Foot and Ankle Potpourri

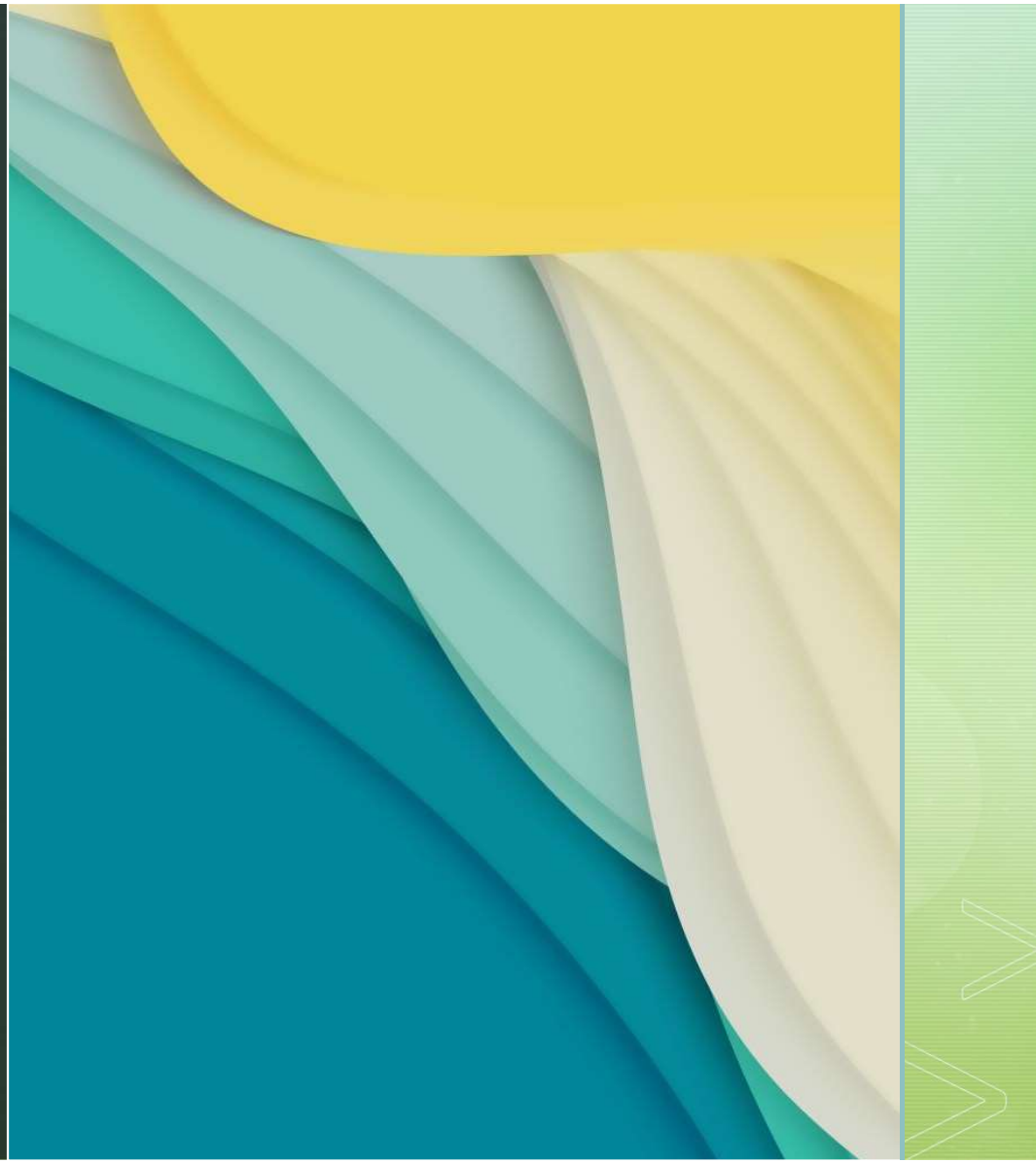
6/6/24

Lara Atwater, MD, FAAOS, FAOFAS

Oregon Health and Science University

Topics

- Ankle Sprains and associated conditions
- Plantar fasciitis
- Achilles tendinosis
- Hallux Valgus
- Hallux Rigidus
- Sesamoid Conditions



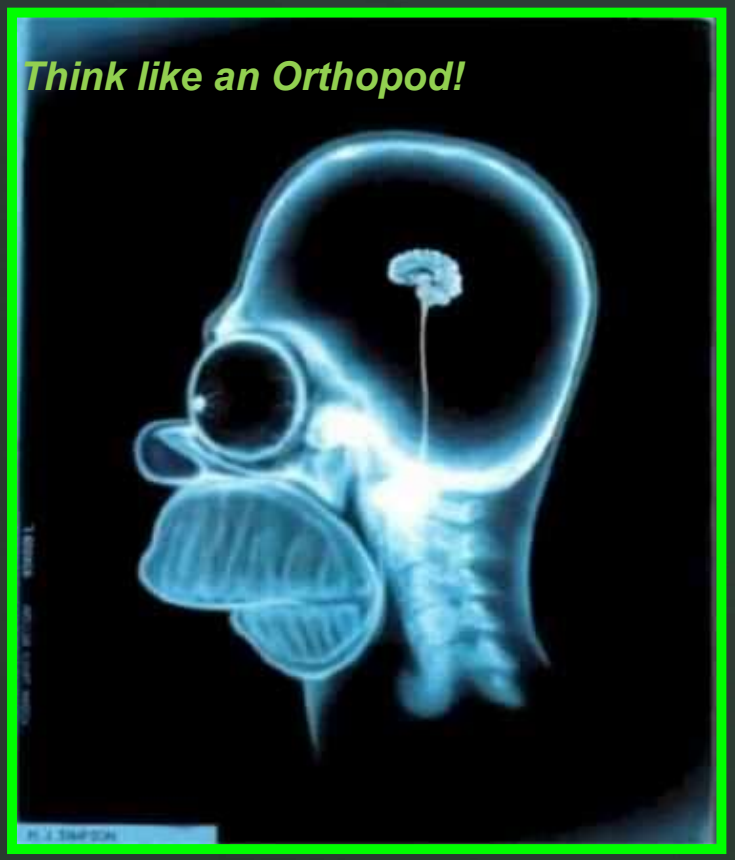
Nothing to disclose

Ankle Sprains – Acute Injuries & Persistent Symptoms

Unbeknownst to most historians, Einstein started down the road of professional basketball before an ankle injury diverted him into science.

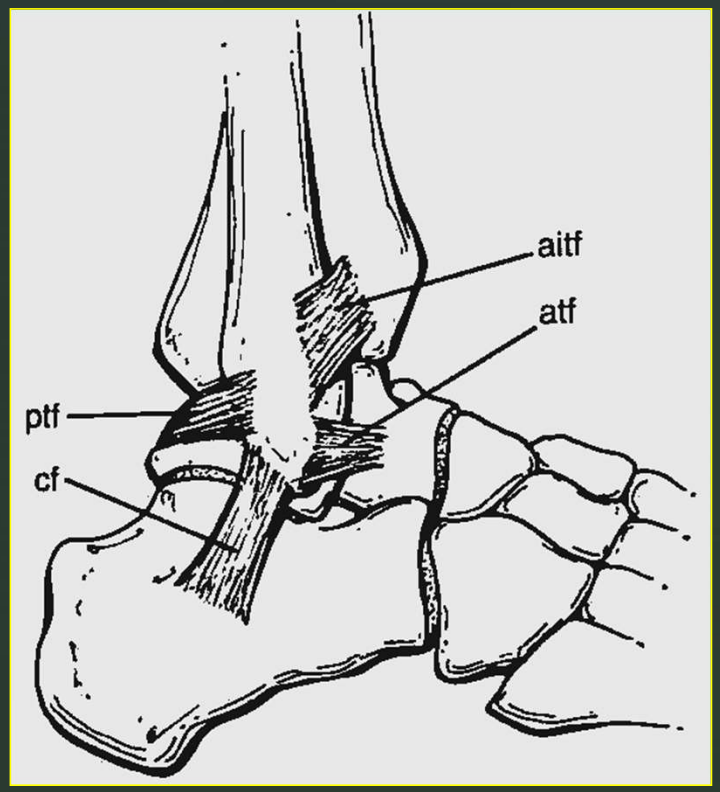
Overview

- Review Anatomy
- Review Acute Ankle Sprain
- Persistent Pain after Sprain
  - Evaluation
  - Differential Diagnosis
  - First Steps in Treatment



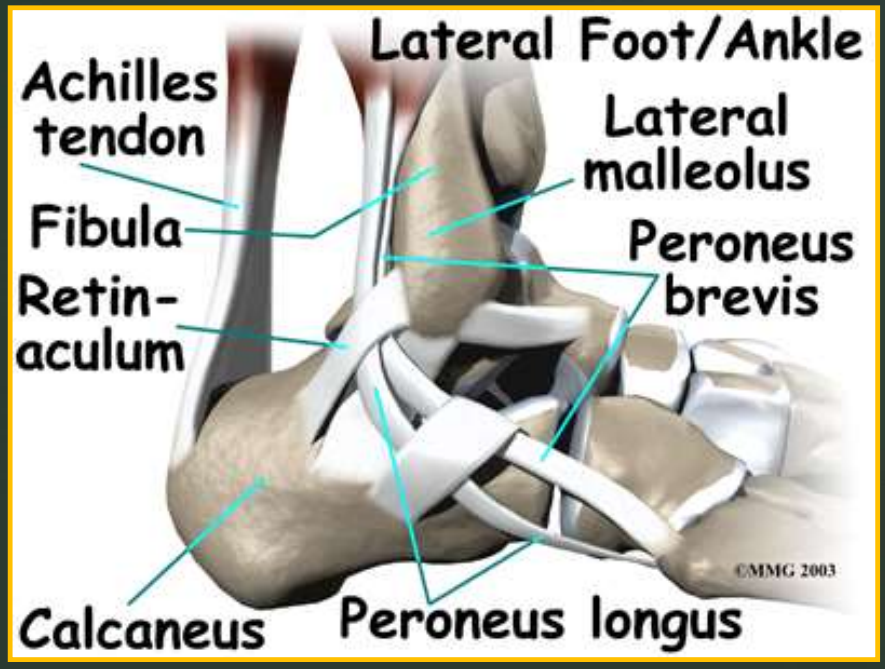
Ligament Anatomy

- Lateral
  - ATF
  - CF
  - PTF
- Medial - Deltoid
- Syndesmotic Ligaments



Tendon Anatomy

- Lateral
  - Peroneus Longus
  - Peroneus Brevis



Acute Ankle Sprain

- Very Common Injury
  - 23,000+ ER Visits Daily in US
  - Most Common Sports-Related Injury
- 90% Lateral, 10% Medial

Mechanisms of Injury

- Lateral
  - *Most Common*
  - Plantarflexion
  - Inversion
- Medial
  - Eversion
  - Rotation

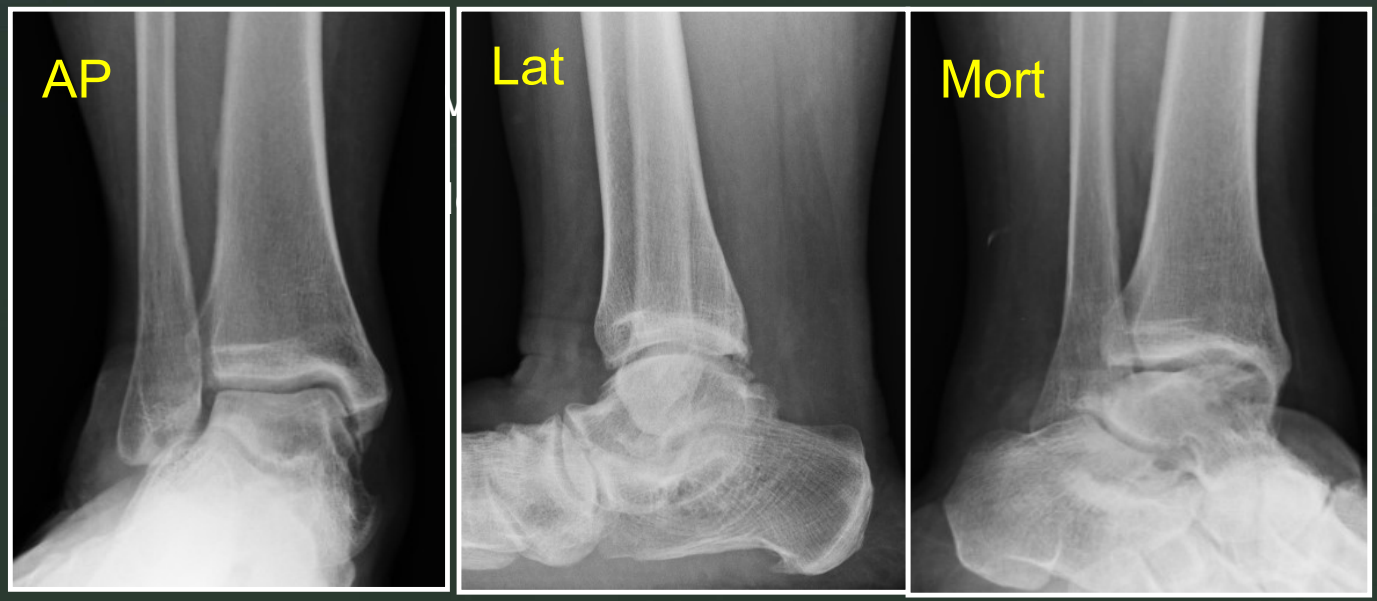
Acute Ankle Sprain

- History
  - Mechanism of Injury
  - Ability to WB
  - Associated Injuries
  - Pain Location

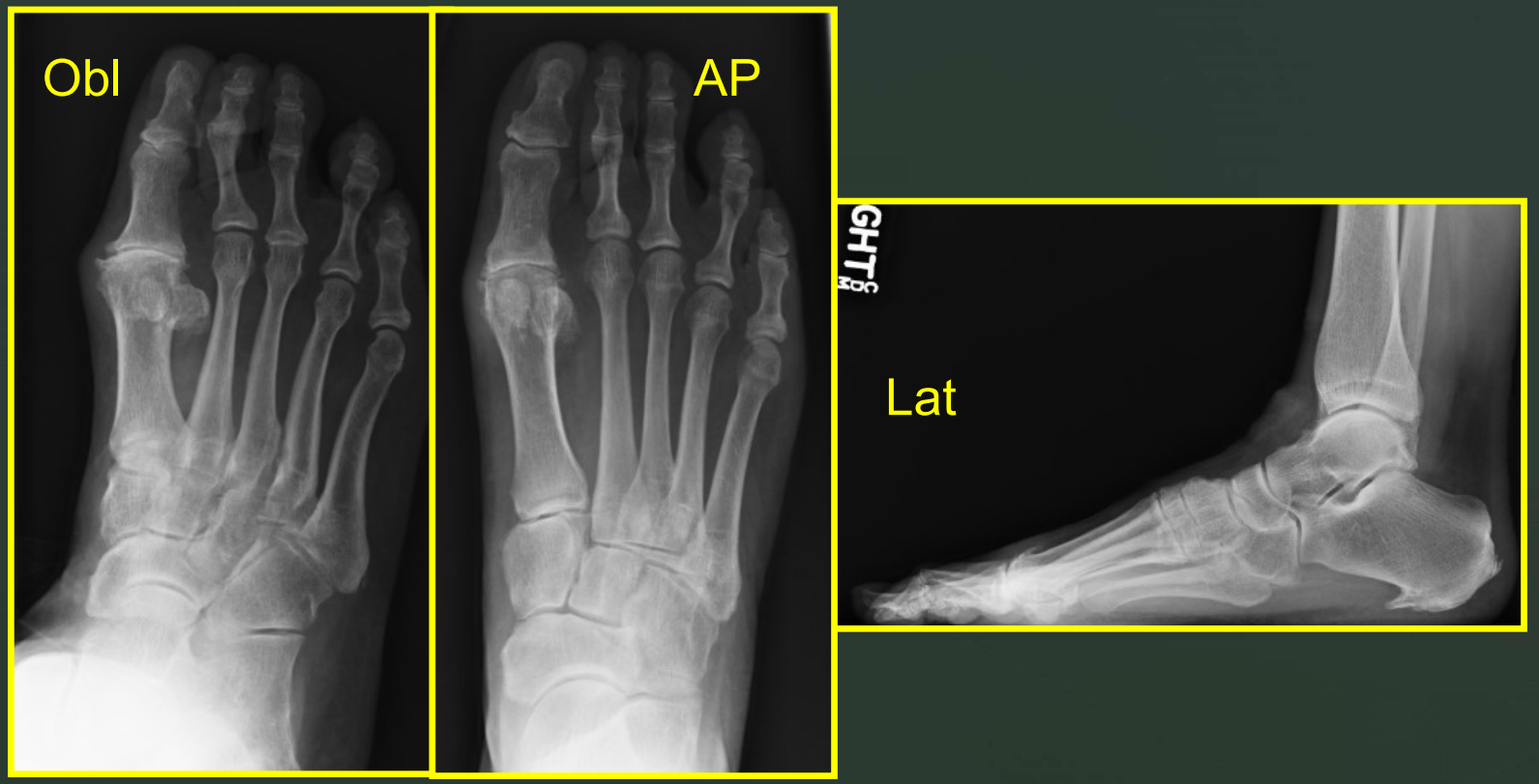
Acute Ankle Sprain

- Exam
  - NV Status
  - Ecchymosis Location
  - Tenderness - R/o Other Injuries!
  - ROM - *DIFFICULT*
  - Assess Stability - *DIFFICULT*

Ankle Radiographs



Foot Radiographs - PRN



- Classification
  - I - ATF Sprain
  - II - ATF Rupture, CF Sprain
  - III - ATF, CF Rupture

I = Mild
II = Moderate
III = Severe

Lateral Ankle Sprain

Treatment of Lateral Ankle Sprain

- Most Patients (> 90%) Have Good Result with Non-operative Treatment!

  Kannus P, Renstrom P, JBJS, 1991

Treatment of Lateral Ankle Sprain

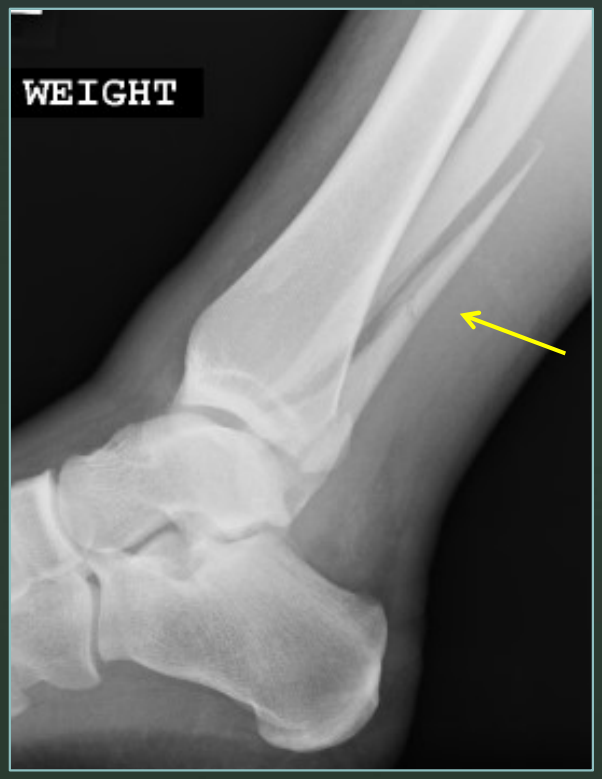
- Early Treatment (ER/Office)
  - RICE
  - NSAID
  - Splint or Aircast
  - WB restriction based on severity

Treatment of Lateral Ankle Sprain

- Later Treatment
  - Advance WB
  - Wean out of brace / boot
  - Physical therapy for strength and proprioception

When to Refer to Ortho?

- (+) Fracture
- Severe symptoms
- Cannot advance WB
- *Just not sure…*

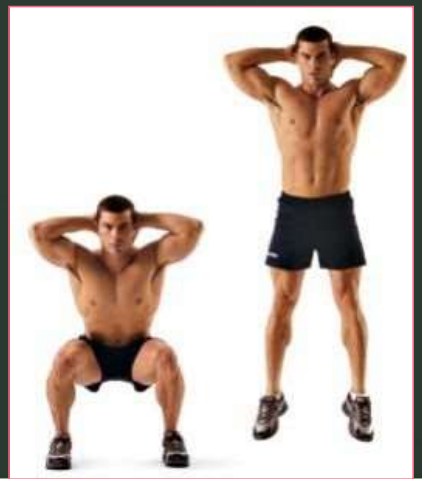


Treatment of Lateral Ankle Sprain

- Physical Therapy
  - ROM
  - Strength - peroneals
  - Proprioception, balance
  - Edema control

Treatment of Lateral Ankle Sprain

- Later – run, agility, plyometrics, sport training
- Advance Activities & Resume Sports Based on Rehab



Persistent Pain after Ankle Sprain

- "Why Does It Still Hurt?"
- > 4-6 weeks after sprain
- Severe pain
- Difficulty progressing with functional recovery
- *Probably refer…*

Persistent Pain after Ankle Sprain

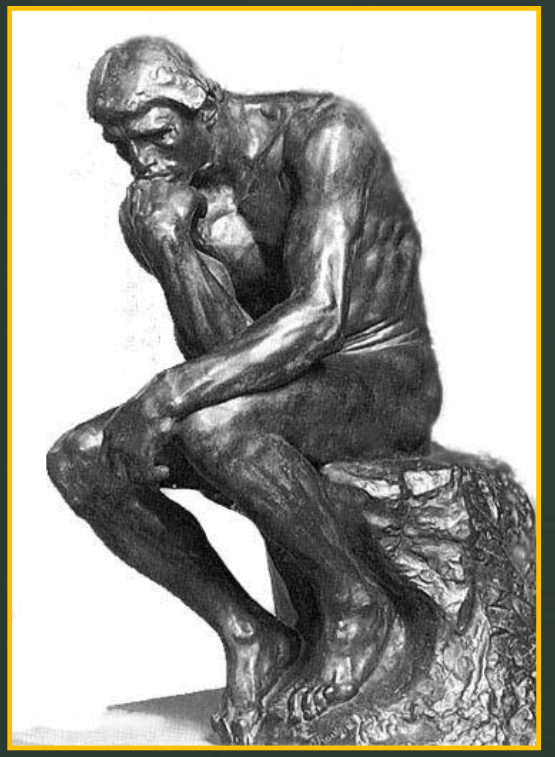
- History
  - Localize & Characterize the Pain
  - Episodic vs. Constant Pain?
  - Giving Way?
  - Aggravating/Alleviating Factors

Persistent Pain after Ankle Sprain

- Physical Exam
  - Localize the Pain!
  - Ligament Laxity
  - Strength

Persistent Pain after Ankle Sprain

- Radiographs – (+/-) Stress Films
- Bone Scan - Identify Occult Fx
- CT Scan - Bony Detail
- MRI Scan - Soft Tissue Detail
- Diagnostic Injections - Local Anesthetic



Chronic Instability

- Incidence - 5-10%
- History
  - Giving way
  - “Weakness”
  - Episodic Pain with Pain-Free Intervals
- Exam
  - Test Stability
    - Anterior Drawer, Tilt tests

Stability Tests

Stress Xrays

Chronic Instability

- Non-Operative Treatment
  - NSAID
  - Taping or Bracing
  - Physical Therapy
    - ROM
    - Strengthening - Peroneals
    - Proprioception

Chronic Instability

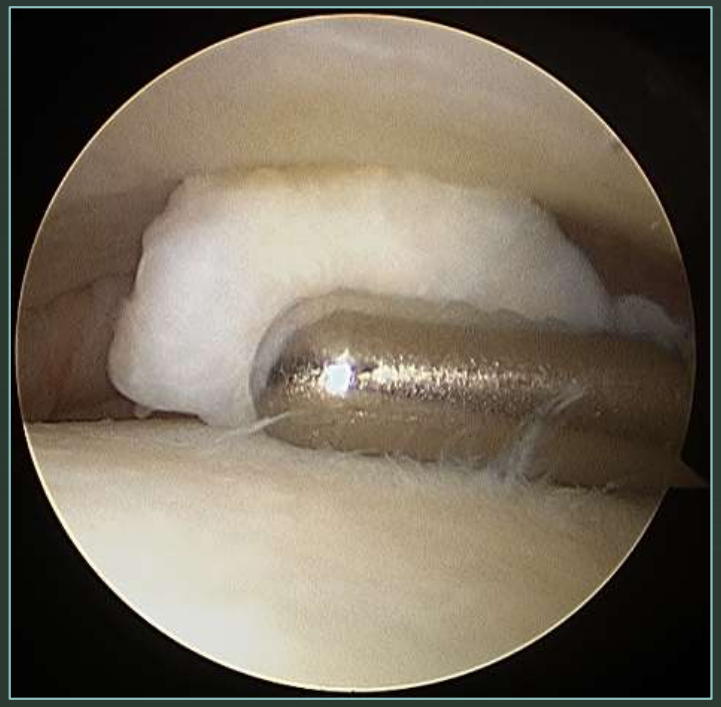
- Surgical Treatment
  - Indication
    - Failure of Non-Operative Means
  - Repair or Reconstruct Ligaments
  - Often Need Ankle Arthroscopy

Ligament repair

DiGiovanni BF, et al. Foot Ankle Int 2000.

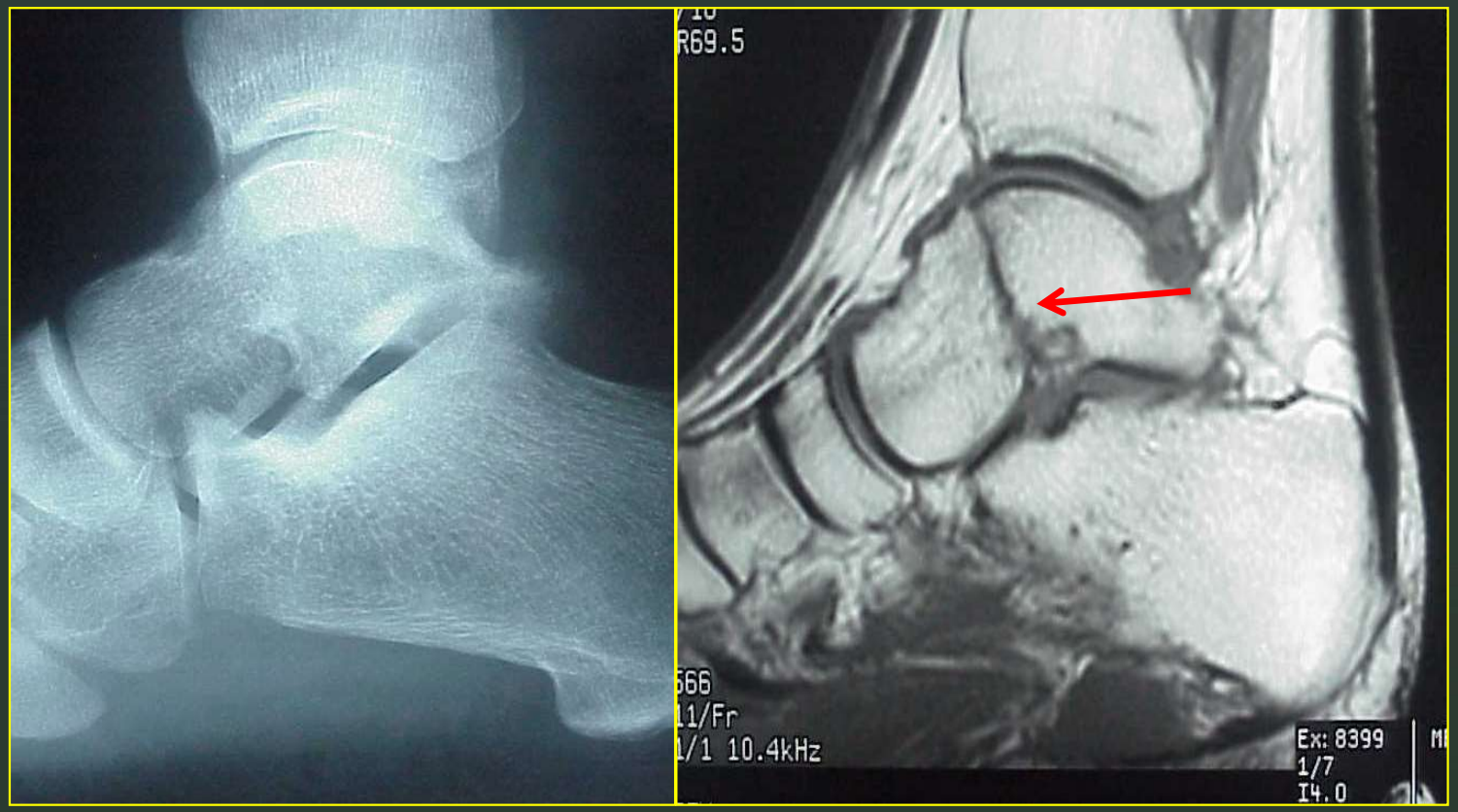
Persistent Pain after Ankle Sprain

- CC = “Constant Pain”
- Differential Diagnosis
  - Occult Fx or loose body
  - OCD Talus
  - Impingement Problem
  - Tendon Injury



- Examples
  - Base 5th Metatarsal
  - Lateral Process Talus
  - Posterior Process Talus
  - Anterior Process Calcaneus

Occult Fracture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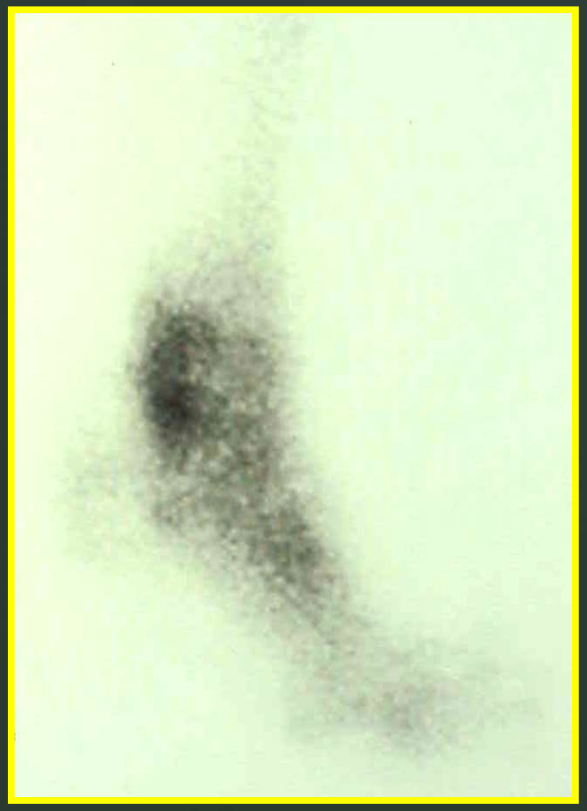
Occult Fracture

- Localized Pain, Activity-related
- Point Tender to Palpation
- X-rays Usually (+)
- Bone Scan or CT Scan Helpful

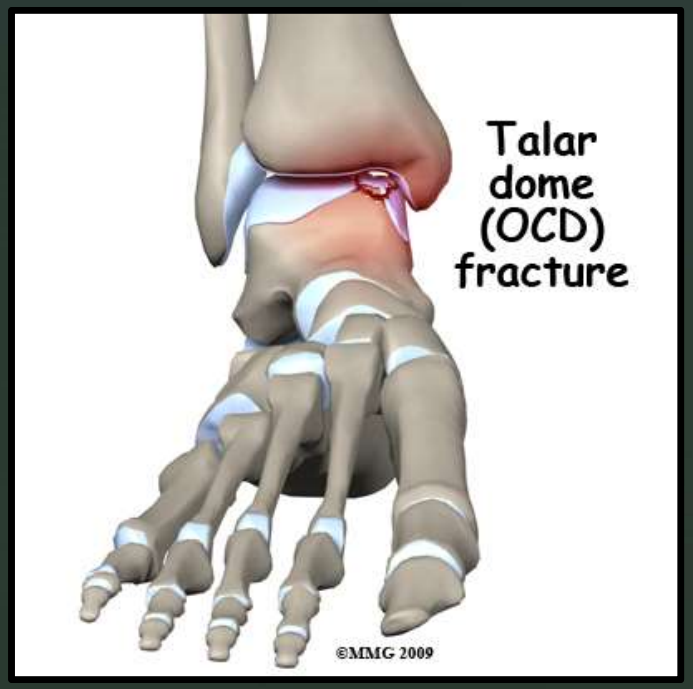


Occult Fracture

- Treatment
  - NSAID
  - PT ?
  - Immobilization - Cast or Brace
  - Surgery – Fix vs. Excision

Osteochondral Defect (OCD) of Talus

- Defect of Cartilage +/- Underlying Bone
- “Deep” Pain - Focal or Diffuse
- Usually Activity-Related, (+/-) at Rest
- Tender to Palpation, Pain with ROM



Osteochondral Defect (OCD) of Talus

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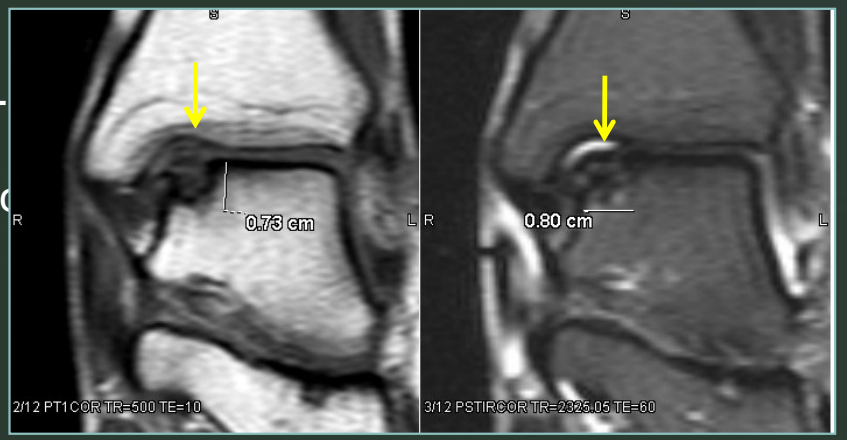
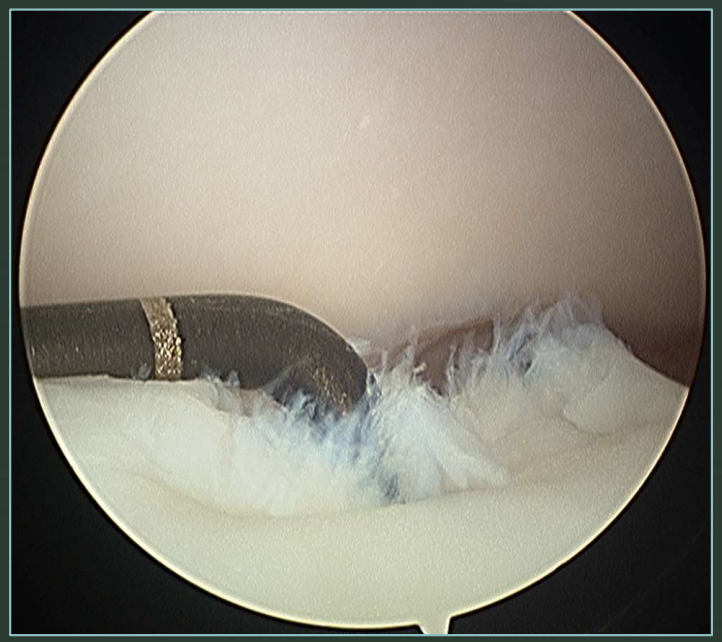


Osteochondral Defect (OCD) of Talus

- Treatment
  - NSAID
  - PT
  - Immobilization
    - Cast or Brace
  - Surgery

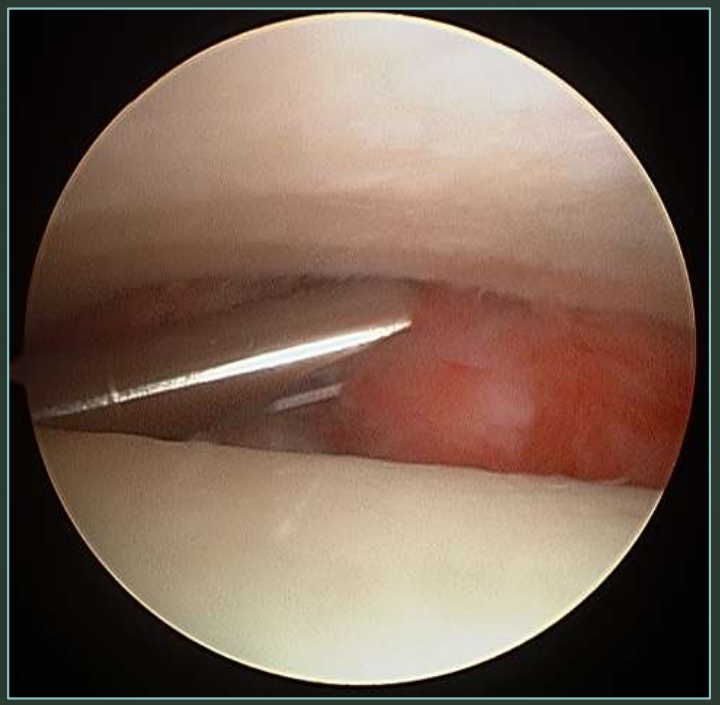


Joint Impingement

- "Pinching" by Soft Tissue or Bone
  - Inflamed Synovium
  - Fibrous Tissue
  - Osteophytes
- Sharp or Aching Pain
- ↑ Pain with Particular Motion

Joint Impingement

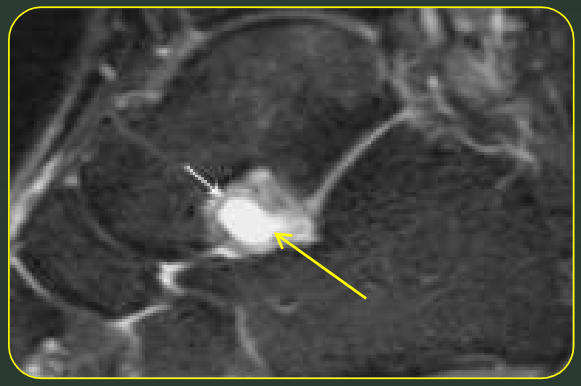
- Treatment
  - NSAID
  - Immobilize - Cast or Boot
  - Physical Therapy
  - Steroid Injection
  - Surgery



Syndesmotic Injury

- “High ankle sprain”
- External rotation injury
- Squeeze & external rotation test
- Stable: rest, PT
  - Recovery 2x longer
- Unstable: surgery

Sinus Tarsi Syndrome



- 70% involved severe inversion sprain
- Lateral hindfoot pain, worse on uneven surface
- Must rule out instability
- Xrays normal
- MRI = inflammation

Sinus Tarsi Syndrome

- Rest, cryotherapy, NSAID's
- PT: modalities, strengthening exercises
- Orthotics : correct overpronation
- Steroid injections
- Surgery: subtalar arthroscopy, arthrodesis

Tendinitis or Tendon Tear

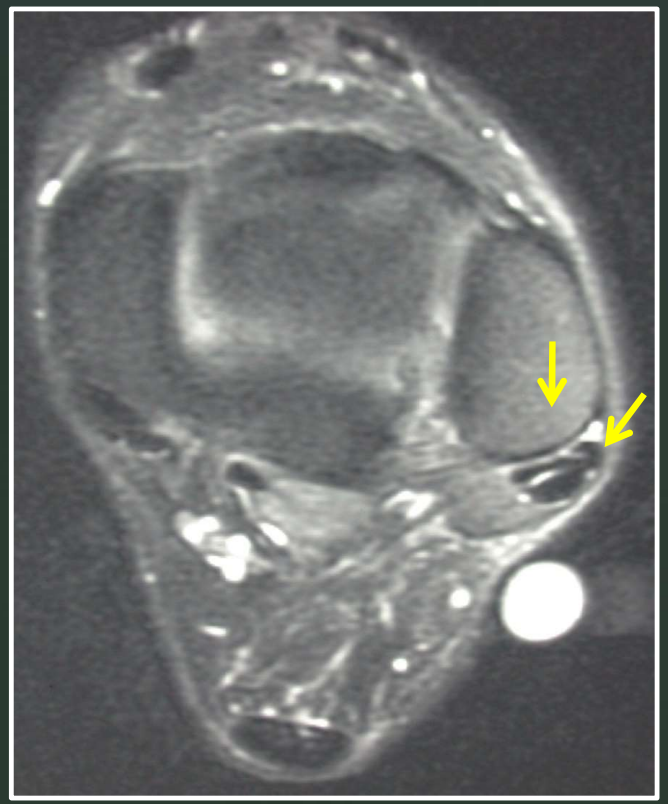
- History
  - Peroneals or Posterior Tibialis Most Common
  - “Tearing” or “Popping” Sensation with Injury
  - Localized Pain, Activity-Related, (+/-) at rest
  - Weakness of Involved Muscles

Tendinitis or Tendon Tear

- Exam
  - Swelling
  - Tenderness along Tendons
  - Pain with Resisted Contraction or Passive Stretch
  - Weakness

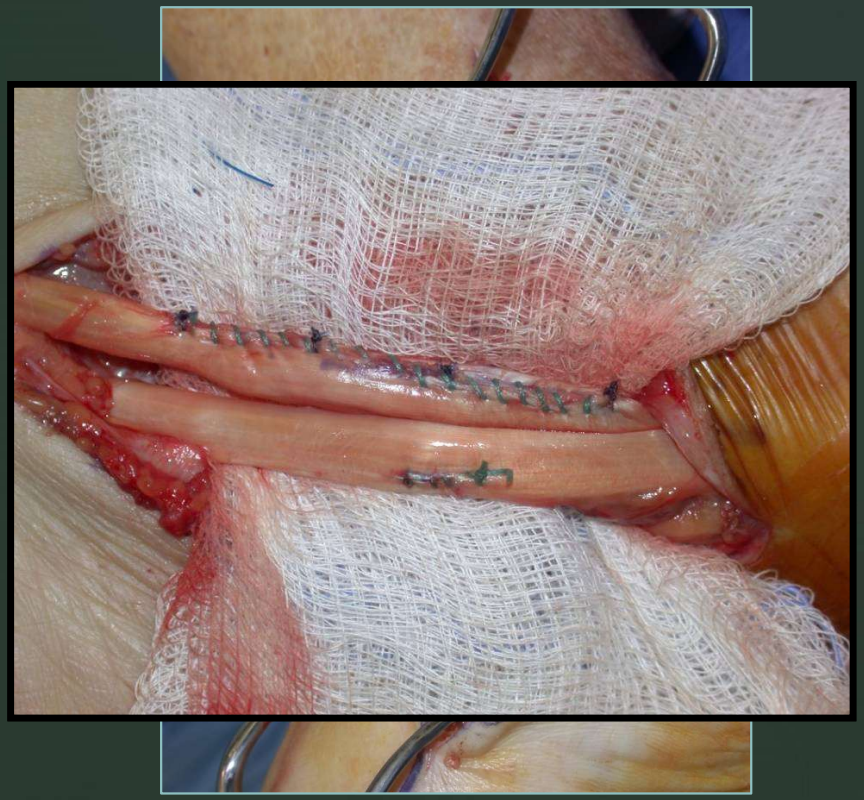
Tendinitis or Tendon Tear

- X-rays (-)
- MRI may be Helpful

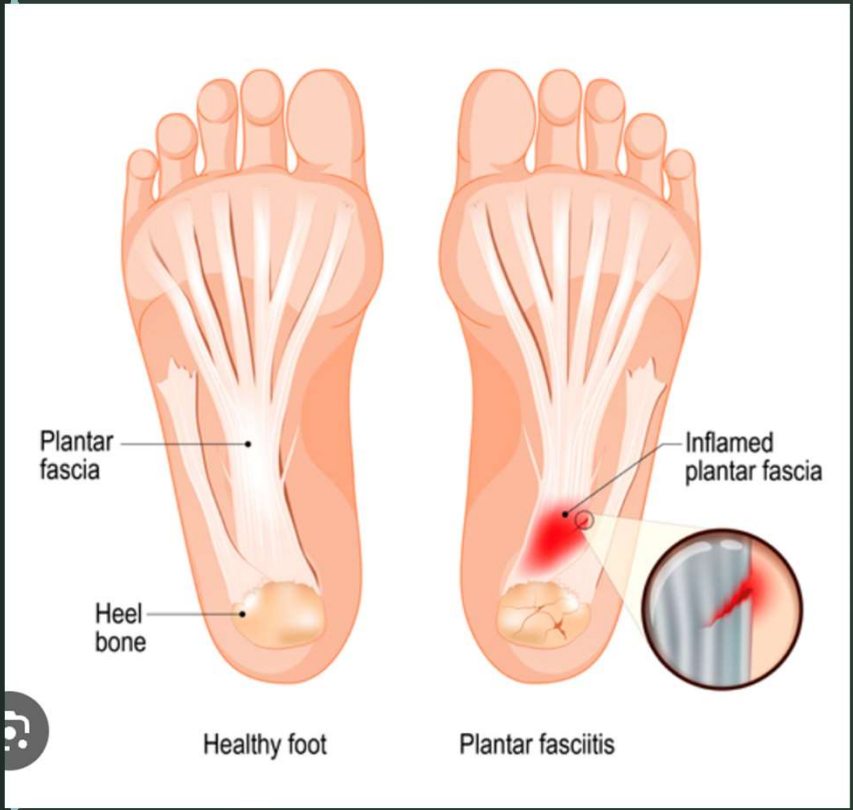


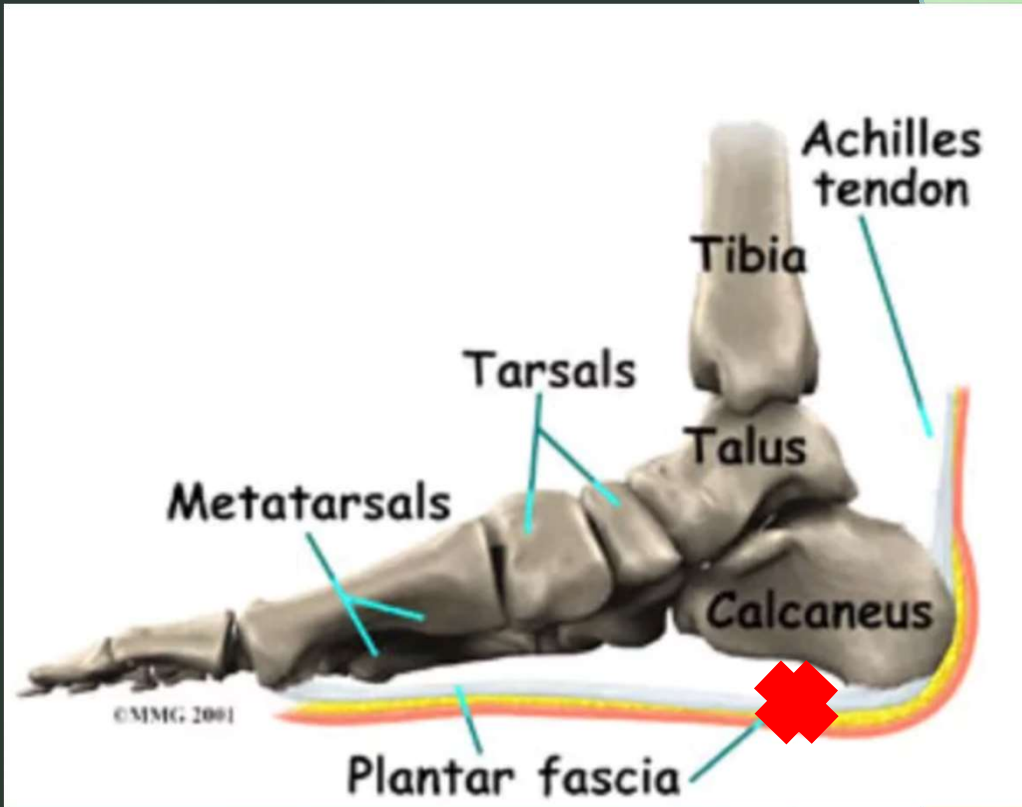
Tendinitis or Tendon Tear

- Treatment
  - NSAID
  - PT
  - Immobilization
  - NO Steroid Injection -*Risks Rupture!*
  - Surgery



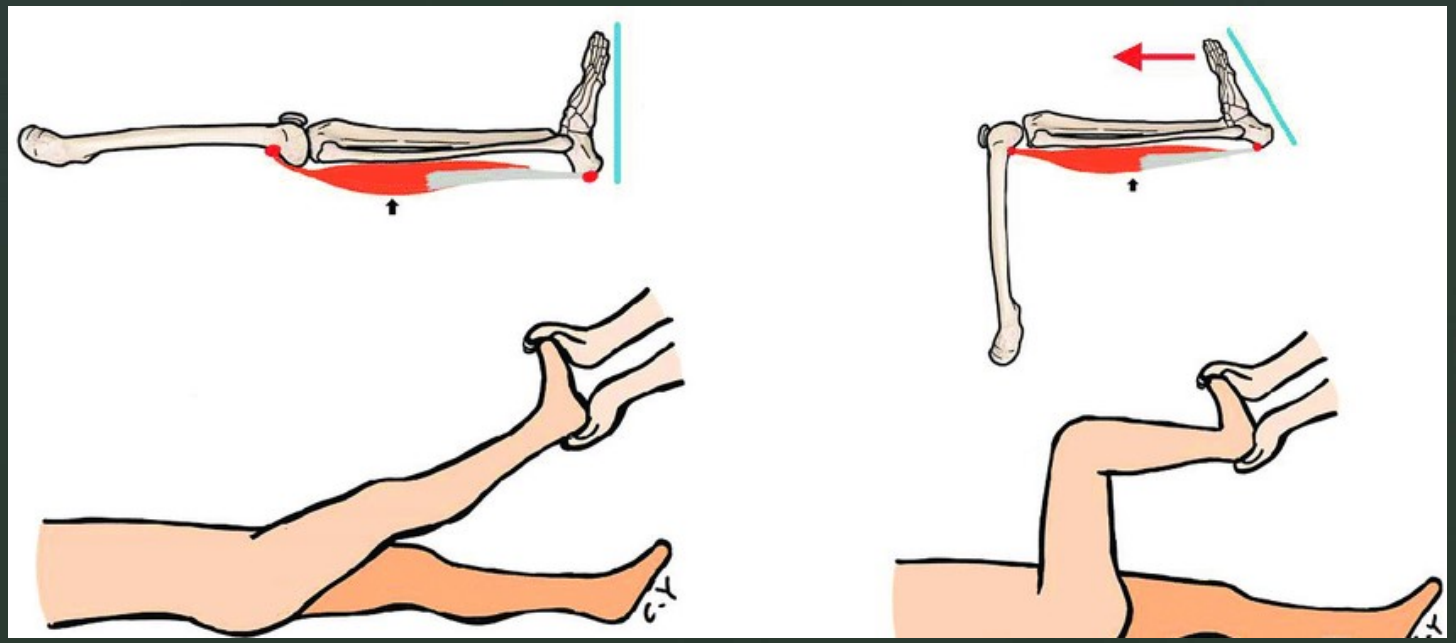
Plantar fasciits


Plantar fascia
Heel bone
Inflamed plantar fascia
Healthy foot
Plantar fasciitis


Achilles tendon
Tibia
Tarsals
Talus
Metatarsals
Calcaneus
©MMG 2001
Plantar fascia

Achilles tightness → plantar fascia tightness

Silfverskiold test

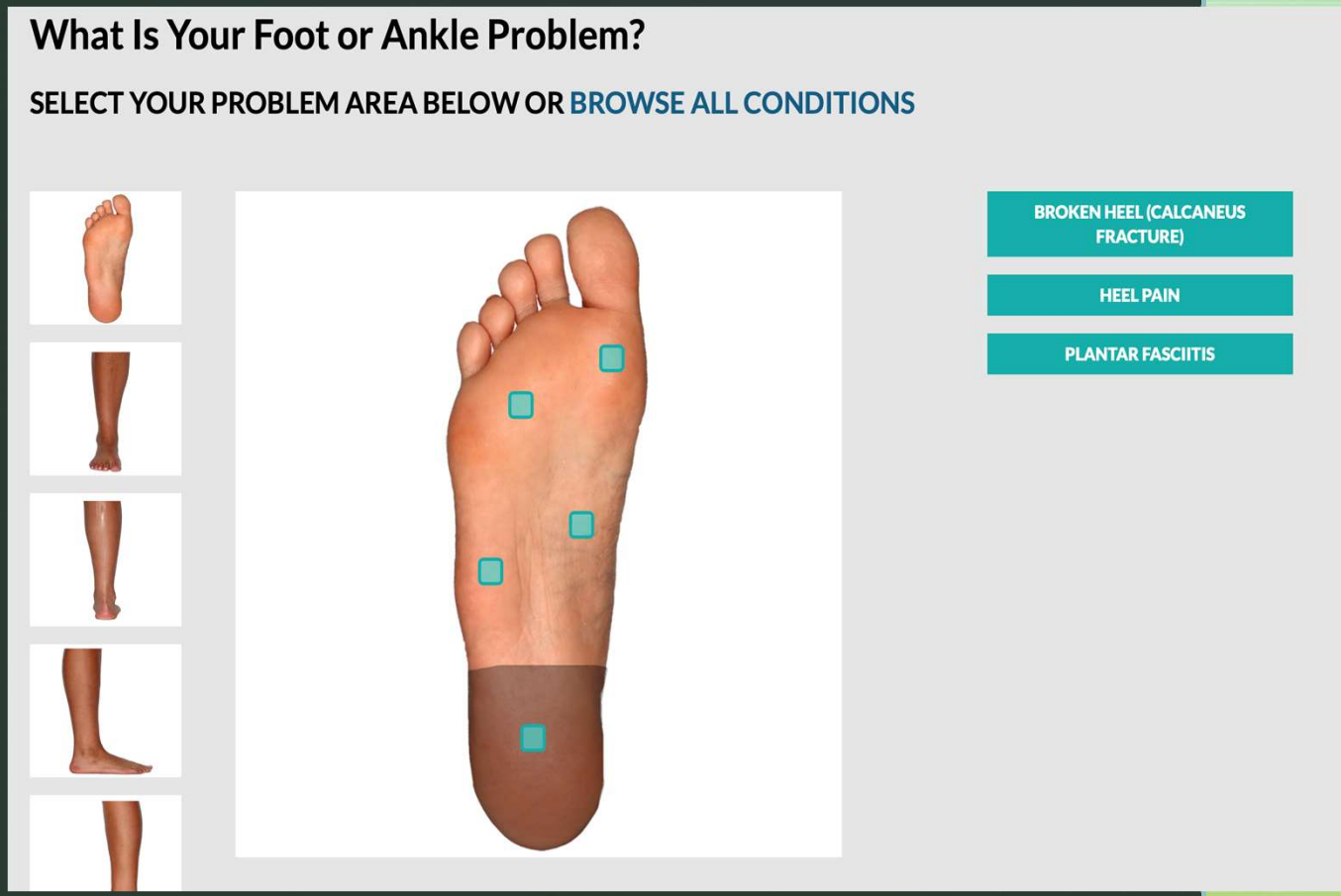


Patient resources

- Google:

FootCareMD

(Association of Orthopedic Foot and Ankle Surgeons)



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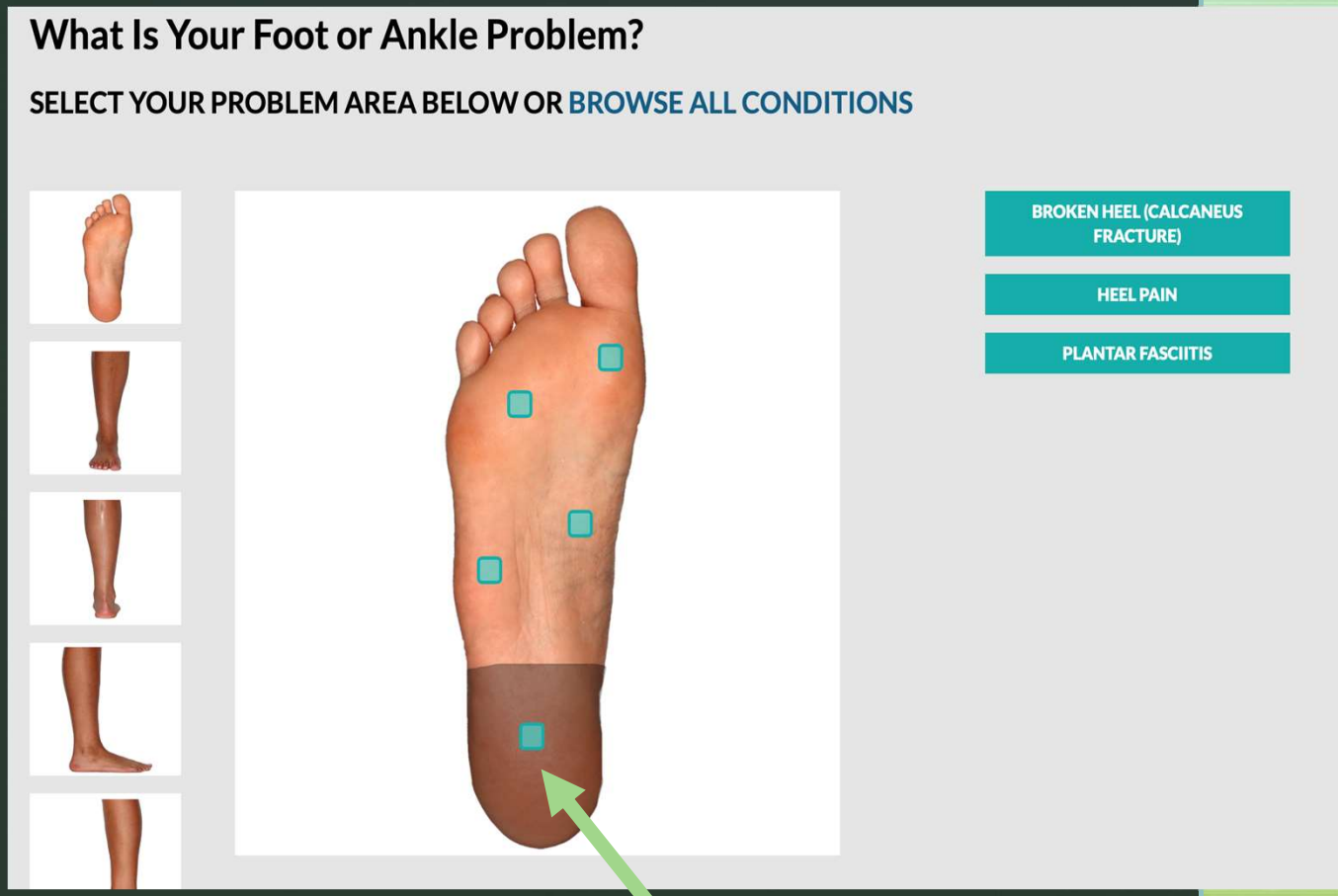

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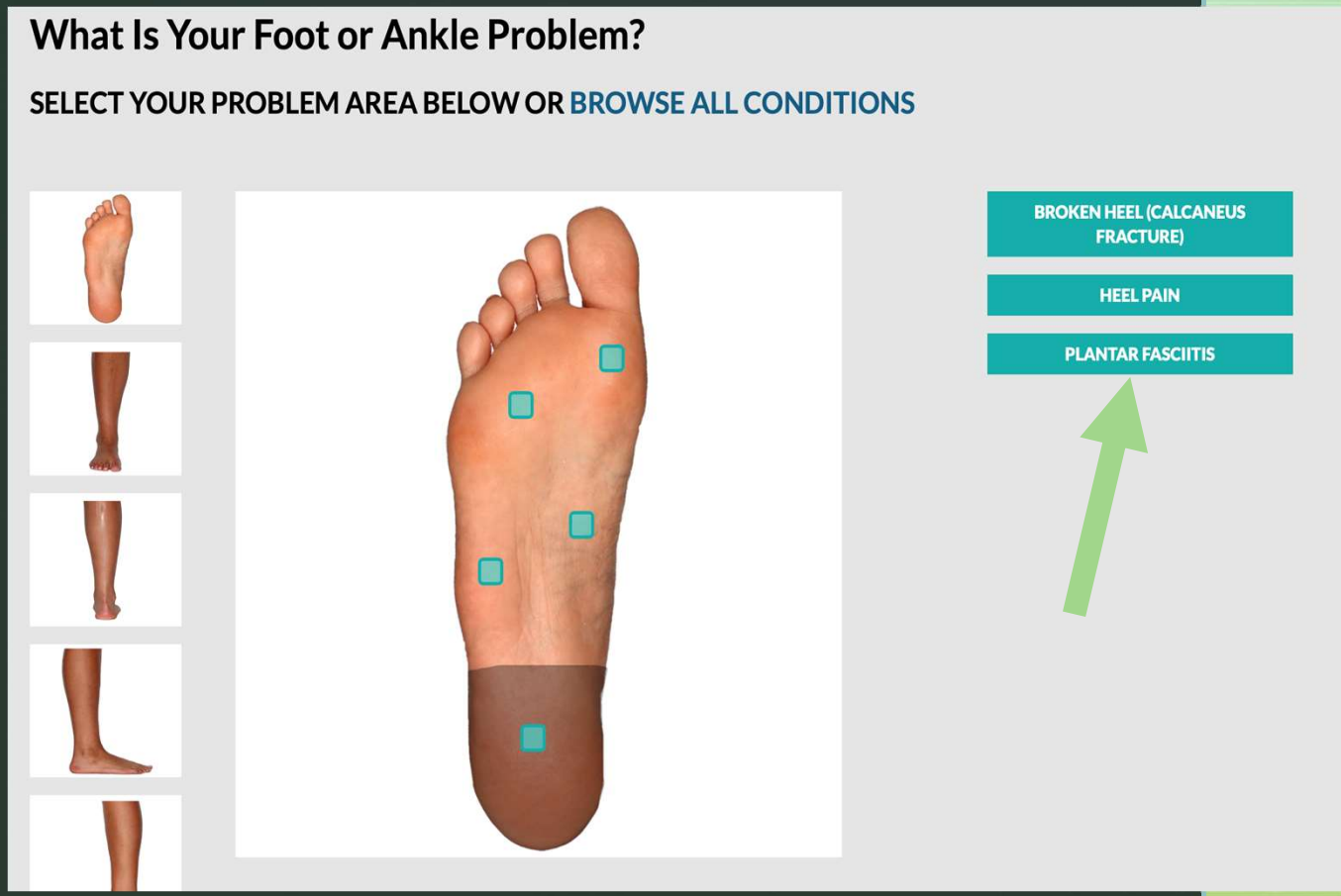

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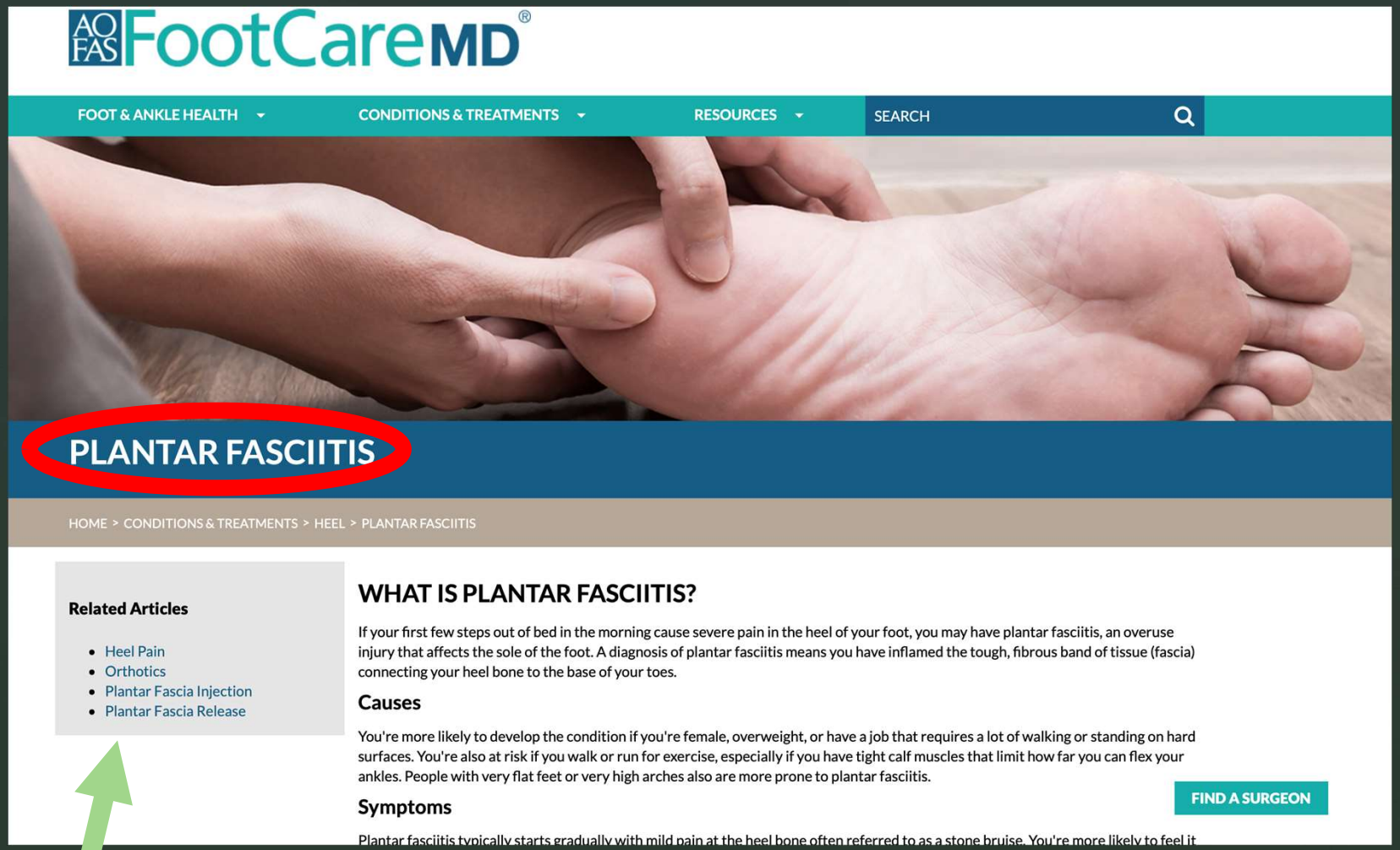
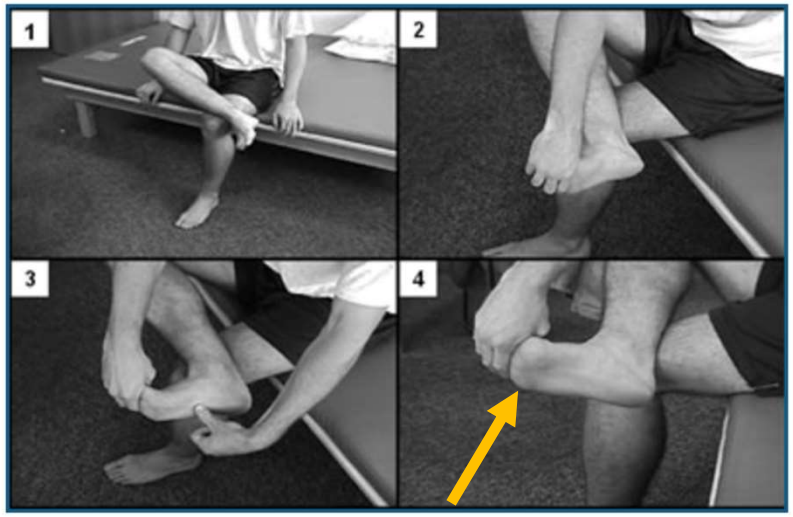


Plantar fascia massage: “the move”

Plantar Fascia-Specific Stretching Program

1. Cross your affected leg over your other leg.
2. Using the hand on your affected side, take hold of your affected foot and pull your toes back towards shin. This creates tension/stretch in the arch of the foot/plantar fascia.
3. Check for the appropriate stretch position by gently rubbing the thumb of your unaffected side left to right over the arch of the affected foot. The plantar fascia should feel firm, like a guitar string.
4. ~~Hold the stretch for a count of 10. A set is 10 repetitions.~~



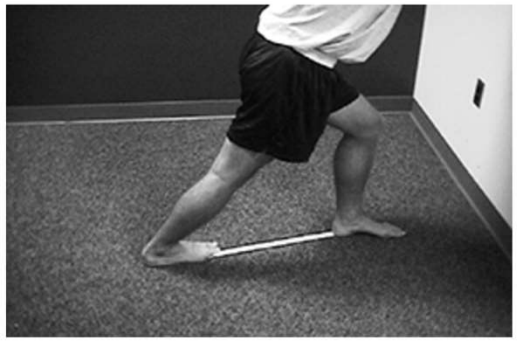
Massage with thumb 15-20 min at end of day

”stretch the guitar string”

Gastroc stretch: 60 seconds each side 5x/day

Additional Stretch: Achilles Tendon Stretch

1. Place a shoe insert under your affected foot.
2. Place your affected leg behind your unaffected leg with the toes of your back foot pointed towards the heel of your other foot.
3. Lean into the wall.
4. Bend your front knee while keeping your back leg straight with your heel firmly on the ground.
5. ~~Hold the stretch for a count of 10. A set is 10 repetitions.~~
6. Perform the stretch at least three times a day.



Big toe toward the heel!!!!!

Other helpful things:

- Night splint if “first-step” pain

Other helpful things:

- Ice cup massage
- Gel heel cup
- Physical therapy

(cheerleading, graston)

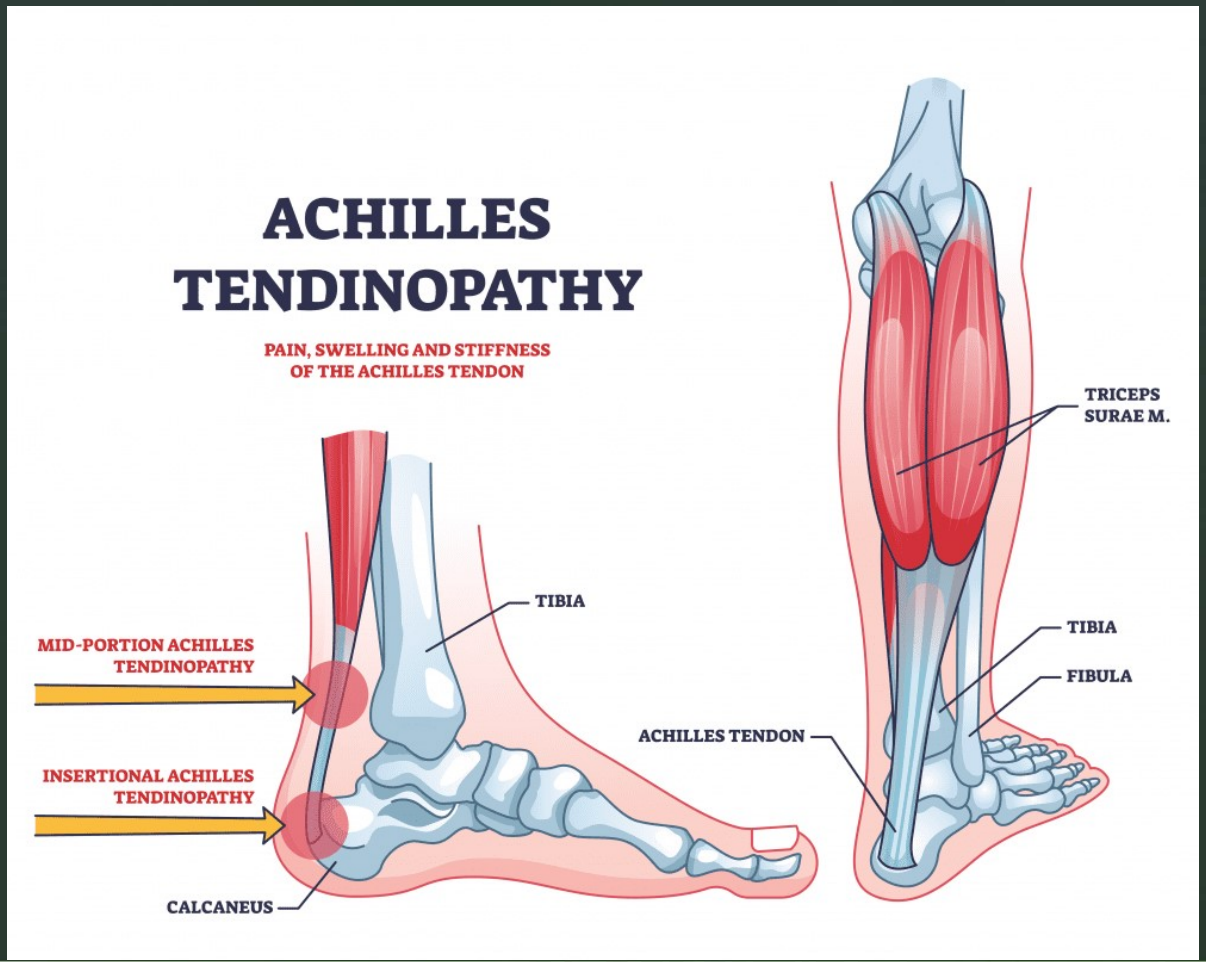
Injections?

- Steroid: once, maybe twice
  - Too many can precipitate rupture
- Platelet rich plasma
  - 50/50 in literature and in practice
  - Biggest risk is $$$

Surgery

Achilles tendonitis

Achilles tendonitis

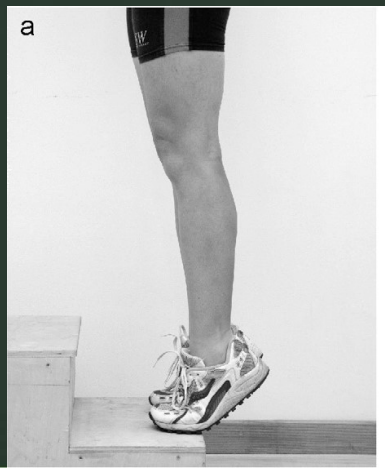


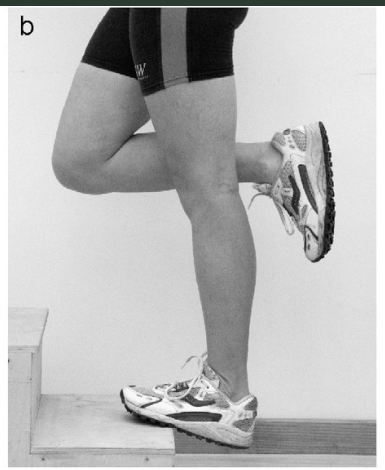
Non-insertional achilles tendonopathy

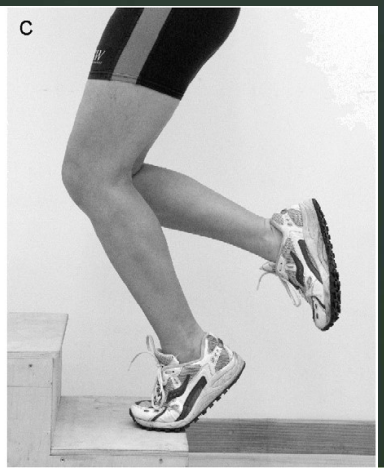
- RICE
- Activity modification
- Shoe wear (heel lift, boot if severe)
- PT
- NSAIDS
- PRP???
- Surgery
  - Open debridement
  - Gastrocnemius recession

Insertional Achilles Tendonoapthy

- Trauma → inflammation → cartilaginous metaplasia → bony metaplasia/osteophytes
- Treatment: ECCENTRIC strenthening







Hallux Valgus (bunion)

Hallux Valgus

- Static subluxation of the the first MTP joint characterized by lateral deviation of the great toe and medial deviation of the first metatarsal

Etiology

- Extrinsic factors: shoe wear
  - Females > Males
- Intrinsic (abnormal foot mechanics)
  - Severe pes plannus (pronation deformity)
  - Ligamentous laxity (hypermobile first TMT)
- Others
  - Hereditary (70% + family history)
  - Generalized NM disorders (CP)
  - Inflammatory (RA)
  - Trauma/ 2nd toe amputation

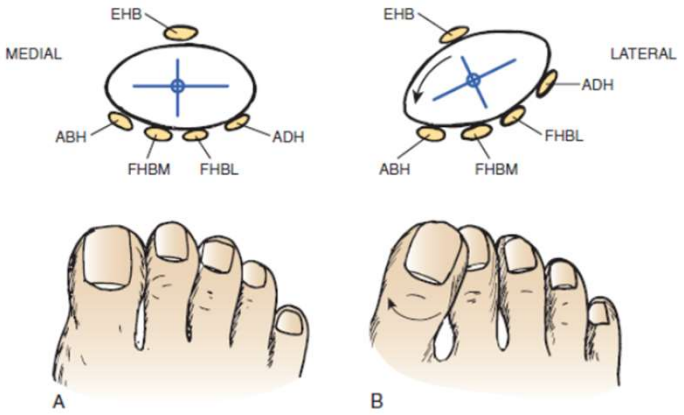
Hindfoot valgus/pes planus

Pronation translates into hallux valgus

1st tarsometatarsal instability

Pathoanatomy

- Medial capsule attenuation
- Secondary Contracture of Lateral structures
- Plantar-lateral migration of abductor halluces → pronated hallux
- Stretch extensor hallucis longus →Lateral dislocation
- 1st MT head moves medially off sesamoids (anchored in place) → ++IMA
- 2nd MTP pathology
  - Hammertoe
  - Crossover toe



Treatment

- Nonoperative treatment
  - Shoes with wide toe box
  - Orthotics (spacers/ splints)
  - No splint can “fix it,” just relieve it

Surgical procedures

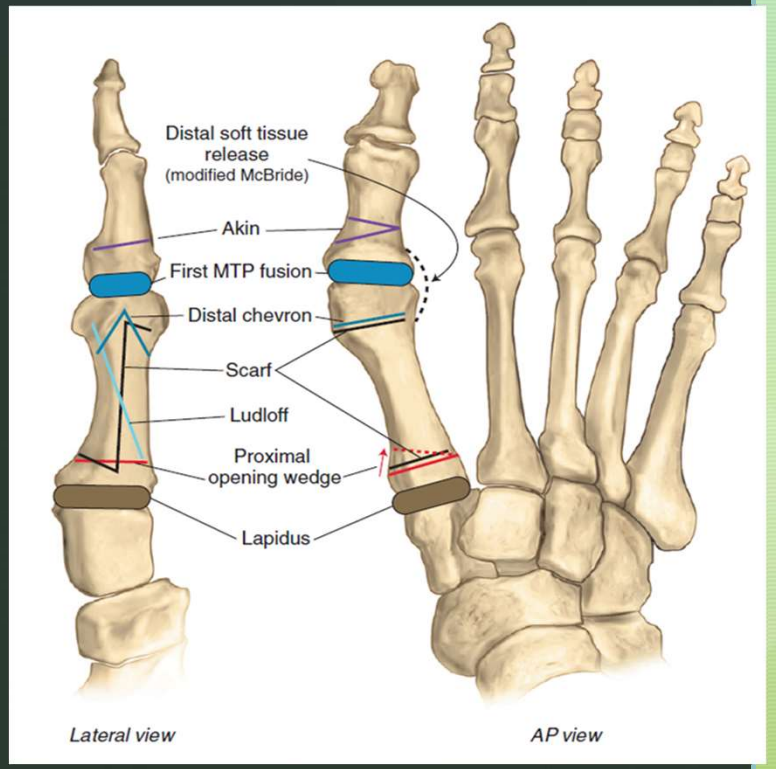
1. Distal osteotomies
   - Chevron

2. Scarf osteotomy

3. Proximal osteotomies
   - Crescentic
   - Ludloff
   - Proximal opening wedge

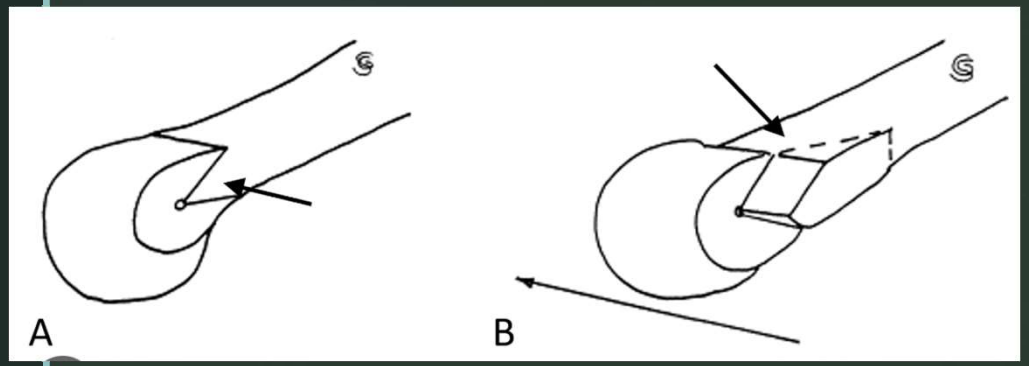
4. Lapidus [first TMT arthrodesis]

5. Akin osteotomy [proximal phalanx medial closing wedge]: **add if HVI > 10**



Chevron

1,874 × 2,410



Complications

- **Recurrence**

++ risk with:

- Undercorrection of IMA
- Failure to recognize abnormal DMAA
- Isolated STR
- Juvenile Bunion

- Dorsal malunion and shortening
- Proximal osteotomies
- Transfer metatarsalgia

- AVN

- Neuropraxia (medial dorsal cutaneous nerve)

Complications

- Hallux varus

++ risk with:

- Resection of **fibular sesamoid**
- Overresection of medial eminence
- Excessive lateral release
- Overcorrection of IM angle

- Nonunion

++ risk with Lapidus

HALLUX RIGIDUS

Hallux Rigidus

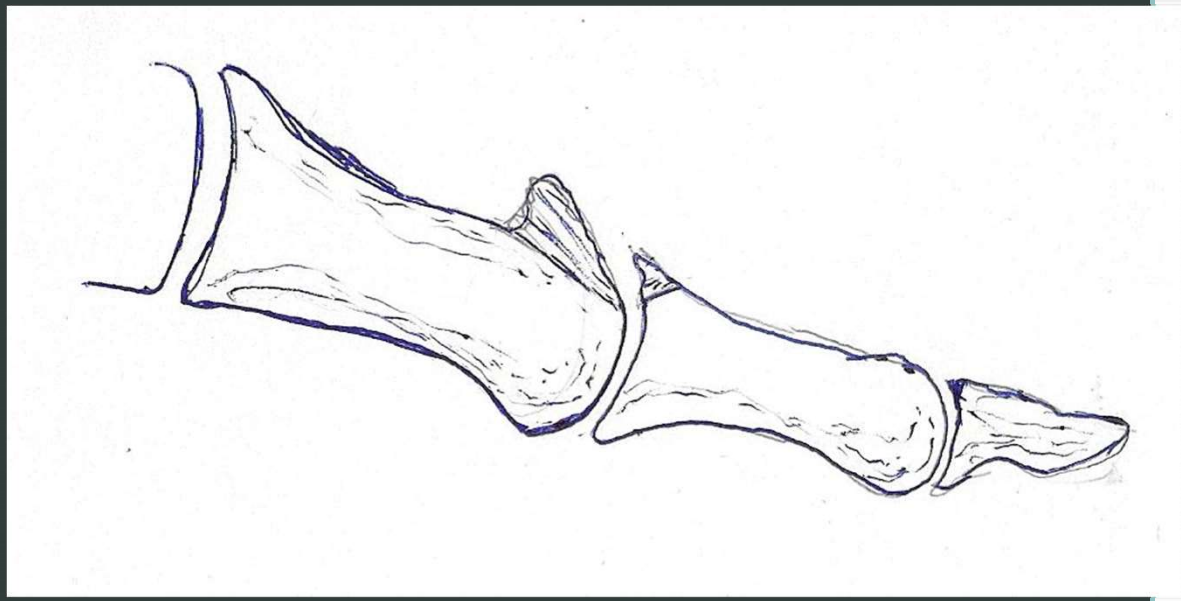
- Arthritis of the first MTP joint with progressive loss of motion
- Most common site of arthritis in the foot
- Female > males, + family history (80%)
- Usually in the 5th or 6th decades of life
- Inflammatory conditions (gout, RA)

Treatment

- Initial presentation: Nonoperative
  - Activity modification
  - Wide or rigid shoes
  - Morton's extension
  - Steroid injection into 1st MTP

- Continued pain: surgery
  - **Pain at end range of motion→ cheilectomy**
  - **Pain at mid range of motion→ 1st MTP fusion**
    (or synthetic cartilage implant/interposition if toe motion is of paramount importance)

Operative treatment: no pain at mid range of motion



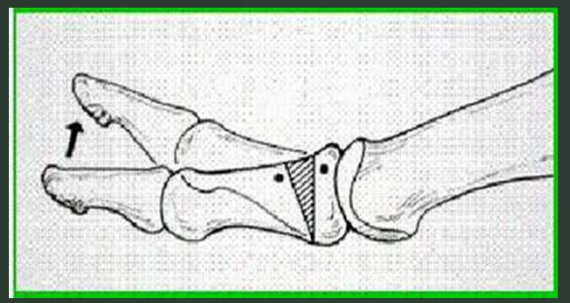
Dorsal Cheilectomy

Operative treatment

- MTP arthrodesis
  - Indications: pain at mid-range
  - Gold standard for advanced disease
  - >90% fusion rate

- MTP arthrodesis with structural bone block graft
  - Revision arthroplasty
  - Primary cases with inadequate bone stock

Operative treatment



- Moberg osteotomy
  - limited DF in early disease
  - In combination with cheilectomy
- MTP arthroplasty (synthetic cartilage implant)
  - Severe disease (3-4)
  - Patients who wish to preserve their motion
- Keller resection arthroplasty
  - elderly, low demand people

Sesamoid conditions

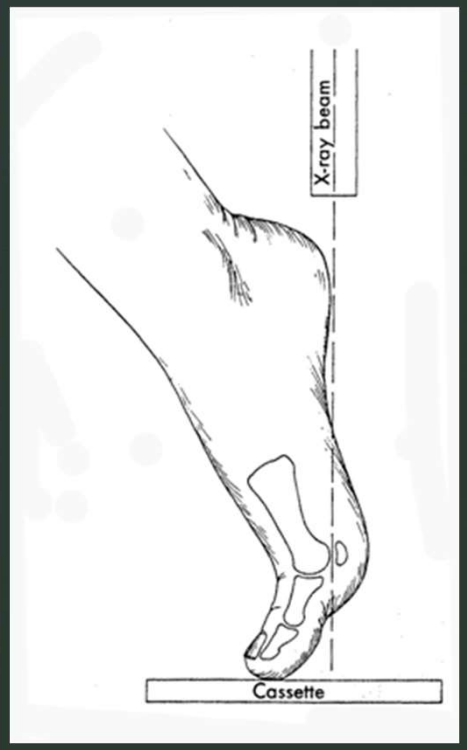
Multiple ways to injury a sesamoid

- Fracture
- Dislocation
- Turf toe (capsular plantar plate sprain or injury)
- Sesamoiditis
- Chondral pathology
- FHB tendonitis

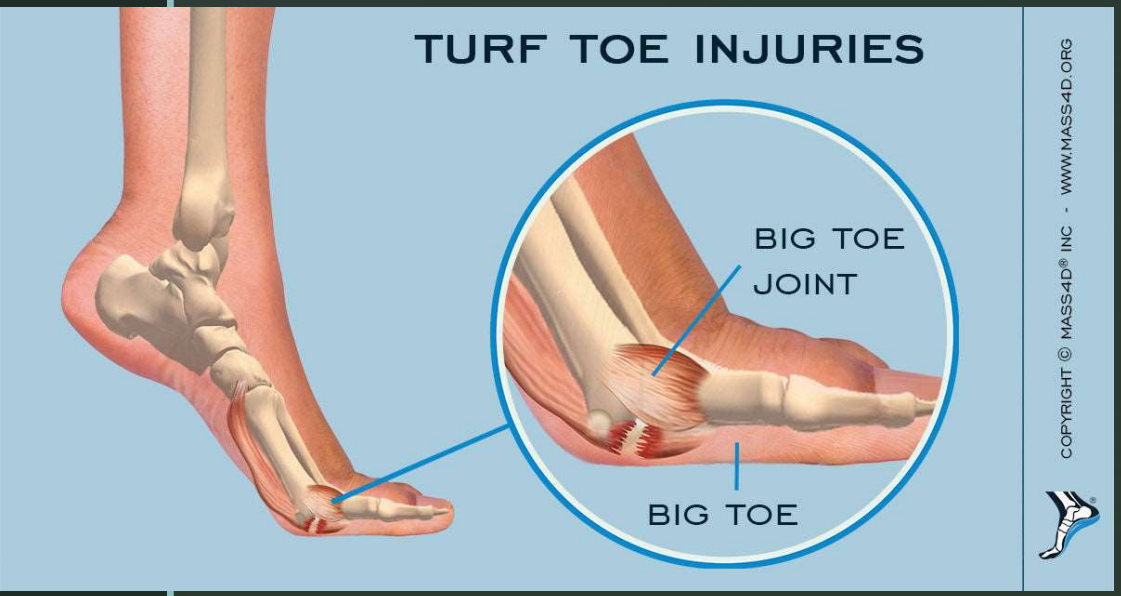
Fracture/dislocation

Bipartite, not fracture

Dislocation → axial sesamoid view



Turf Toe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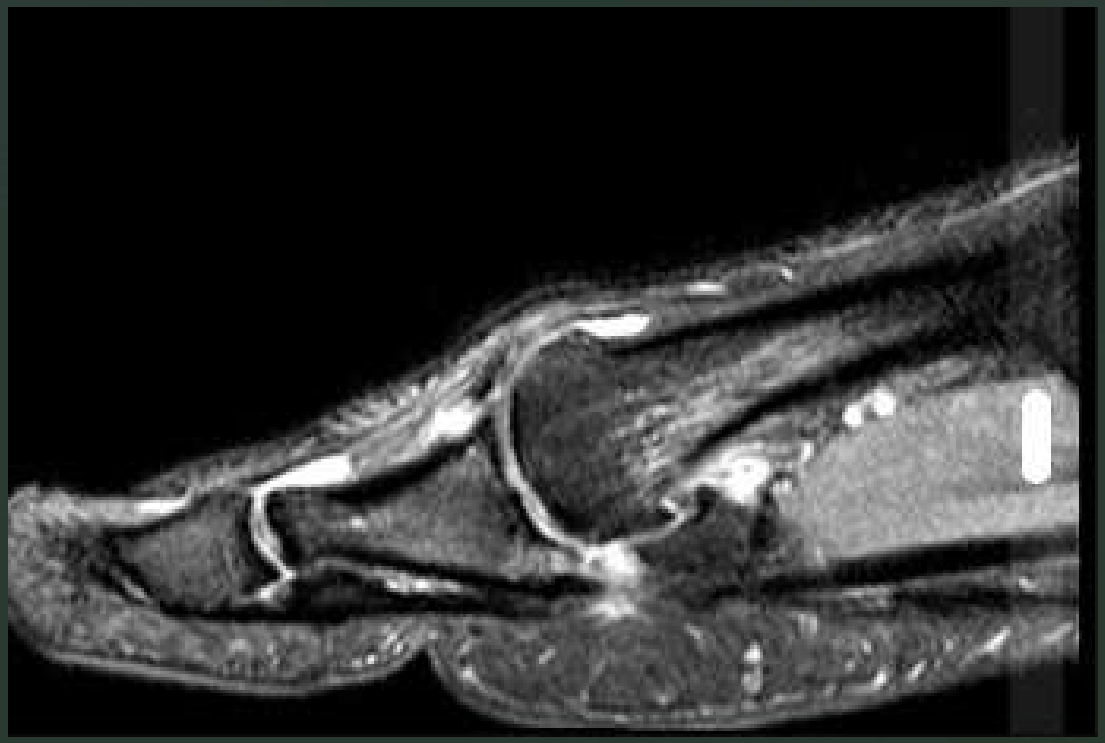
Sesamoids

Turf Toe - MRI



Turf Toe

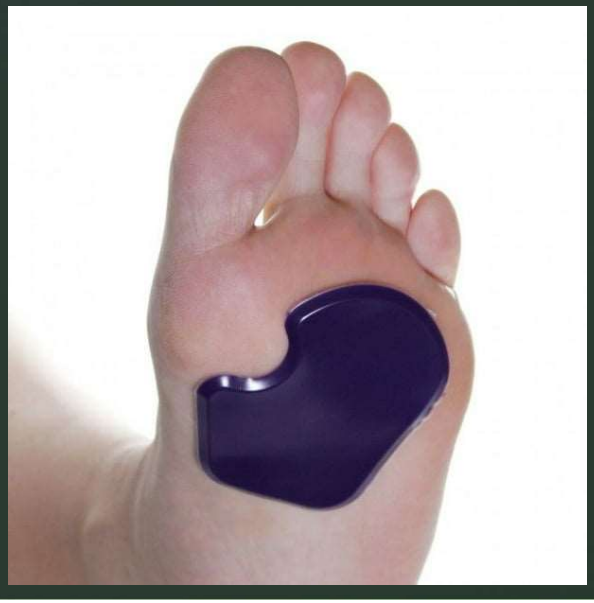
- Grade 1: stretching of plantar plate but not rupture. Will present as local tenderness and mild swelling. Treatment: RICE, rigid shoes or graphite insert.
- Grade 2: partial tear. Moderate swelling/tenderness. Limitation in toe motion. RICE, walking boot for 1-3 weeks. No return to play for 14 days.
- Grade 3: complete tear of the plantar plate. Boot or cast plantarflexing the big toe, then step down to grade 2 and 3 treatments.

Surgical indications

- Full thickness tear
- Sesamoid retraction
- Sesamoid fracture
- Sagittal instability
- Free ostochondral fragment or severe chondral injury from impaction
- Traumatic bunion

Sesamoditis

- Chronic inflammation of the sesamoids
- Can see inflammation on MRI or bone scan
- Treatment is to offload, rice, nsaids, plantarflexion taping. Short period in a cast can jumpstart healing.



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DISEASES & CONDITIONS

Bunions

A bunion is a painful bony bump that develops on the inside of the foot at the big toe joint. Bunions are associated with hallux valgus, a condition where the big toe drifts toward the smaller toes and the outside of the foot.

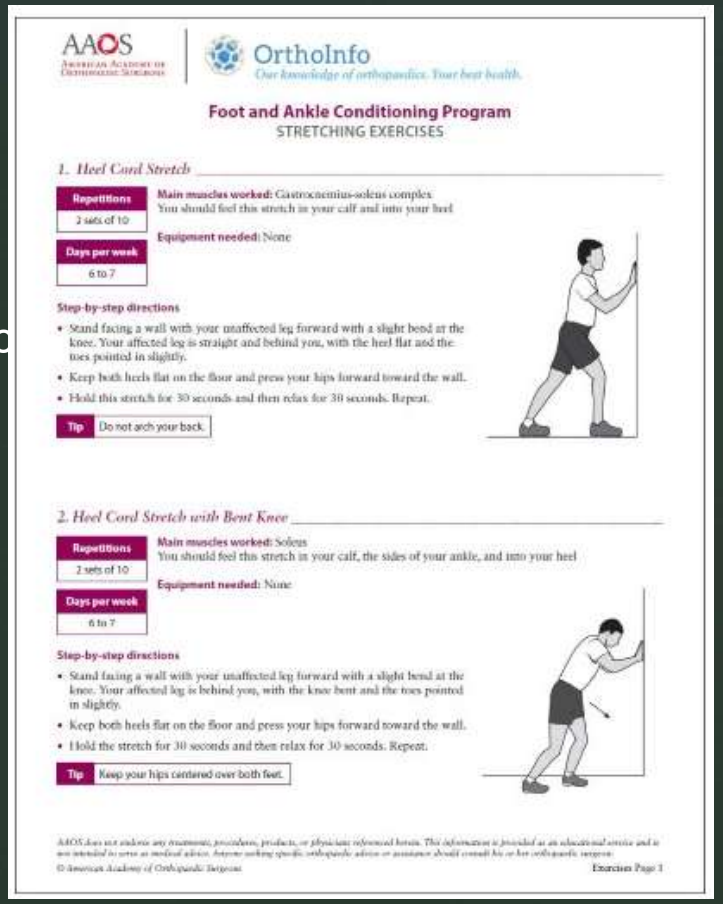
Pain from bunions develops over the bony bump due to shoe irritation, and in the other toes due to crowding and altered mechanical forces in the ball of the foot.

Bunions usually develop slowly. Pressure on the big toe joint causes the big toe to lean toward the second toe. Over time, the normal position of the bone, tendons, and ligaments changes, resulting in the bunion deformity. Often, this deformity gradually worsens over time and may make it painful to wear shoes or walk.

Bunions are more common in women than men. Seventy percent of people who develop bunions have a family history, which suggests there is a large genetic component to developing bunions. This is especially true for adolescent bunions, which are acquired early in life. Most bunions develop in adulthood and may be the result of repetitive micro-trauma, possibly from wearing shoes with a heel lift and narrow toe box.

In most cases, bunion pain is relieved by wearing wider shoes with adequate toe room and using other simple treatments to reduce pressure on the big toe. In cases where pain persists despite nonsurgical treatment, surgery is performed to correct the bunion and hallux valgus deformity.

Bunions sometimes develop in both feet.



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Foot and Ankle Conditioning Program
STRETCHING EXERCISES

1. *Heel Cord Stretch*

Repetitions: 2 sets of 10
Days per week: 6 to 7

Main muscles worked: Gastrocnemius-soleus complex
You should feel this stretch in your calf and into your heel

Equipment needed: None

Step-by-step directions

- Stand facing a wall with your unaffected leg forward with a slight bend at the knee. Your affected leg is straight and behind you, with the heel flat and the toes pointed in slightly.
- Keep both heels flat on the floor and press your hips forward toward the wall.
- Hold this stretch for 30 seconds and then relax for 30 seconds. Repeat.

Tip: Do not arch your back.

2. *Heel Cord Stretch with Bent Knee*

Repetitions: 2 sets of 10
Days per week: 6 to 7

Main muscles worked: Soleus
You should feel this stretch in your calf, the sides of your ankle, and into your heel

Equipment needed: None

Step-by-step directions

- Stand facing a wall with your unaffected leg forward with a slight bend at the knee. Your affected leg is behind you, with the knee bent and the toes pointed in slightly.
- Keep both heels flat on the floor and press your hips forward toward the wall.
- Hold the stretch for 30 seconds and then relax for 30 seconds. Repeat.

Tip: Keep your hips centered over both feet.

AAOS does not endorse any treatments, procedures, products, or physicians referenced herein. This information is provided as an educational service and is not intended to serve as medical advice. Anyone seeking specific orthopaedic advice or assistance should consult his or her orthopaedic surgeon.

Thank you!!!