TENDONITIS OF THE FOOT AND ANKLE

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OVERVIEW

ACHILLES' TENDON

- Acute/Chronic ruptures
- Achilles' tendonitis

PERONEAL TENDON

- Tendonitis
- Subluxation
- Tears

POSTERIOR TIBIAL TENDON

- Post injury flatfoot deformity
- Tendonitis

FLEXOR HALLUCIS TENDON

- Dancers
- Dancer's Tendonitis
- Impingement Syndrome

ACHILLES' TENDON ACUTE RUPTURE

- ACUTE RUPTURES
  - Operative vs. non-operative treatment
    - Operative treatment has a lower re-rupture rate compared to non-operative
      - 3.7% re-rupture in surgical group vs. 9.8% in conservative group
  - Need to look at patient activity level as well to determine best treatment option.
    - If young and active recommend repair
    - Diabetic, older, inactive can-do conservative treatment
  - Major complications of repairing acute achilles' tendon rupture
    - Re rupture rate – 5%
    - Deep infection 1.5%
    - DVT 2.67%
    - Minimally invasive technique decreases major complication rate for Achilles' tendon rupture repair

ACHILLES' TENDON CHRONIC RUPTURE

- Chronic Ruptures how to treat
  - FHL transfers
    - Functional outcome does show a decreased heel rise and strength testing compared to the unaffected side.
  - V-Y lengthening or gastrosoleal lengthening may be required if the gap is too large
  - Primary repair
    - Not as likely due to the retraction of the tendon ends and large gap.
  - Free graft transfers if required

ACHILLES' TENDONITIS

- Insertional Achilles' tendonitis
  - NSAIDs, steroids, immobilization 2 weeks.
  - Physical therapy
    - ASTYM/graston, US modalities, eccentric stretches 12 sessions needed minimum.
    - Surgical correction if no improvement
- Paratendonitis Achilles' tendon
  - Immoblization, NSAIDs, steroids for 2 weeks
- Achilles' tendinosis
  - Should palpate the mass and should move with the tendon
  - NSAIDs, steroids, immobilization

PERONEAL TENDONITIS

Pathophysiology

- Commonly seen in inactivity or significant increase in activity

Risk factors

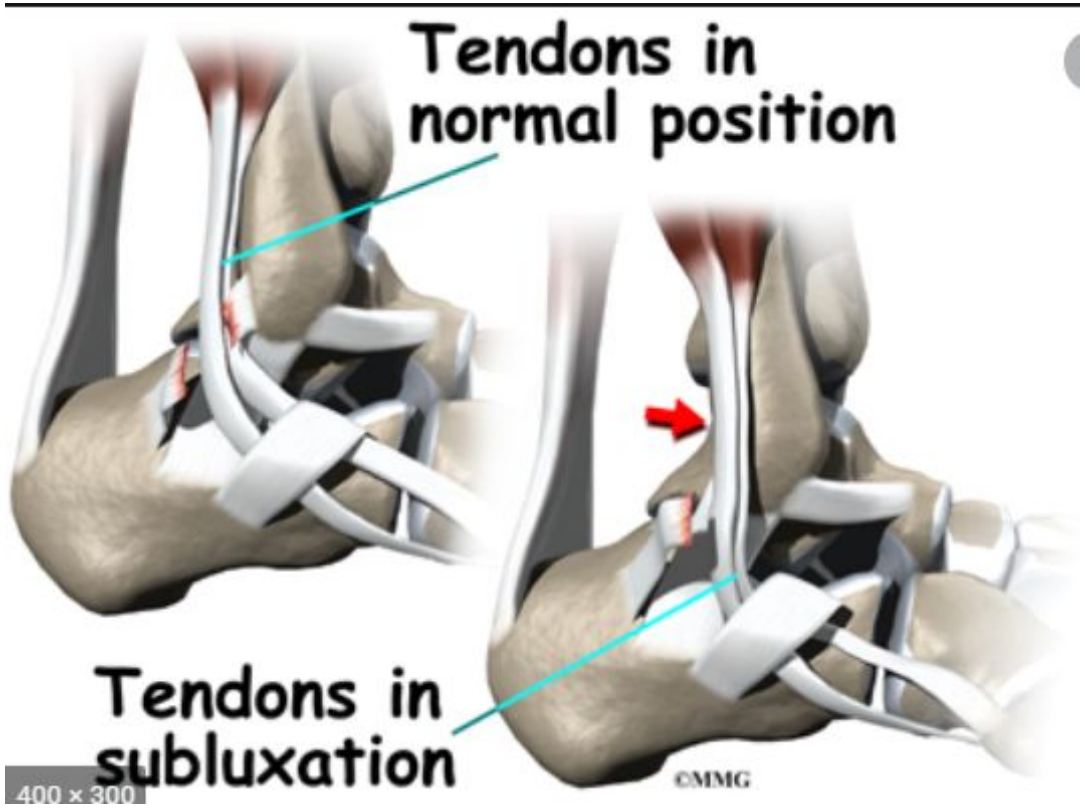
- Cavovarus foot, severe inversion sprains, hypertrophy of peroneal tubercle, trauma, chronic ankle instability

Examination

- Peroneal tendon pain, posterior and distal to the lateral malleolus
- Passive hindfoot inversion and ankle plantar flexion
- Resisted active hindfoot eversion and ankle dorsiflexion

Treatment Conservative

- Physical therapy, Ice, NSAIDs, activity modification, Immobilization, proprioceptive training, corticosteroid injections.
- Custom orthotics if foot malalignment

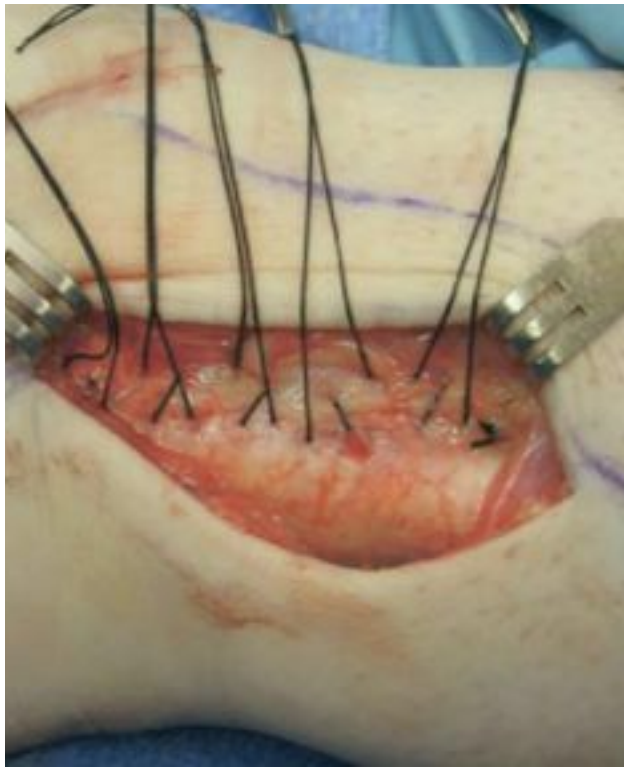


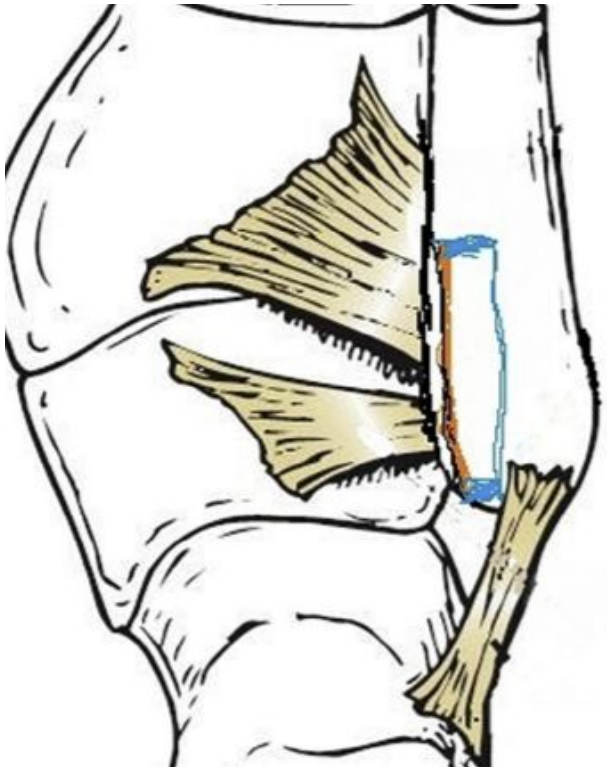
PERONEAL TENDON SUBLUXATION

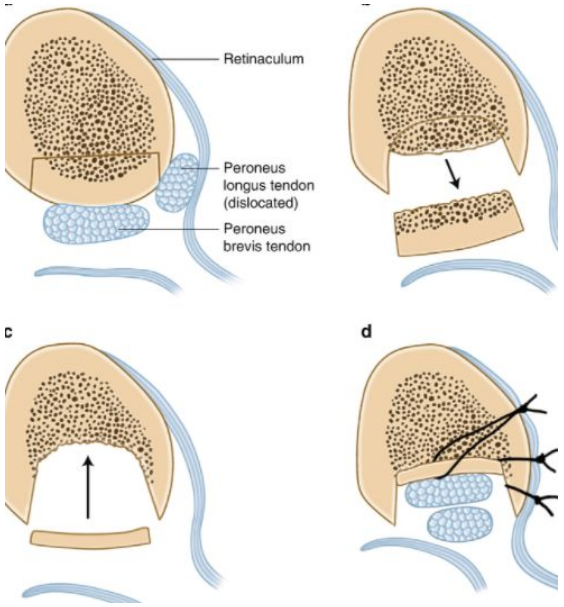
- Internal vs. external subluxation
  - peroneal tendons subluxing within the retinaculum
  - Subluxing over the lateral malleolus
- Causes of subluxation
  - Anatomical variation of the peroneal groove
  - Rupture of the peroneal retinaculum
  - Longitudinal tear of the peroneal tendons causing the intact tendon to sublux between the torn tendon

PERONEAL SUBLUXATION REPAIR

- Conservative
  - Rupture of the retinaculum place in a boot and decrease motion to attempt to get the retinaculum to scar down into place.
  - Orthotics
  - Muscle training and strengthening
  - NSAIDs
- Surgical
  - Peroneal groove deepening procedure for anatomic variants.
  - Primary repair of the peroneal retinaculum in acute cases
  - Reconstruction of the peroneal retinaculum
  - Retubularization of the peroneal tendons







PERONEAL GROOVE DEEPENING

- Different techniques have been discussed to deepen the groove for the peroneal tendons
  - En bloc procedure
  - Removal of the posterior cortex, excavation of the medullary canal and repositioning the posterior cortex back down.
  - Drill up the fibula and remove the medullary canal, tamp down the posterior cortex

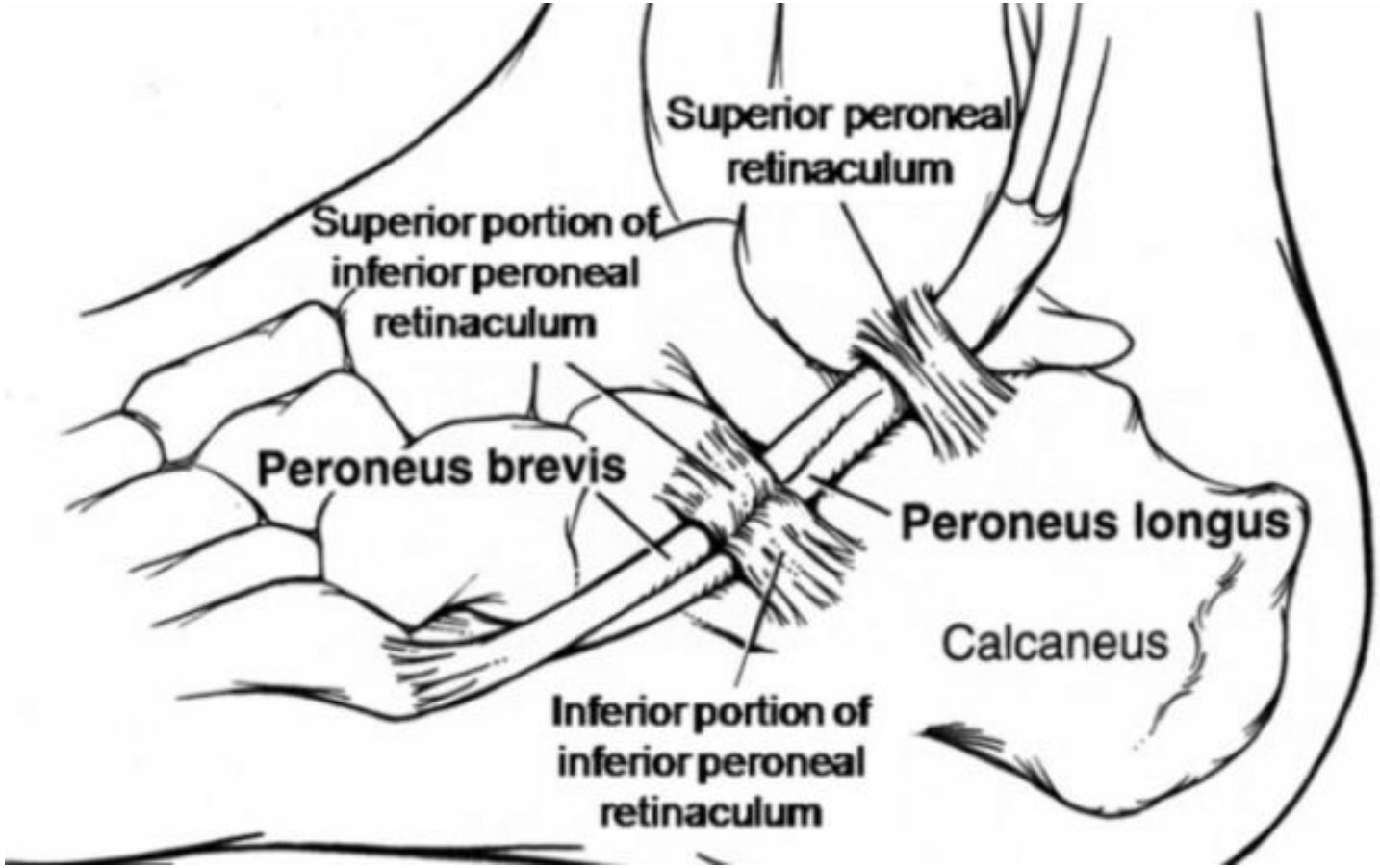
PERONEAL RETINACULUM REPAIR

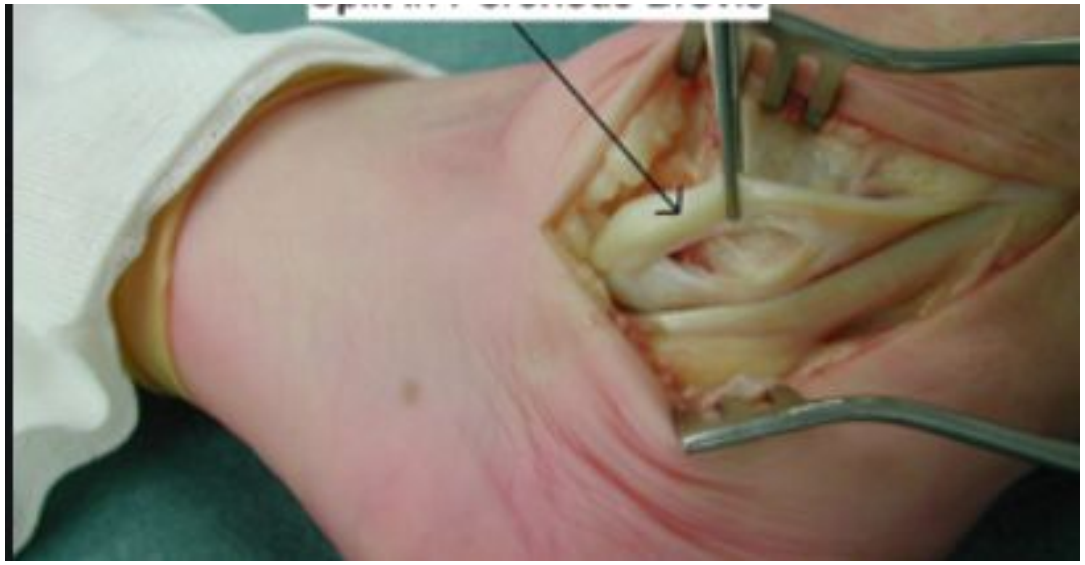
Primary repair

- Using 2-0 or 0 vicryl suture to primarily repair the retinaculum

Reconstruction

- Suture anchors to reef up the retinaculum
- Graft to completely recreate a tunnel for the peroneal tendons





PERONEAL TEARS

- Peroneus brevis tendon
  - Longitudinal split tears
    - Retubularization, fluoroscopic tendon sheath injections
  - Ruptures
    - Primary repair
- Peroneus Longus tendon
  - Longitudinal split tears
    - Retubularization, fluoroscopic tendon sheath injections
  - Ruptures
    - Primary repair

33% of active population had longitudinal tears of the peroneal tendons, asymptomatic.

POSTERIOR TIBIAL TENDON

Posterior tibial insertional tendonitis

- Causes: overuse syndrome, flatfoot, improper shoe gear
- Treatment: immobilization, NSAIDs, steroids, PT

Posterior tibial tendon dysfunction

- Causes: Flatfoot deformity, PT rupture
- Treatment: Immobilization, NSAIDs, custom/OTC orthotics, shoe modifications

Posterior tibial tendon rupture

- Traumatic, already weakened from deformity
- Treatment: Surgical repair or will progress to deformity

POST INJURY FLATFOOT

- Conservative treatment options
  - Using single heel rise test to determine if orthotics or AFO are needed. If ligamentous failure an AFO is needed.
    - Custom orthotics
  - Following treatment plan for 1 year, AFO with a motion control pair of shoes such as Brooks Beast
  - Stretching and physical therapy to work on activating the muscle in the proper position vs. in a flatfoot position.

POST INJURY FLATFOOT

- Surgical Treatment
  - Flexible flatfoot deformity
    - Evans calcaneal osteotomy
    - Medial calcaneal slide osteotomy
    - Cotton osteotomy
    - PT tendon repair and kidner (if required)
    - STJ arthroresis
  - Rigid Flatfoot deformity
    - Subtalar joint fusion
    - Talonavicular joint fusion
    - Adjunctive soft tissue and bone work as needed
  - Ankle ligament reconstruction is it required?

- Ankle ligament reconstruction
  - Deltoid ligament reconstruction
    - Ankle joint is in a valgus position consider deltoid augmentation.

- MRI studies
  - Posterior tibial tendon 100% of patients is pathologic for flatfoot
  - Spring ligament 87% of patients
  - Deltoid ligament 33% of patients

FLEXOR HALLUCIS LONGUS TENDON

FHL Tendonitis

- Pain can be in:
  - Posteromedial ankle in 50% of patients
  - Plantar heel in 28%
  - Midfoot in 27%
  - Multiple areas of the foot
- Conservative Treatment
  - Rest, ICE, Immobilization, NSAIDs, steroid taper, steroid injection therapy

DANCERS

- Considerations when treating Dancers
  - Female athlete triad is common amongst female professional ballet dancers
  - 17-29 hours per week in organized rehearsals
    - +8-20 per week for dance classes
      - Do about 130 performances a year depending on the troupe
  - 95% of ballerinas will have one injury in 1 year
    - 54% of injuries are of the foot and ankle
      - Most are overuse, acute are sprains and strains
  - Technique
    - Dancers have on average
      - 30% more hip external rotation
      - 8% more hip flexion
      - 15% more hip abduction
      - Dancers are no more hypermobile than the average person

FOOT MECHANICS FOR DANCERS

- Basic technique for Ballet
  - Foot eversion ideally to 180°
    - 60% of this is achieved from the hips by retroversion of the femur
    - 40% achieved from the knees and feet
  - Turn-out
    - Causes excess valgus stress on the knees, excess tibial torsion, pronation of the feet, or lumbar lordosis
      - Dancers in training lack strength, flexibility and technique to avoid injury
  - En Pointe
    - Dancer must have minimum of 90° plantarflexion in the foot
      - This is 123% above average
- Modern dance
  - Graham technique
    - Extreme turn-out at the tip, knee injuries are common with this technique
  - Horton technique
    - Flat back, pelvic hinges and lateral T's this can lead to low back injuries

DANCERS TENDONITIS

- Overuse syndrome from repetitive plantarflexion and dorsiflexion
  - Repetitive friction leads to inflammation, nodule formation and degeneration
- Conservative treatment options:
  - Rest, ice, immobilization, NSAID/steroid therapy
  - FHL tendon sheath injection therapy under fluoroscopy
  - Kinesio taping
- Dancers vs Non dancers
  - 71% of dancers had FHL tendon longitudinal tears
  - Dancers also had symptoms for longer before

DANCERS TENDONITIS

Shoe gear modification for en pointe

- Wood or metal shank.
  - Shank can be made more pliable to assist a stiff midfoot in forming an arch
  - Shank can be rigid to support a naturally flexible

Braces

- Usually are not worn by dancers as they cannot fit in their shoes and they are bulky for performances and the costumes.

Dance Modification

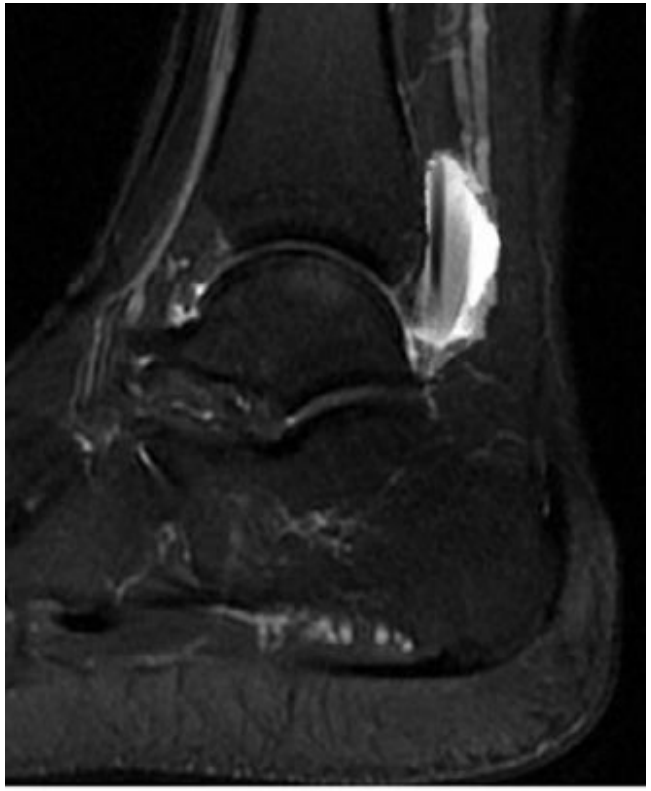
- Can usually continue dance and remove or modify certain movements that cause the pain so dancer can stay performing.

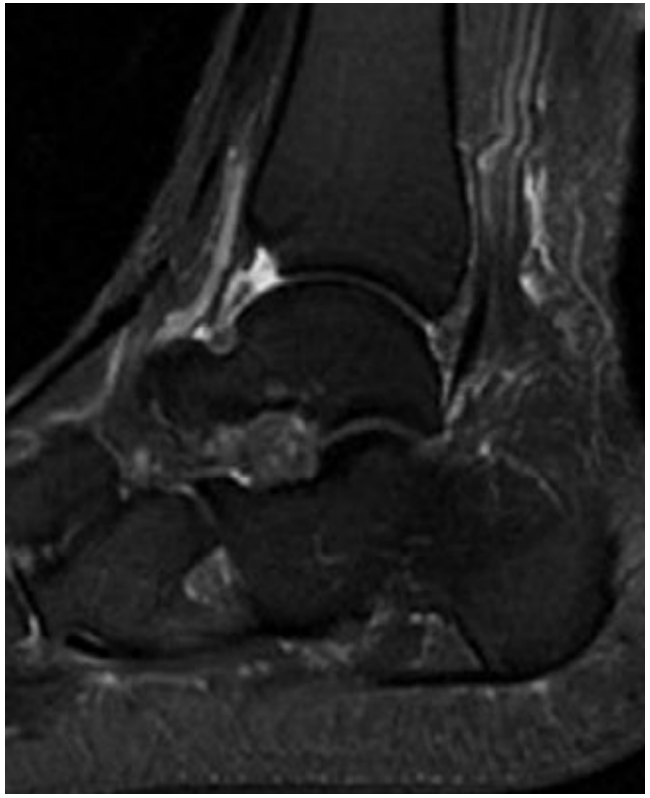
Surgery

- Debridement of the tendon, fixing a tendon tear,
- Arthroscopic debridement vs open

FLEXOR HALLUCIS LONGUS TENDON IMPINGEMENT SYNDROME

- Clinical
  - Tenderness medial hindfoot, hallucis back extension test and traction test are positive
  - MRI
    - Shows edema around the FHL tendon
- Treatment options
  - Conservative
    - NSAIDs, support, cold compress and Physical therapy
  - Surgery when >6 months with no relief
    - All inside arthroscopic
      - FHL tendon sheath debridement and muscle belly resection
      - Good to excellent results 12-36 month f/u





POSTERIOR IMPINGEMENT SYNDROME

- Posterior ankle pain during movements that require plantarflexion
  - Relevé or pointe
- Causes
  - Os trigonum
  - Large lateral process of the talus
  - Prominence at the dorsum of the posterior calcaneus that prevents full rotation of the talus
  - XRAYS
    - AP and lateral as well as AP and lateral views with dancer in relevé or pointe
  - Treatment
    - Physical therapy,, cortisone injection, surgical resection as a last resort.

ANTERIOR IMPINGEMENT SYNDROME

- S/S
  - Anterior ankle pain during movements, dorsiflexion (plié)
    - This repetitive motion can lead to osteophyte formation on anterior tibial ridge and talar neck
  - Xrays
    - Lateral view and 25°external rotation view.
  - Conservative treatment
    - Heel lift to relieve pain from impingement
  - Surgery
    - Resection of osteophyte, but this will likely return in a few years

REFERENCES

Deng MD, Senlin: *Surgical Treatment versus Conservative Management for Acute Achilles Tendon Rupture: A systematic review and meta-analysis of Randomized Controlled Trials.* The Journal of Foot and Ankle 2017, volume 56, issue 6.

Ezekiel, Oburu; Myerson, Mark MD. *Deltoid ligament repair in flatfoot deformity.* Foot and Ankle Clinical Medicine 2017.

Feng MD, Shi-Ming; Sun MD, Qing-Qing etal. *Flexor Hallucis Tendon Impingement Syndrome: All-Inside Arthroscopic Treatment and Long term follow-up.* Journal of Foot and Ankle Surgery. 2020

Mu Hu MD. Et al. *Treatment of Chronic Subluxation of the Peroneal Tendons Using a Modified Posteromedial Peroneal Tendon Groove Deepening Technique.* Journal of Foot and Ankle Surgery. 2018, level 4 evidence.

Michaelson MD, James et al. *Tenosynovitis of the Flexor Hallucis Longus: A Clinical Study of the spectrum of presentation and treatment.* Foot and Ankle International. 2005

Nery, Ciao; Lemos MD, Andre Victor et al. *Combined Spring and Deltoid Ligament Repair in Adult Acquired Flatfoot.* Foot and Ankle International. 2018

Rivard, Dwayne DPM et al. *Bilateral Congenital Peroneal Tendon Subluxation.* Journal of Foot and Ankle Surgery. 1998

Yahong, Wu MD et al: *Complications in the Management of Acute Achilles Tendon Rupture: A Systematic Review and Network Meta-analysis of 2060 Patients.* American Journal of Sports Medicine 2019.

Sammarco MD, James; Cooper MD, Paul. *Flexor Hallucis Longus injuries in Dancers and Non-dancers. Foot and Ankle International.* 1998

Shah, Selina. *Caring for the Dancer Special Considerations for the Performer and Troupe.* Current Sports Medicine Reports. May 2008 Volume 7, Issue 3

Smith, Simon; Camasta DPM, Craig et al: *A Simplified Technique for Repair of Recurrent Peroneal Tendon Subluxation.* Journal of Foot and Ankle Surgery. 2009 volume 48.

QUESTIONS???