# Overview of Musculoskeletal Ultrasound

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## Outline

- Why do musculoskeletal ultrasound?
- Advantages and disadvantages
- How do I get started?
- Keys to a successful examination
- Specific structures and applications

## MRI is very much accepted

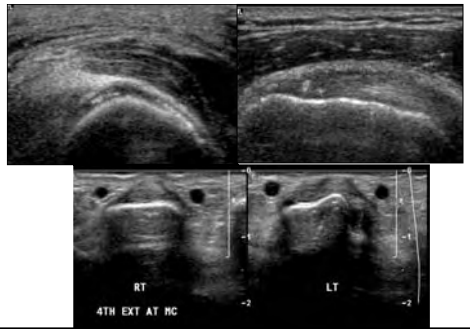
- Well established
- Referring docs can "read" it
- Standard protocols exist
- Higher reimbursement
- Less operator dependent

## Why bother with sonography?

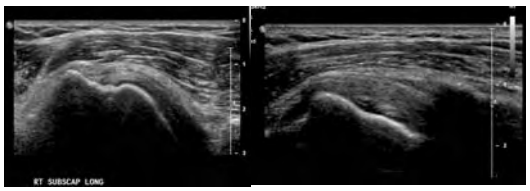
1. Every patient can undergo sonography.
2. Superior resolution: 150 um vs 450 um, and that's with 10mHz probe!
3. Dynamic examinations can be performed.
4. Can place probe where it hurts.
5. Can image patients with hardware.
6. Doppler provides important physiologic information.
7. Great at distinguishing solid from cystic lesions.
8. Can guide interventions.
9. Bilateral comparison "free."
10. More flexible field of view.

Nazarian, L. AJR 2008; 190:1621-26.

## Superior resolution




## Superior resolution



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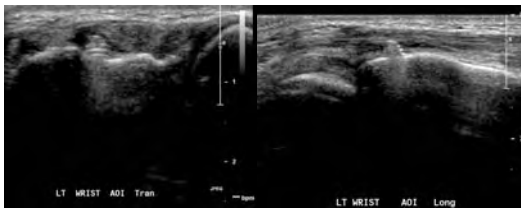
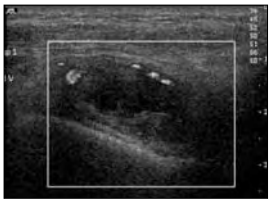
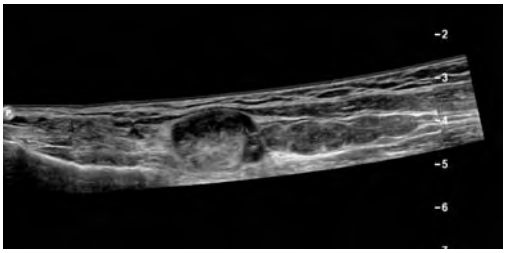
## Can image patients with hardware



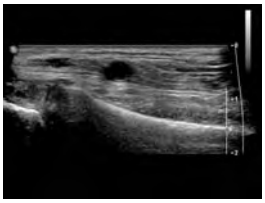

## Cystic vs. solid

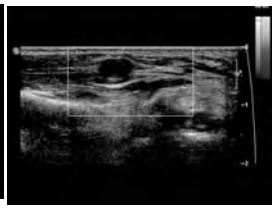


## Unlimited FOV




## Additional lesions found in thumb





## How do I get started?

## MSK Ultrasound Technique

- High frequency linear transducers
- 7MHz or higher; 5 MHz if needed for body habitus
- Stand-off pad for skin, otherwise transducer on skin with coupling gel heaped up gel
- Make use of machine presets

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## Keys to a successful examination

- Learn the anatomy
- All tendons, ligaments, muscle look the same
- Compare to contralateral structure
- Measurements are important
- Use Doppler
- Listen to the patient
- Dynamic examination

## Approach to Patients

- Take a good history; talk to referring physician if needed
- Localize disease on US to the proper structure(s)
- Characterize US appearance
- Generate differential diagnosis based on history and US findings

## Learn the anatomy

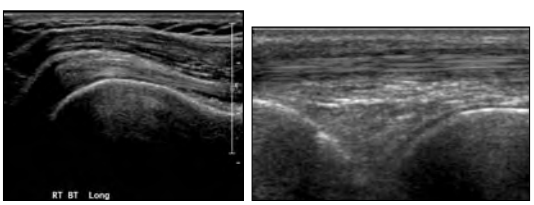
- atlas
- internet
- practice on thyself
- bony landmarks
- patient participation

"Excuse me while I answer this page…"

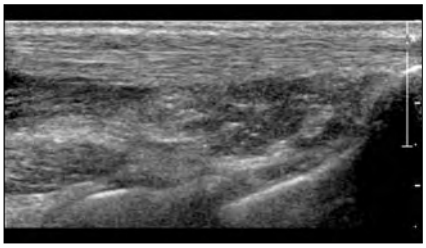
## Learn Normal US Appearances

- Tendons/tendon sheath
- Joints
- Bursae
- Muscle
- Ligaments
- Cartilage
- Peripheral Nerves
- Bones

## All tendons have the same appearance.




## Normal Tendon Echotexture



- Fine parallel echogenic lines
- Collagen fibrils are specular reflectors

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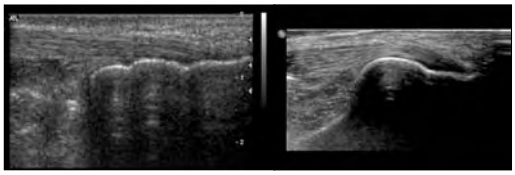
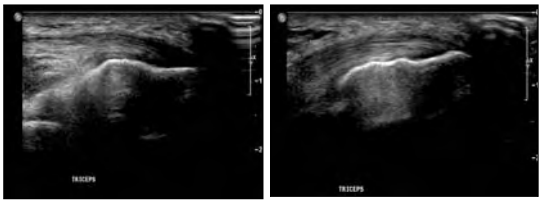
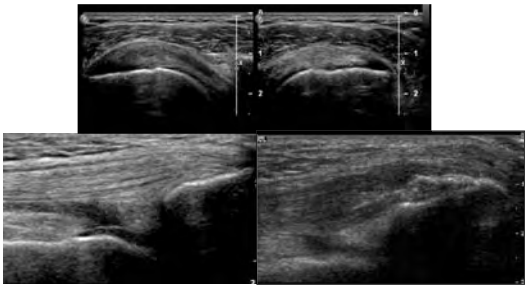
## All tendons exhibit anisotropy.



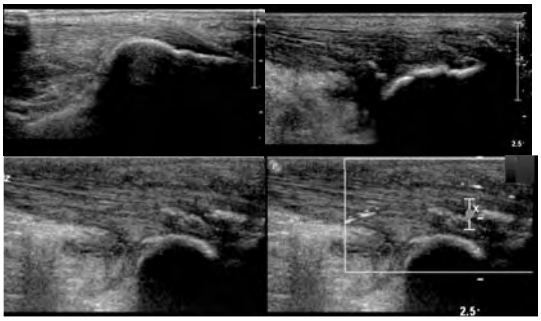
## Triceps tendon anisotropy



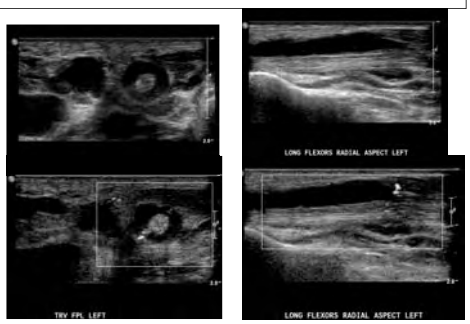

## Tendinosis



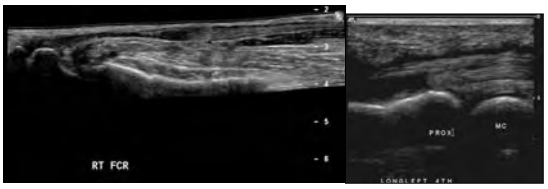
## Calcific Tendinosis/Tendinitis




## Tenosynovitis




## Tendon rupture/laceration



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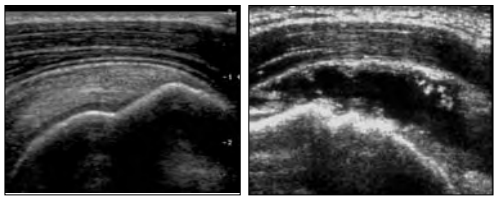
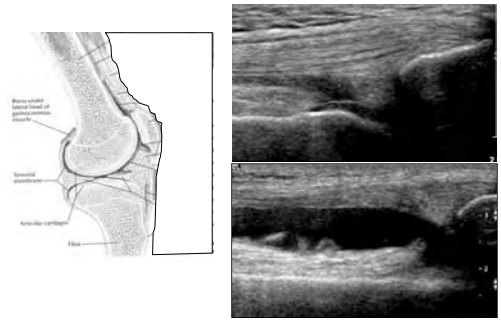
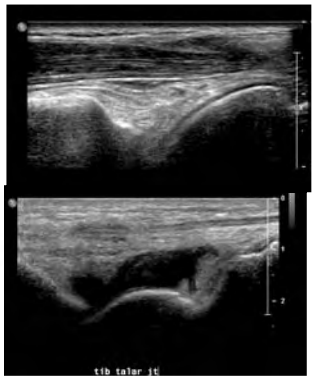
## Rotator cuff tear



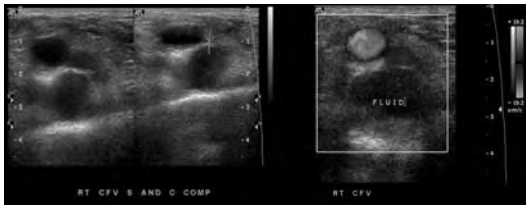
## Joints



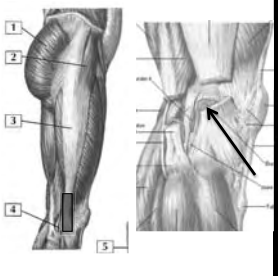
## Effusion



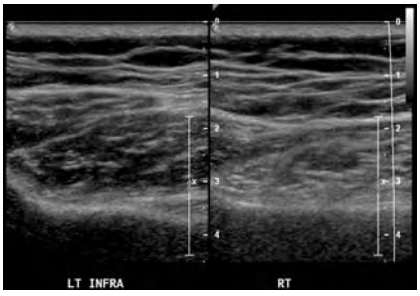

## Iliopsoas Bursitis



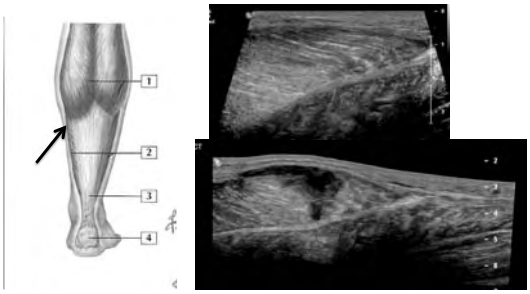

## Iliotibial Bursitis



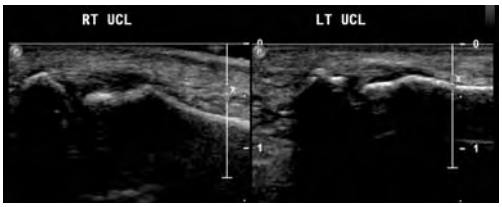

## Muscle



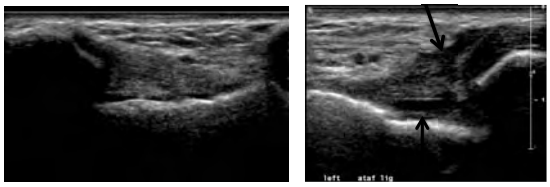
## Gastrocnemius Tear



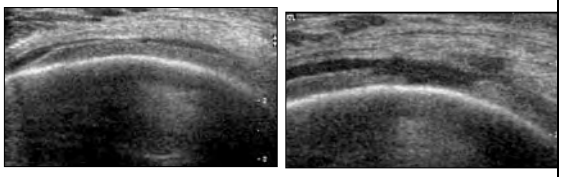

## Ligament



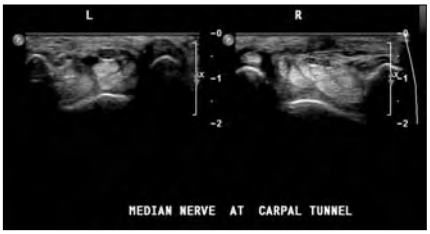

## Anterior Talofibular Ligament Rupture



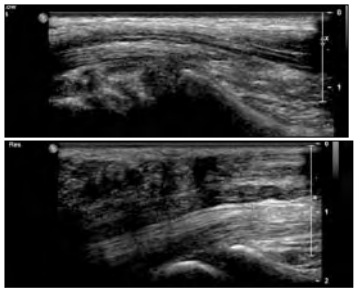
## Cartilage



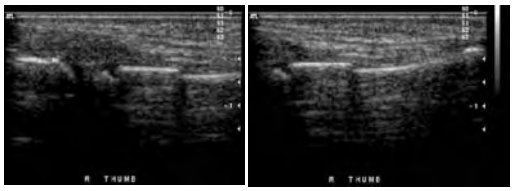
## Peripheral Nerves




## Carpal tunnel



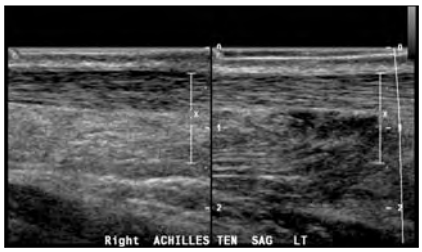
## Bones



## Keys to a successful examination

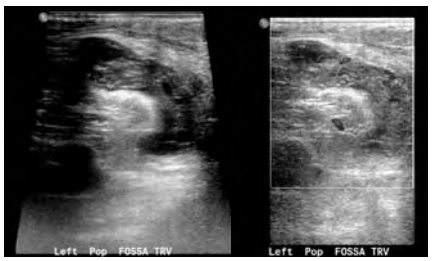
- Learn the anatomy
- All tendons, ligaments, muscle look the same
- Compare to contralateral structure
- Measurements are important
- Use Doppler
- Listen to the patient
- Dynamic examination

## You must compare with asx side.

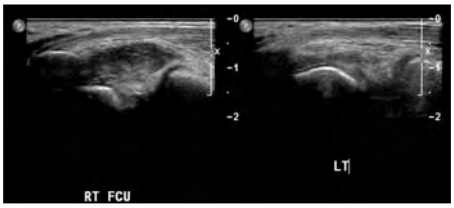



## Size matters!

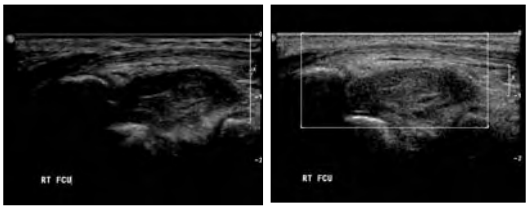

## Doppler provides information.



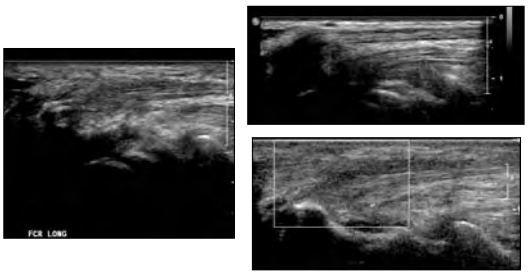

## 40 yo woman with wrist pain



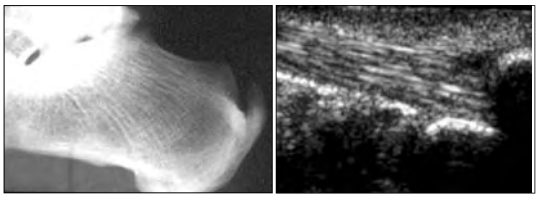
## Use Doppler.



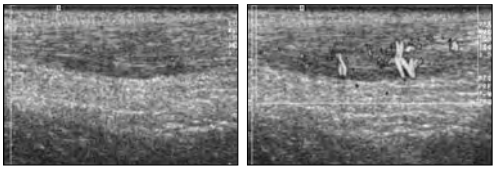

## Listen to the patient.




## 45 year old woman with heel pain



## Achilles Tear / Tendonitis



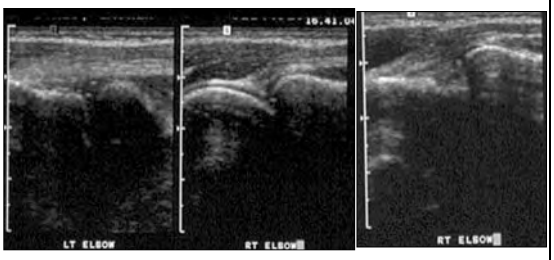
Listen to the patient.

## Dynamic Examination

- Pathology may not be apparent at rest
- Use maneuvers to elicit
  - Dorsiflex and evert foot for peroneal tendon subluxation
  - Maneuvers to bring out bony subluxation
  - Stress views to demonstrate Stener lesion of gamekeeper's thumb

## You must stress the patient.

Rest Stress



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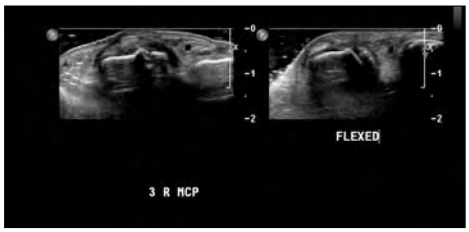
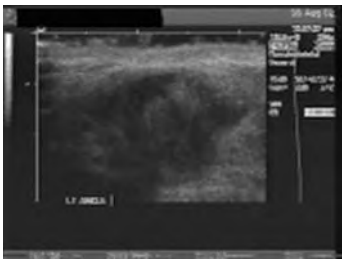
## Extensor hood abnormality




## Dynamic exam



## Needle guidance

## Why bother with sonography?

1. One size fits all.
2. I see small things.
3. Patients can participate.
4. This is where it hurts!
5. Plates and screws are welcome!
6. We've got Doppler!
7. Cysts-are-us.
8. One stop shopping.
9. The second side is for "free."
10. No boundaries.

Nazarian, L. AJR 2008; 190:1621-26.

## Thank you!