED
ABNORMALITIES OF THE
FOOT AND ANKLE



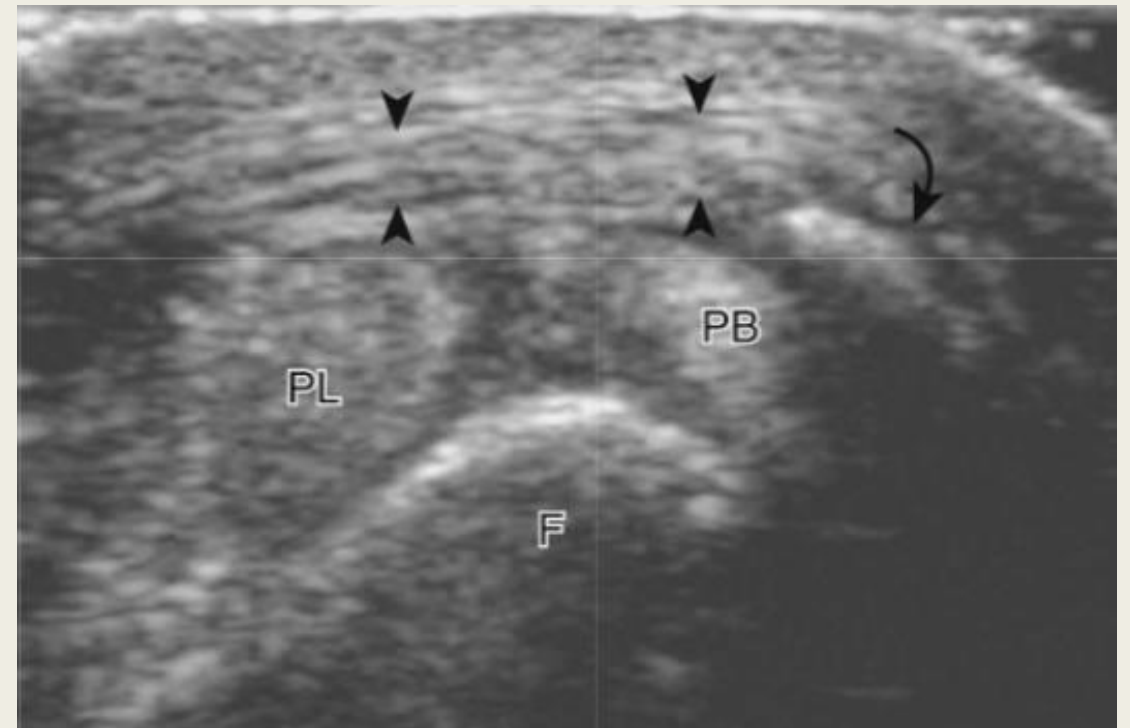
Tibialis Posterior Abnormalities



- Tendinosis
- Tenosynovitis
- Tear
 - *Partial intra-substance*
 - *Longitudinal split*
 - *Full-thickness complete*

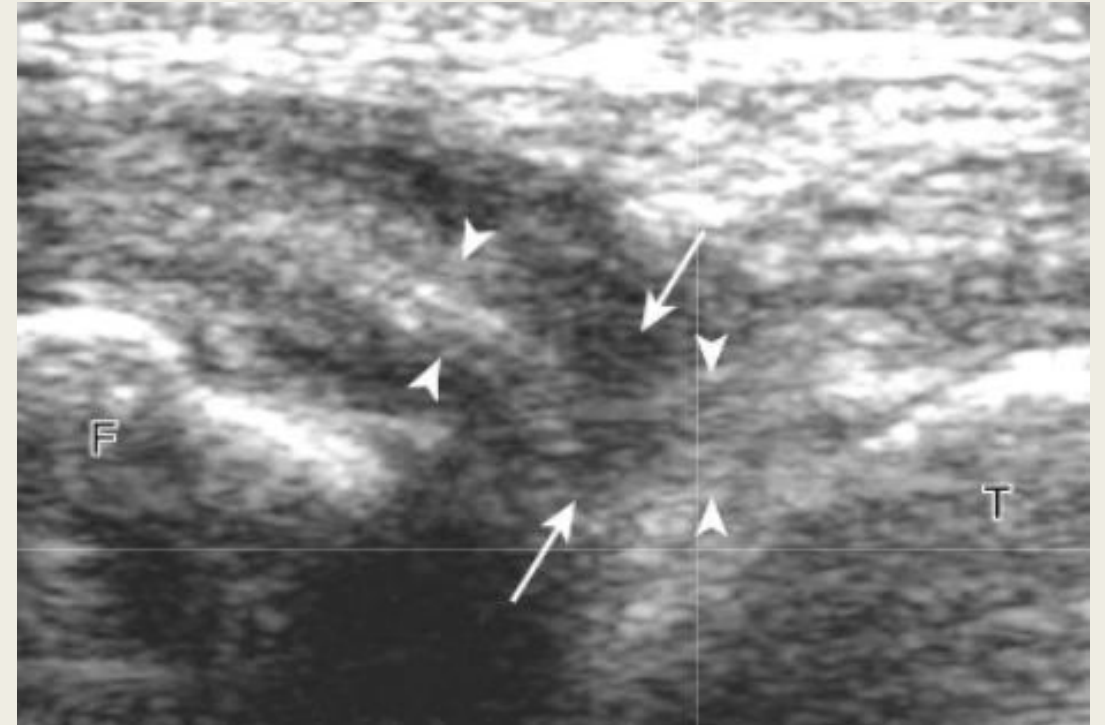
Peroneal Tendon Abnormalities

- Tendinosis
- Tear
 - *Intrasubstance*
 - *Longitudinal split*
- Tendon dislocation



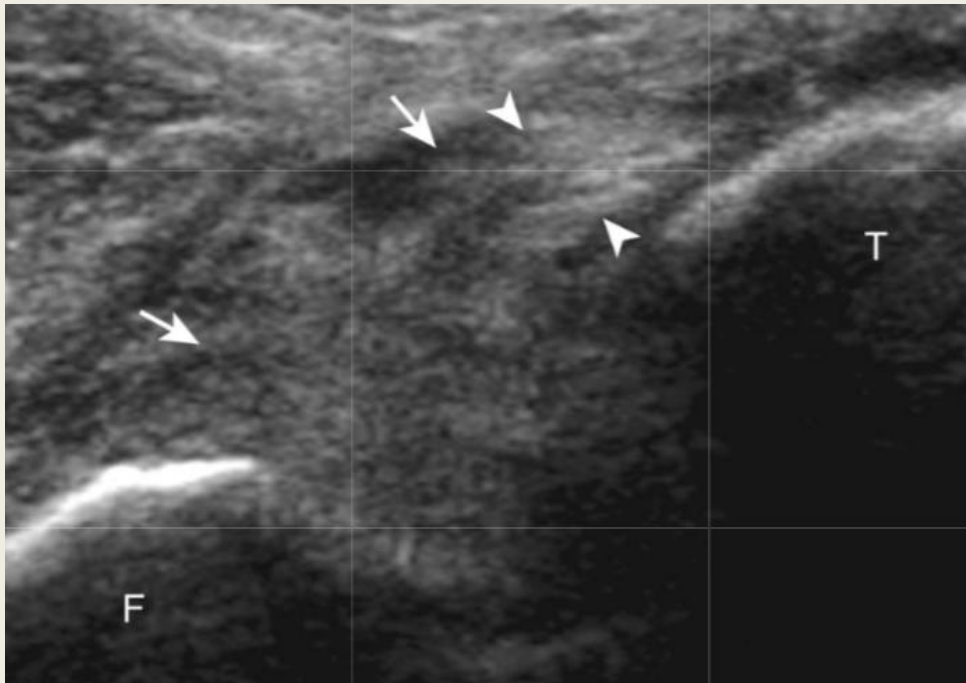
Anterior Talofibular Ligament (ATFL) Injury

- Most commonly injured ligament in the ankle
- Thickening or discontinuity of ligament
- Sonographic anterior drawer



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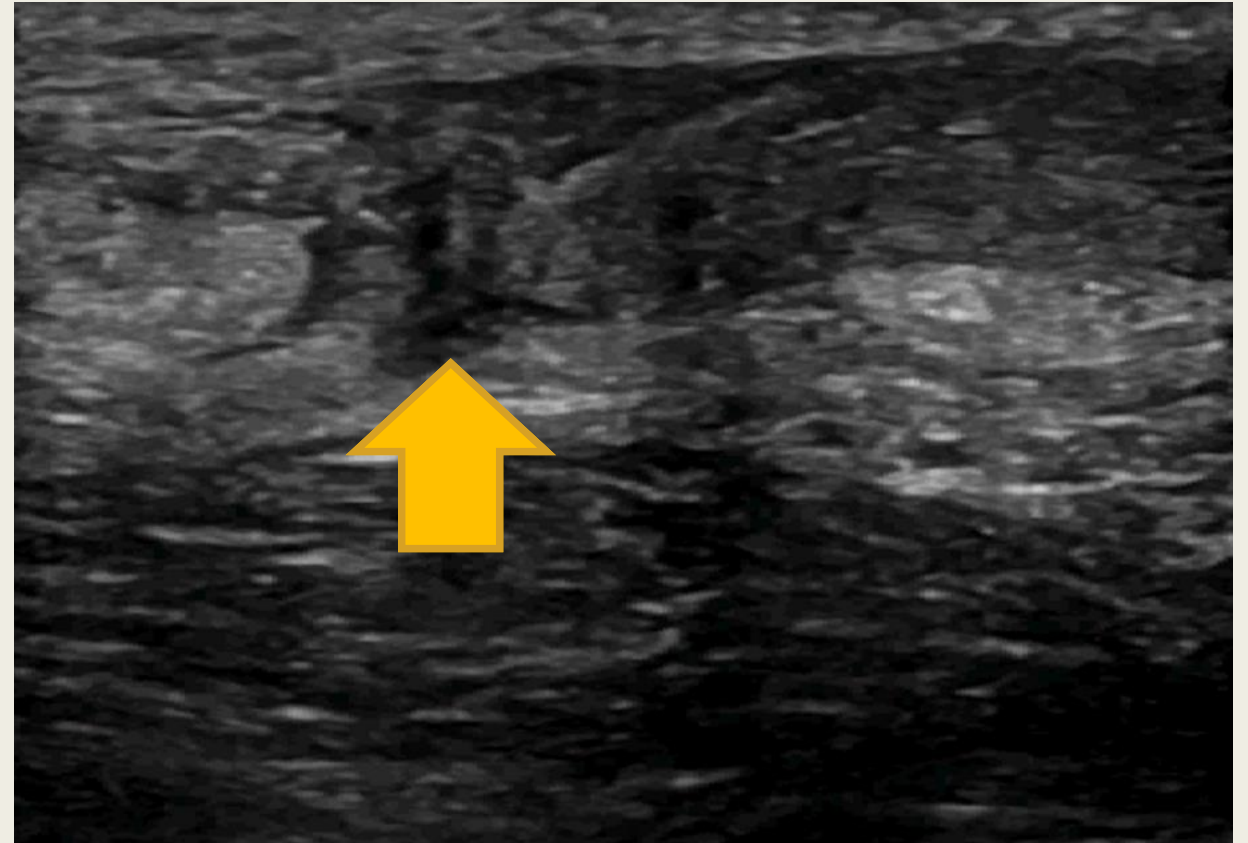
Anterior Inferior Tibiofibular (AITFL) Ligament Injury



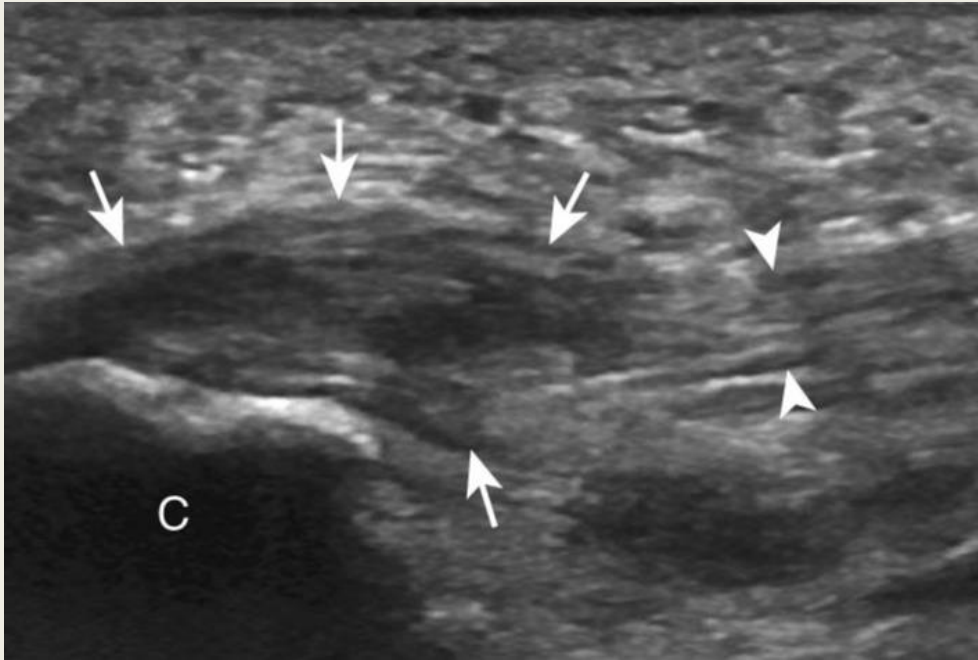
- Tears
- Widening of tibia/fibula space

Achilles Tendon

- Tendinosis
- Enthesopathy
- Rupture



Plantar Fascia



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- Plantar fasciosis

Final Thoughts

- Ultrasound is a helpful tool for evaluation of anatomy and pathology around the foot and ankle
 - *Focused exam*
 - *Dynamic*



QUESTIONS?

References

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