Ultrasound Foot and Ankle Pathology

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Disclosures
- None relevant

Foot and Ankle Fundamentals
- AIUM Practice Guidelines for MSK US
- Foot and Ankle Sonography usually focused on specific structure(s) of interest
- Single quadrant of the ankle or section of the foot is satisfactory for complete US evaluation based on clinical scenario
  - Anterior, Medial, Lateral, Posterior ankle
  - Hindfoot, Midfoot, Forefoot

Anterior Ankle Effusion
- Tibio-talar joint
- Anterior recess
  - Hypoechoic cartilage
  - Anterior fat pad
  - Physiologic fluid in recess
- Effusion will distend fat pad

Tibialis Anterior Tendinopathy

Medial Ankle
- Posterior Tibialis Tendon
- Flexor Digitorum Longus
- Neurovascular Bundle
  - Artery
  - Vein
  - Nerve (+/- branches)
- Flexor Halucis Longus
Medial Ankle Soft Tissues

Posterior Tibial Tendonopathy
- Hypoechoic enlargement of the tendon
- With or without tear

Accessory Navicular
- Normal variant
- Do not mistake for avulsed bone in tendon ruptures
- Cause of PT Tendinopathy May be symptomatic

Spring Ligament
- Ultrasound to depict superomedial CNL spring ligament.
- Thickening, loss of normal echogenic structure = ligament insufficiency.
- Association between posterior tibial tendinopathy and spring ligament abnormality

Tarsal Tunnel Syndrome
- ID honeycomb pattern of the tibial nerve
- Look for compressive pathologies in or around tarsal tunnel
- Scanning distally in the infra-malleolar region
  - Medial and lateral plantar nerves
  - Calcaneal branch

Tarsal Tunnel Syndrome
Flexor Hallucis Longus Tendinitis
- Deepest of the medial tendons
- Use passive flexion of the great toe

Lateral Ankle
- Peroneal Tendons
- Peroneal Retinaculum
  - Dynamic Exam
  - Anterior Talo-fibular ligament

Peroneal Tendons
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- Peroneal Retinaculum
  - Dynamic Exam

Peroneal Tendinopathy
- Commonly Brevis
  - Low lying belly
- Ultrasound 100% Sensitive
  - "Horeshoe or C" Sign

Peroneal Tendon Subluxation/Dislocation
- Subluxation or dislocation
- Dynamic Evaluation
- Retinaculum disruption
Chronic ATFL Tear
Most Commonly torn Ankle Ligament
Inability to Visualize Ligament
Use Heel – Toe Maneuver

Posterior Ankle
- Achilles Tendonitis
- Plantaris Tendon
- Retrocalcaneal Bursitis
- Posterior Subtalar Joint

Achilles Tendon Longitudinal

Insertional Tendinopathy and Haglund’s Deformity

Achilles Tendinopathy
Need long axis us view of tendinopathy
And MRI correlation

Achilles Rupture
Retrocalcaneal Bursitis
• Float the probe
• May be present in normal (2.5mm)
• Retro-Achilles bursa not present normally

Midfoot Degenerative Joint Disease
• Tarsal – Tarsal
• Tarsal-Metatarsal
• Long Axis to the Foot

Morton’s Neuroma

Dynamic Imaging
• Dynamic images
  • i. Active motion
  • ii. Passive motion
  • iii. Compression

Plantar Fascitis

Hallux Rigidus
Pre-Procedural Considerations

- Pre-procedural planning
- Choose equipment
- Plot approach (MRI correlation)
- Time allotment
- Contraindications
- Set up (needle selection and ergonomics)

Sterile Technique

- Tegaderm

Injection Technique

- Appropriate anesthesia (skin, subQ, superficial structures)
  - Plot approach with smaller gauge needle
- Find needle
  - Use tissue harmonics if necessary
- Advance to target
  - Follow needle tip
- Do not move needle and probe at the same time
- Small movements, anchor probe
- Aspirate / inject

Out of Plane Approach

- Needle Tip/Shaft perpendicular to probe face
- Needle appears in cross section within joint space / recess
- Medication fills joint space / recess
Gel Standoff with Foot

Ankle Injection
- Patient supine
- Knee flexed to allow foot flat on bed
- Linear array probe
- Find tibiotalar joint and anterior recess in long view
- 22 or 25 gauge needle
- In-plane approach from the lateral side or out-of-plane approach.
- Anterior in-plane approach is difficult
- (Beam Steer and Gel Stand-off)
- Avoid artery
- 20-40 mg of kenalog

Subtalar Injection
- Localize joint
- Posterior lateral
  - In-plane
- Lateral approach
  - Out-of-plane
- Medial approach
  - Proximity to nerve
- 25 gauge needle
- 20 mg kenalog

Lateral Subtalar Approach

Posterior Tibialis Tendon Sheath Injection
- Lateral Decubitus
- Ankle Facing up
- Trans to Tendon
- Needle in plane
- 25G Needle
- 20mg Kenalog
Peroneal Tendon/Sheath Injection

- Similar to set up for PT
- Lateral Ankle Exposed
- Injecting Posterior to Anterior

Tibial Nerve Injection/Tarsal Tunnel

Tarsal Tunnel Ganglion Cyst

Tarsal-Tarsal/TMT Midfoot Injection
- Transverse to Joint
- Out of Plane Approach
- Avoid Dorsalis Pedis Artery

Hallux Rigidus

1st MTP Joint Aspiration and Injection
- Out-of-Plane needle Approach
- Probe Longitudinal to Joint and Tendon
- Use M/D Cursor Assist
- 25 guage needle to Inject
- 18 guage to aspirate
- Consider lavage for dry tap
1st MTP Joint Injection

Morton’s Neuroma Injection
- In-plane Dorsal Approach
- Alternative - Out of Plane Webspace approach

Plantar Fasciitis
- Multiple approaches
  - Superficial Long or Trans
  - Deep Long or Trans
- Little evidence for CSI after 6 weeks
- Needle Fasciotomy and PRP incompletely studied

Deep Plantar Fascia Injection

Superficial Plantar Fascia Injection

Plantar Fascia Needle Tenotomy
Documentation

**Procedure:** Joint Aspiration / Injection Procedure

**Indication:** Symptomatic relief, glenohumeral osteoarthritis.

**Informed Consent:** Prior to starting the procedure, the patient’s identity was verified, pertinent medical records were reviewed, the nature of the procedure was explained along with risks, benefits and alternatives. Consent was signed. The appropriate sites of the procedure were confirmed directly with the patient, verified, and marked. A pre-procedure pause was performed for final verification of all the above.

**Location:** Right shoulder.

**Preparation and Technique:** Skin prep Choraprep, sterile preparation of site (in usual fashion), local anesthesia with lidocaine (1 ml, 1% strength, without epinephrine). An initial pre-injection ultrasound evaluation was performed to survey the relevant anatomy. Approach: lateral, posterolateral, under continuous ultrasound guidance using a 45° curved array probe at a frequency of 5 MHz, in plane approach, per the protocol originally published by Zwar, et. al. in the American Journal of Roentgenology, July 2004 Vol. 183.). Sterile needle used (size #22 gauge, length 2.5 inch). Joint injected with Kenalog 40mg 4ml 1% Lidocaine without epinephrine. Procedure tolerated well. No Complications.

**Patient Instructions:** Ice shoulder tonight, gradually resume use as pain permits.

Billing - CHANGES 1/1/15

- Standard Joint, Bursa, Tendon Injections do not accompany CPT 76942 US Guidance for Needle Placement when billing Medicare as of January 2015
- Ganglion or Nerve procedure injection codes may still
- US Guidance for Needle Placement in Small, Medium, Large Joints - CPT 20604, 20606, 20611
  - Requires documented indication
  - Requires description of procedure
  - Requires permanently stored image of target localization and needle
- May be used in combo with Diagnostic Codes if justified and appropriately documented