“발바닥이 아프면 모두 족저근막염?”

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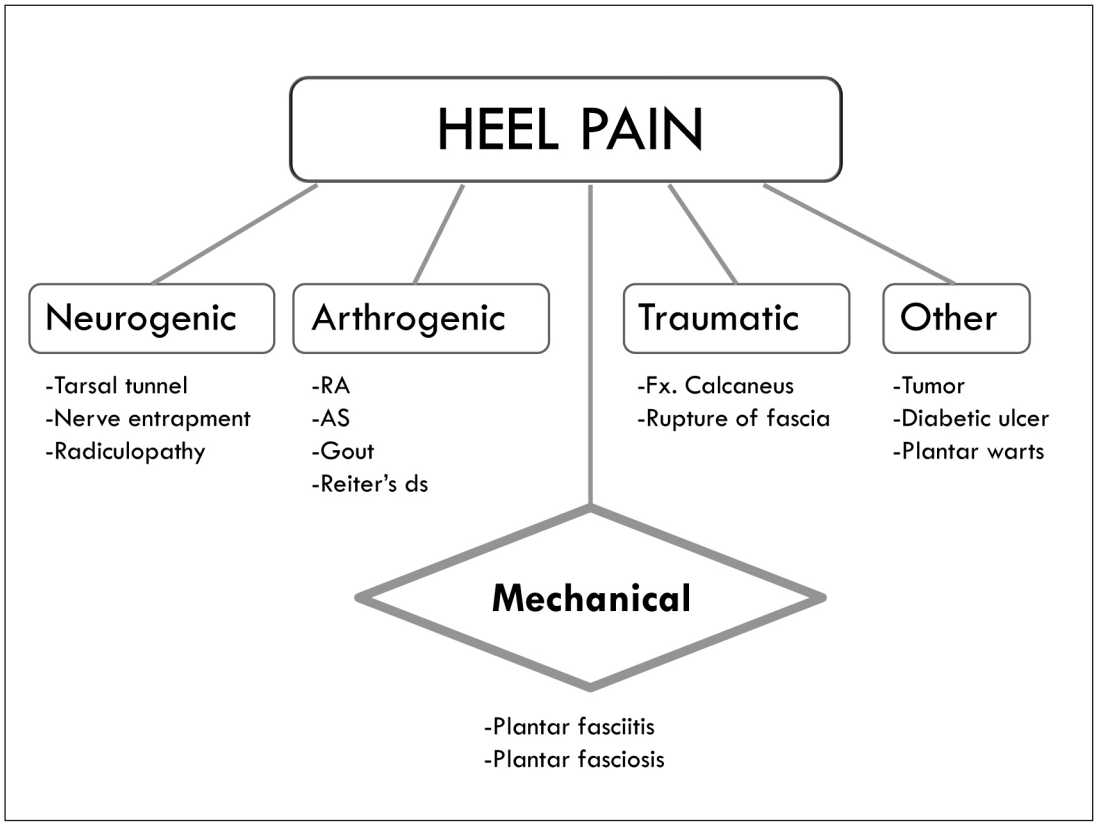
"발목과 발꿈치 부위의 통증 및 변형"

□ 발바닥이 아프면 모두 족저근막염?

- Heel pain
- Plantar fasciitis

□ 발꿈치가 아프면 모두 아킬레스건염?

□ 발목이 아프면 모두 관절염?



Heel pain by location

1. Plantar
   - Plantar fasciitis/fasciosis
   - Calcaneal stress fracture
   - Heel pad syndrome
   - Plantar fascial rupture
   - Nerve entrapment
2. Midfoot (medial)
3. Midfoot (lateral)
4. Posterior

Heel pain by location

1. Plantar
2. Midfoot (medial)
   - Posterior tibialis tendinopathy
   - FDL tendinopathy
   - FHL tendinopathy
   - Tarsal tunnel syndrome
3. Midfoot (lateral)
   - Peroneal tendinopathy
   - Sinus tarsi syndrome
4. Posterior (Achilles tendinopathy, Haglund deformity, Retrocalcaneal bursitis, Sever ds)

PLANTAR FASCIITIS

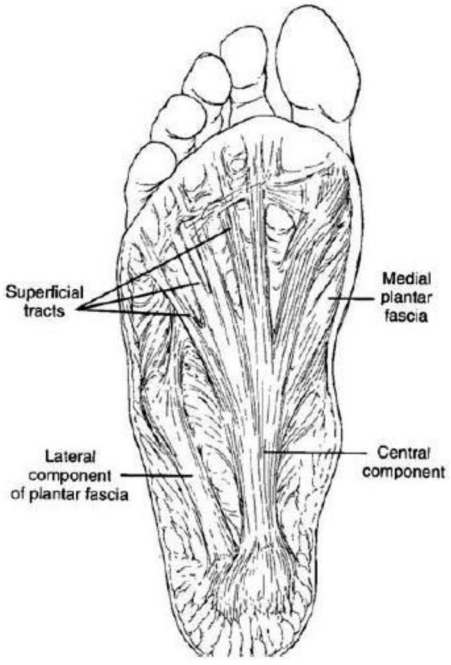
- The most common cause of heel pain
- 10% of adults in their life time
- The peak age of incidence : 40-60 yrs
- Equally affected in men and women
- Self-limited
  : 80-90% of cases within 10 months
- 50 % of patients have heel spurs
- Synonym
  - Plantar fasciitis, plantar heel pain, heel spur, runner's heel, plantar fasciosis

The concepts of plantar fasciitis

- 1930s
  : an infectious etiology as TB and venereal ds
- Impingements as the result of the heel spur
- Chronic inflammatory condition
- Degenerative condition
  - Collagen degeneration, fiber disorientation
  - Absence of inflammatory cells
  - "Plantar fasciosis"
- Chronic inflammation followed by degeneration

Anatomy

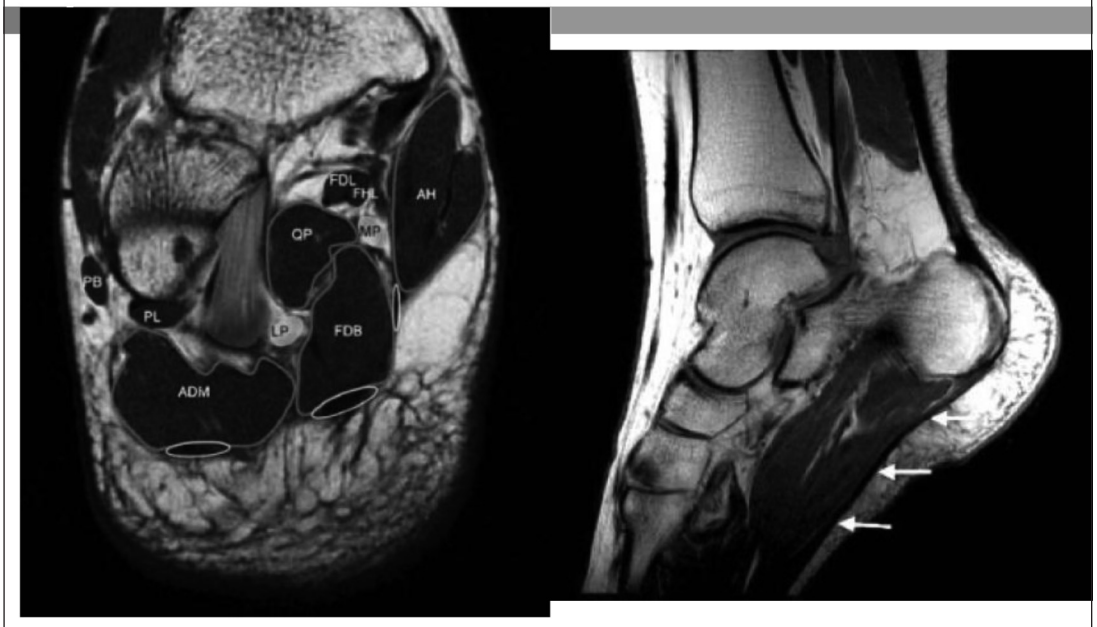
- A sheet of dense, fibrous, collagenous connective tissue (aponeurosis)
- A relatively inelastic (4% max elongation)
- Origin
  - the plantar tuberosity of the calcaneus
- Insertion
  - deep short transverse ligaments of metatarsal heads



Plantar fascia

- 3 band : central, medial, lateral
- Central band
  - Most important
  - The one most commonly affected by disease
  - FDB
- Thickness : 3-4 mm
- Functions
  - Static support for the longitudinal arch
  - Dynamic shock absorption (2-3 times BW)

Plantar fascia



Clinical manifestations

- Start-up pain (intense, sharp pain)
  - Post static dyskinesia
  - Out of bed in the morning or from a chair after sitting for a long period
  - Dissipate once weight-bearing is initiated
  - Constant aching or throbbing pain
- Rest, elevation, and massage of the foot
- Exacerbated by walking barefoot or by walking in shoes with minimal arch support

Intrinsic risk factor

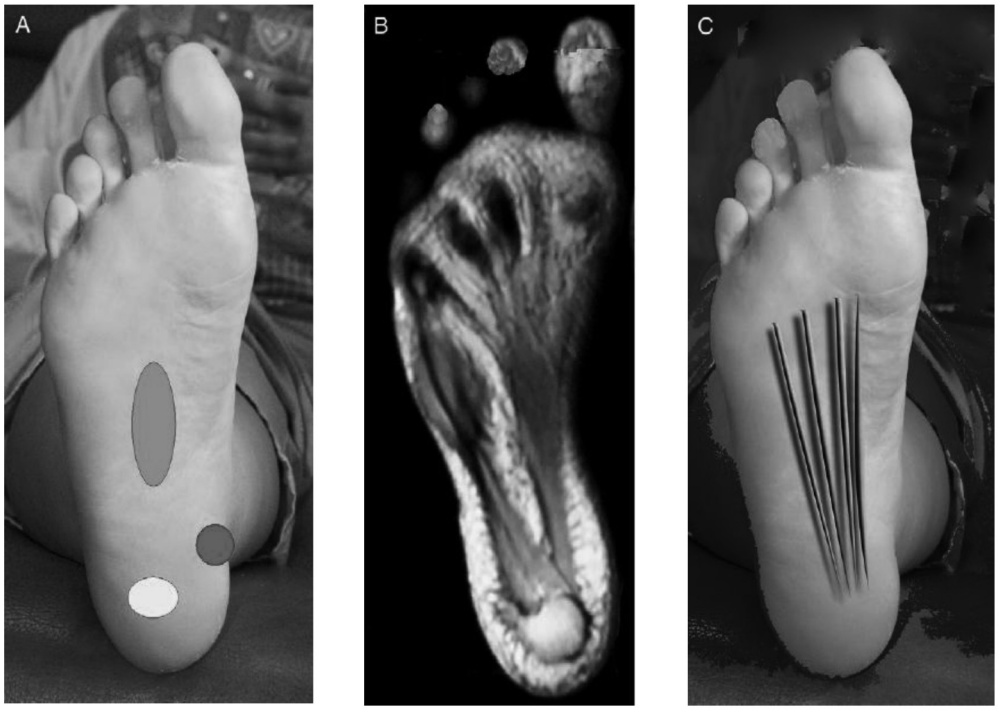
- Anatomical
  - Pes planus, pes cavus
  - LLD, excessive lateral tibial torsion & femoral anteversion, overpronation
- Functional
  - Tightness in GCM, soleus, Achilles tendon
  - Weakness of GCM, soleus, intrinsic foot m
- Degenerative
  - Aging and atrophy of the heel fat pad
- An important risk factor : reduced D/F of ankle

Extrinsic risk factors

- Excessive use
- Training error
  - Too rapid increase in the distance, intensity, duration
  - Poorly cushioned surface
- Improper footwear
  - Athletic shoes
  - 407 full-time employees
    - Rotation of shoes during the work week
    - 72 % decrease in the risk for plantar fasciitis

Physical examination

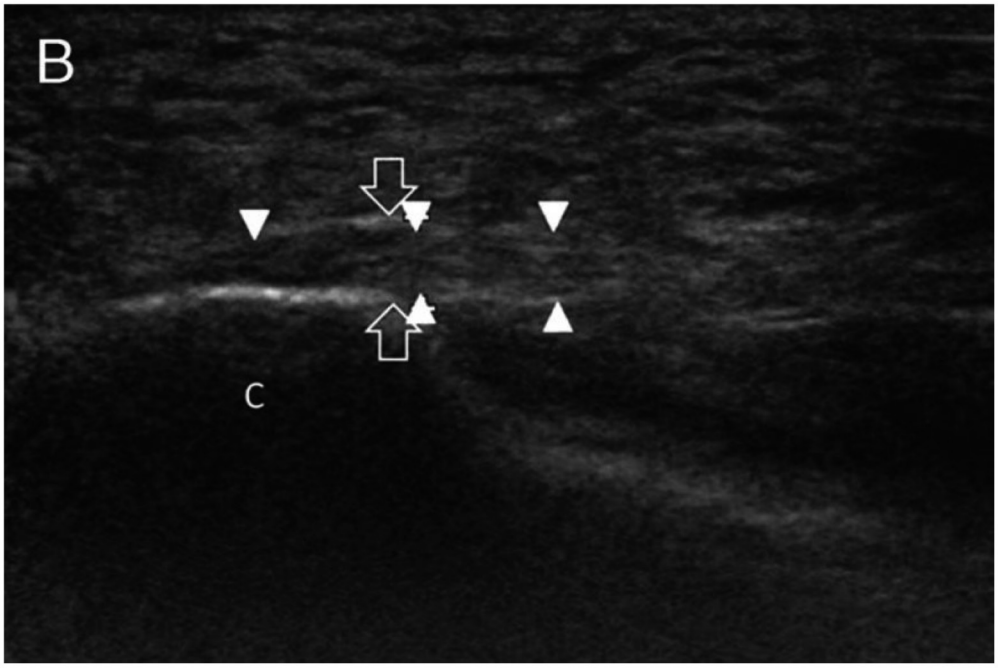
- Tenderness
  - The medial tubercle of the calcaneus
  - Proximal portion of plantar fascia
- Windlass test
  - Reproduce the pain by passive D/F of the toes
  - Having the patient stand while the windlass test : sensitivity (13.5%->31.8%)
- ROM of foot & ankle
- Exam of foot shape and gait pattern



Diagnostic studies

- Plain radiography
  - Heel spur
    - 15-25% in general population – asymptomatic
    - Increase the probability
    - Not change the clinical diagnosis
- Ultrasonography
- MRI
- Bone scan
- EMG


A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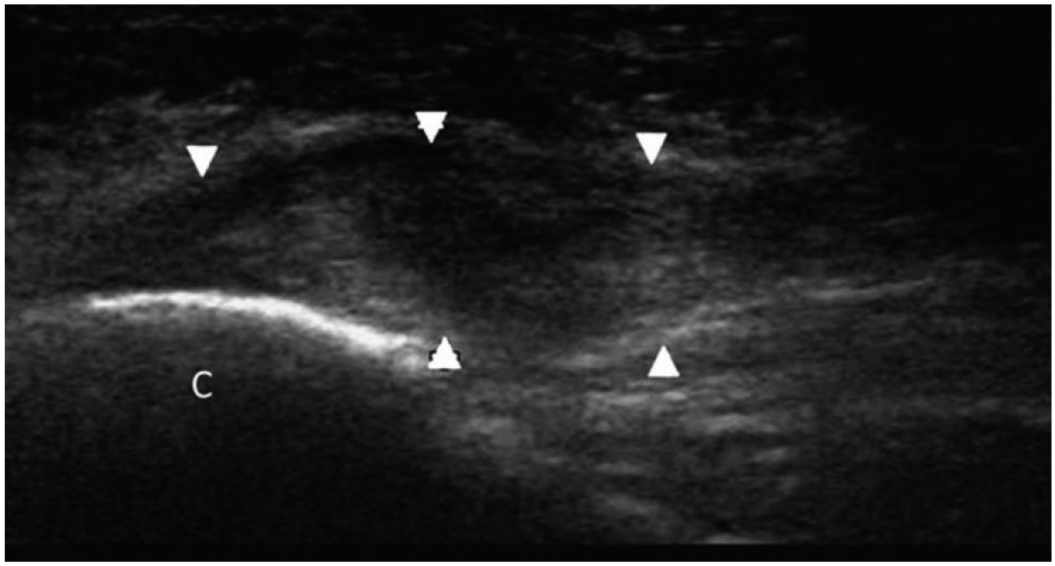
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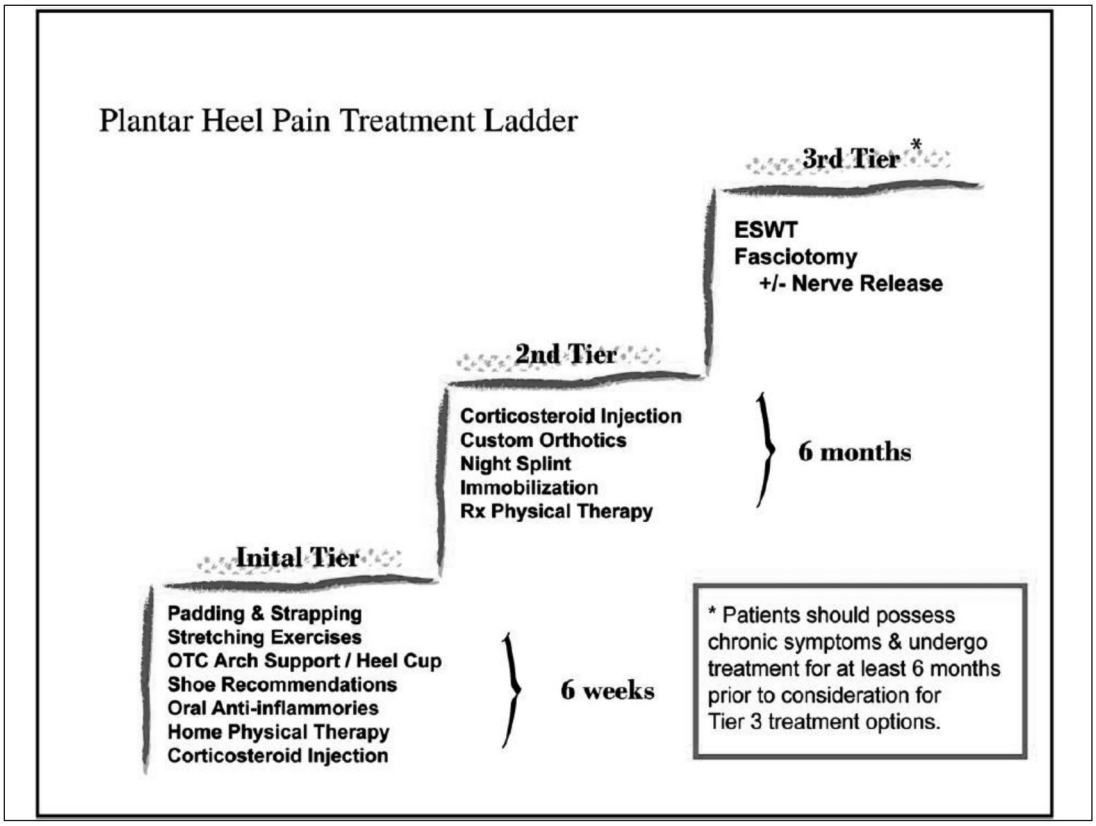
Ultrasonography

- Position
  - Prone, vertically to the plantar aspect
- A linear, fibrillar echogenic structure
  - Thickness at the proximal attachment to the calcaneus
  - Not exceed 4 mm
- Diagnosis of plantar fasciitis
  - Fascial thickening greater than 4-5mm
  - Decreased echogenicity
  - Perifascial effusion
  - Acute stage(Hypervascularity)

Managements

- The common goals
  - Alleviating pain
  - Increasing tolerance for activity
- Principles
  - Comprehensive
  - Flexible
  - Initial : a variety of non-invasive, non-drug Tx
  - Combined with education
    - Weight loss, activity modification, exercise
    - foot wear (q 3 months or 800 kms of wear)

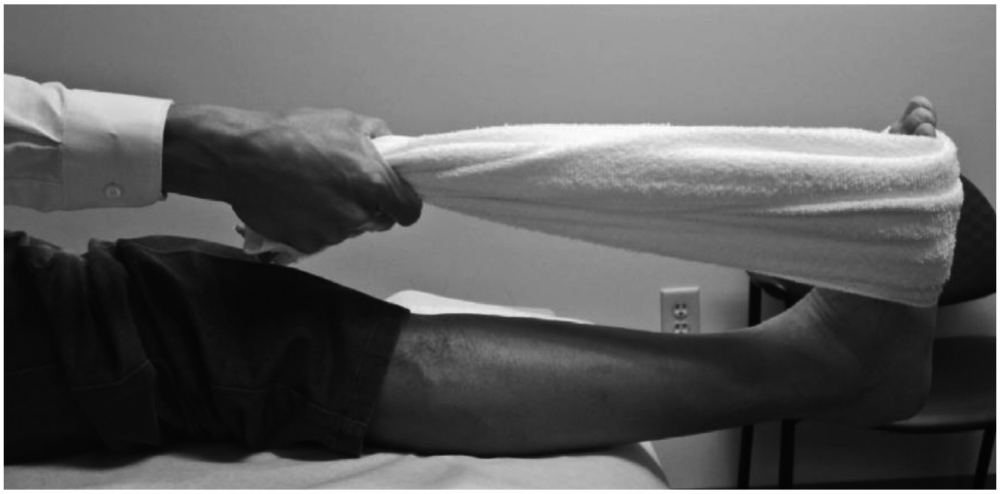


Stretching (I)

- Porter et al. 2002
  - Sustained vs intermittent group
    (3 times a day for 3 min vs twice a day five 20-second)
  - Randomized 94 pts, 4 months
  - No significant differences (ROM, pain, function)
  - A correlation between stretching and an improvement

Stretching (II)

- DiGiovanni et al. 2006
  - Stretching the Achilles tendon vs plantar fascia
  - Prospectively, 82 pts (+soft insole, celecoxib)
  - At 8 weeks
    - Plantar fascia : significant improvement (pain scale)
  - At 2 years
    - Both group : significant improvement
  - A plantar fascia-specific stretching may be advantageous for the short term relief of pain
- Grade I / B recommendation




STOP


STOP

Nocturnal dorsiflexion splints

- Several prospective, randomized studies
  -> the absence of heel pain in the morning
- Batt et al. 1999
  - heel lift, NSAIDs, stretching + night splint
    -> substantial clinical relief (12.5 wks)
- Powell et al. 1998
  - 37 chronic pts
  - For first month vs second month, night splint
    -> both improvement
- Grade B recommendation

Orthoses (I)

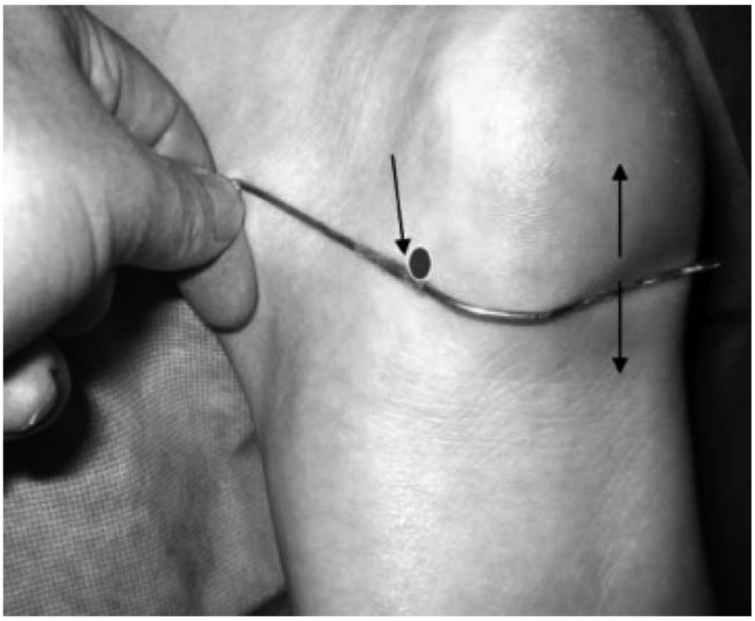
- Pfeffer et al. 1999
  - 237 pts
  - 5 group : all patients – stretching ex
    (silicon heel pad / felt pad / rubber heel cup /
    custom-made polypropylene orthosis)
  - At 8 wks
    : no difference in FFI scores
    : a subgroup who stood more than 8hrs
    (custom orthotics < prefabricated inserts)

Orthoses (II)

- Roos et al. 2006
  - Custom orthoses/nigh splint/both
  - Significant improvement at 12 wk -> maintained at 1 year
- Landorf et al. 2006
  - Randomized 135 pts
  - Non-therapeutic/prefabricated/customized
  - At 3months : improvement in prefabricated/customized
  - At 12 months : no difference
- Conclusions
  - Fair evidence of the short-term use of foot orthoses
  - Custom orthosis : no benefit over prefabricated orthosis
- Grade B recommendation

Corticosteroid injection

- Effective in rapidly relieving pain & debility
- Crawford et al
  - Reduced pain so after 4 wks(Maximum 6-8wks)
  - At 3- and 6-months : no significant differences
  - Effective short-term relief, but no long-term benefit
- Response rates : 70%,
  - Fat pad atrophy, fascia rupture (10%)
- A safer alternative : iontophoresis
- Grade I / B recommendation



Extracorporeal shock wave therapy

- Rompe et al. 2002
  - 112 pt with chronic plantar fasciitis(> 6mon)
  - 1000 impulse vs 10 impulse/session, 1/wk × 3 wks
  - At 6 months
    - 57 % good to excellent results compared to only 10% in placebo (pain, pain-free walking)
  - At 5 years
    - Surgical release (13% vs 58%)
- Inconsistencies in their methodology
- ESWT : 3rd Tier

  (Grade C recommendation)

Surgical treatment

- Plantar fasciotomy
  - Functional limitations, prolonged recovery times
- Release of the plantar fascia
  - Endoscopic (the risk of nerve injury)
  - Decrease tarsal arch height, stress in the midfoot and metatarsal bones
- Nerve decompression (Baxter nerve etc)
- Grade I recommendation

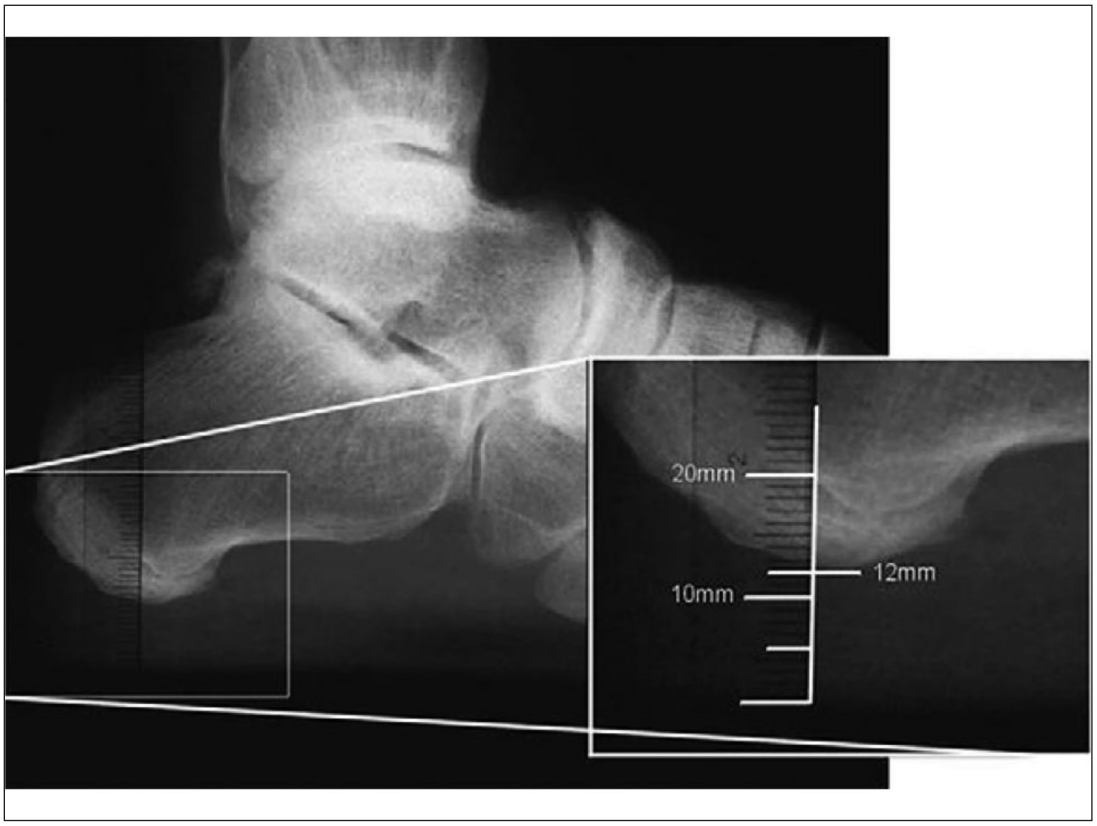
Emerging treatments

- Injection of botulinum toxin
  - Direct relaxation to tight tissues
  - An anesthetic effect
- Sclerotic substance
  - Hyperosmolar dextrose
- Autologous blood
- Platelet-rich plasma

HEEL PAD SYNDROME

Heel pad

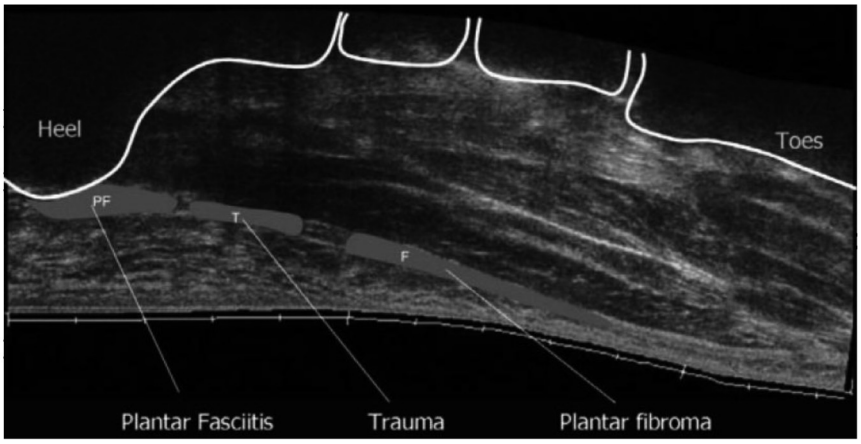
- Columns of adipose tissue separated by fibrous septae
- A hydraulic shock-absorbing layer
- Elderly, obese pts, sports-related injuries
- Heel pad pain
  - Typically diffuse, most of the weight-bearing portion of the calcaneus
  - Not to radiate anteriorly
  - Not increase pain by toe's dorsiflexion



PLANTAR FASICAL RUPTURE

Plantar fascial rupture

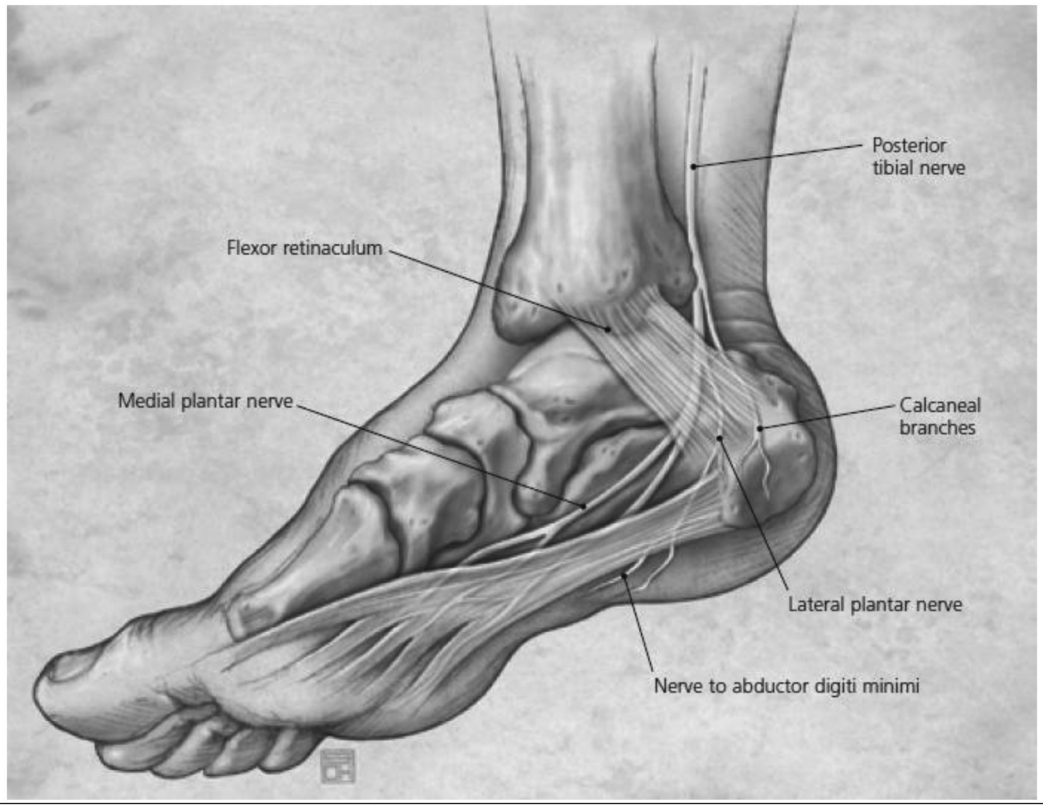
- Pain : sudden acute, knife-like
  : a snapping sound, ecchymosis
- Location : 2 to 3 cm from the insertion
- A strong axial compression force
  - When the forefoot strikes the ground on contact point first and the heel later
- D/Dx with plantar fascitis



NEUROGENIC HEEL PAIN

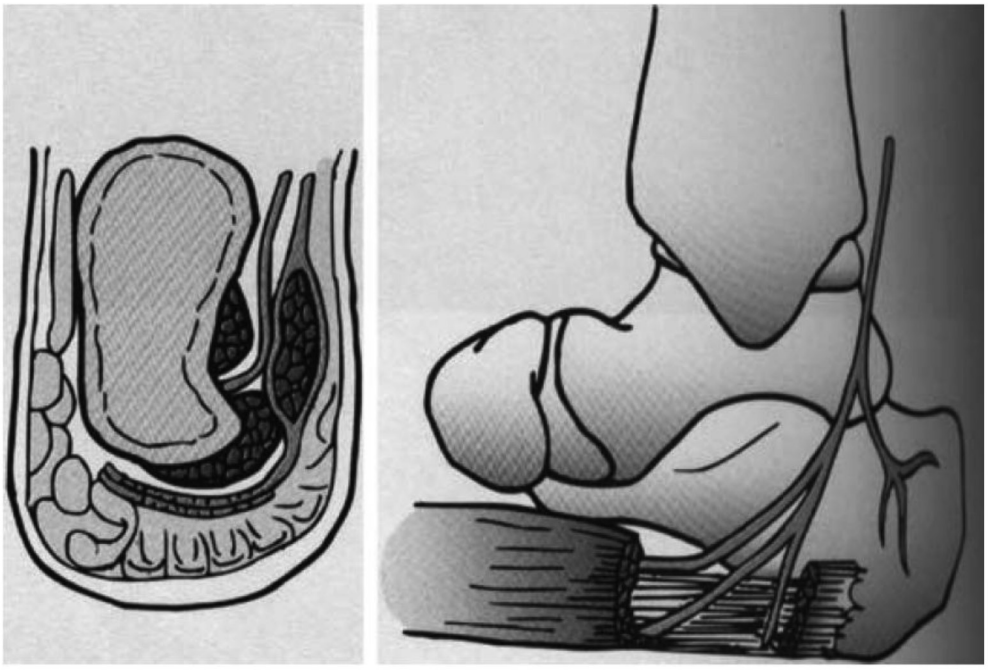
The causative factors

- Obesity, venous insufficiency
- Previous heel surgery
- Fracture of the medial wall of the calcaneus
- Space-occupying lesions
  - Ganglion, lipoma, tenosynovitis, varicose vein
- Most patients : unilateral
- Bilateral cases
  - Underlying systemic disease (DM, Vitamin deficiency, alcoholism)



Plantar fascia

- Two nerve
  - Medical calcaneal n
    : a superficial location between the AH & the superficial fascia -> the skin of the heel
  - The first branch of the lateral plantar n
    : pass along the medical border of the calcaneus , under the deep fascia of the AH and medial edge of plantar fascia, over the quadratus plantae -> between AH and FDB -> plantar fascia
    : Baxter nerve



- Classic tarsal tunnel syndrome
- Distal tarsal tunnel syndrome
  - First branch of the lateral plantar n.
  - Lateral plantar n. to abductor digiti minimi
  - Neuroma of the medial calcaneal n.
  - Medial plantar n.
- Lumbar radiculopathy

Tarsal tunnel syndrome

- Heel pain
  - With prolonged walking
  - Not remit spontaneously or immediately with rest
  - accompanied by tingling, burning, numbness
- Radiate to the plantar heel
- The dorsiflexion-eversion test
- Tinel's sign : percussion of the nerve
- Pes planus : a common cause

ARTHROGENIC HEEL PAIN

Systemic causes of heel pain

- If the heel pain is recalcitrant to treatment
- A detailed history, laboratory tests, radiological studies (other joint symptoms)

- Rheumatoid arthritis
- Psoriatic arthritis
- Reiter's disease
- Gout
- Paget disease
- Inflammatory bowel ds
- Sickle cell anemia
- Infectious ds

Rheumatoid arthritis

- Falsetti et al. in 2004
  - A inflammation & edema of the heel pad in 6.6 % of RA
  - US
    : focal rupture of the fibrous septae of the heel pad,
    : necrosis of the fat pad
- Radiologic finding
  - Bone erosion (posterior superior surface of calcaneus)
  - Retrocalcaneal and plantar spurs

Ankylosing spondylitis

- Inflammation of the attachment points of ligament and capsule(enthesis)

  -> plantar fasciitis, Achilles tendinitis
- Radiologic finding
  - A fluffy periosteal reaction
  - Retrocalcaneal spur
  - Erosion of the plantar aspect of the calcaneus

- Psoriatic arthritis
  - Combination of osseous erosions with new bone production
- Reiter syndrome
  - 61% of pts have heel pain
  - Nongonococcal urethritis, arthritis, conjunctivitis
- Inflammatory bowel disease
  - Arthritis in 10-20% of Crohn ds and UC
- Gout
- Sickle cell anemia
  - Aseptic necrosis of the calcaneus d/t thrombosis of the microvascular circulation

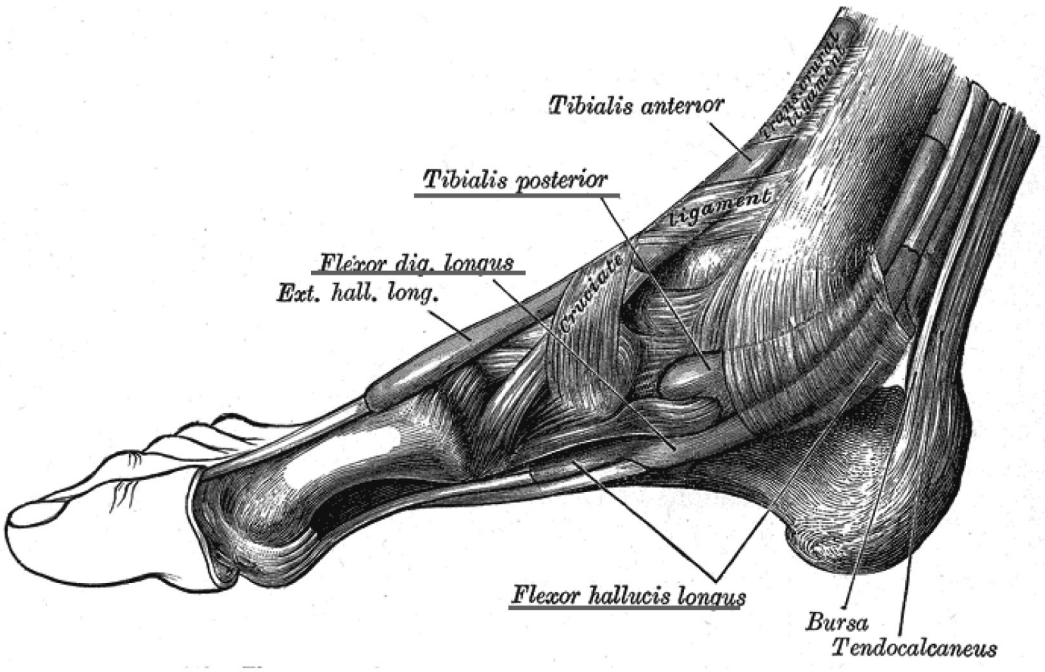
CALCANEAL STRESS FRACTURE

- The second most common in the foot
- Repetitive overload to the heel
- Immediately inferior and posterior to the posterior facet of the subtalar joint
- Diagnosis
  - Diffuse swelling and ecchymosis
  - Tenderness the lateral wall (squeeze test)
  - X-ray, Bone scan, MRI
- Treatment
  - decreased activities, no weight bearing, heel pads or walking boots

Other osseous lesions

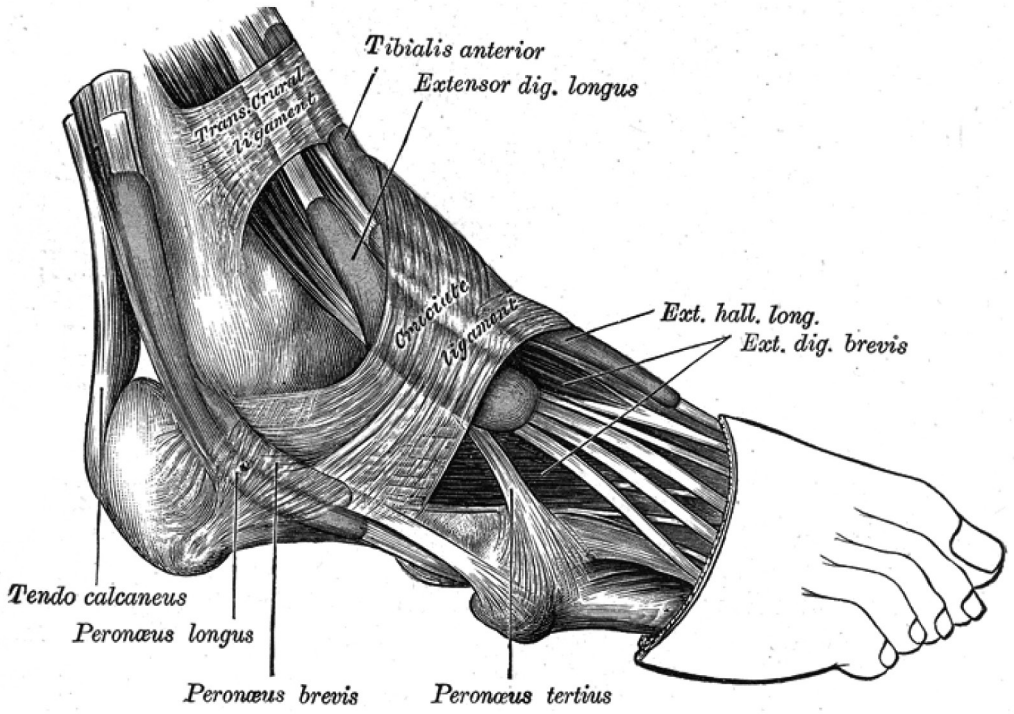
- Simple bone cysts
  - Within the calcaneus
  - Not associated with pain
- Ewing's sarcoma
  - The most common 1' bony tumor of the heel
- Metastatic tumor
  - Endometrial adenocarcinoma, bronchogenic carcinoma, bladder carcinoma, gastric cancer

MID-FOOT : TENDINOPATHY



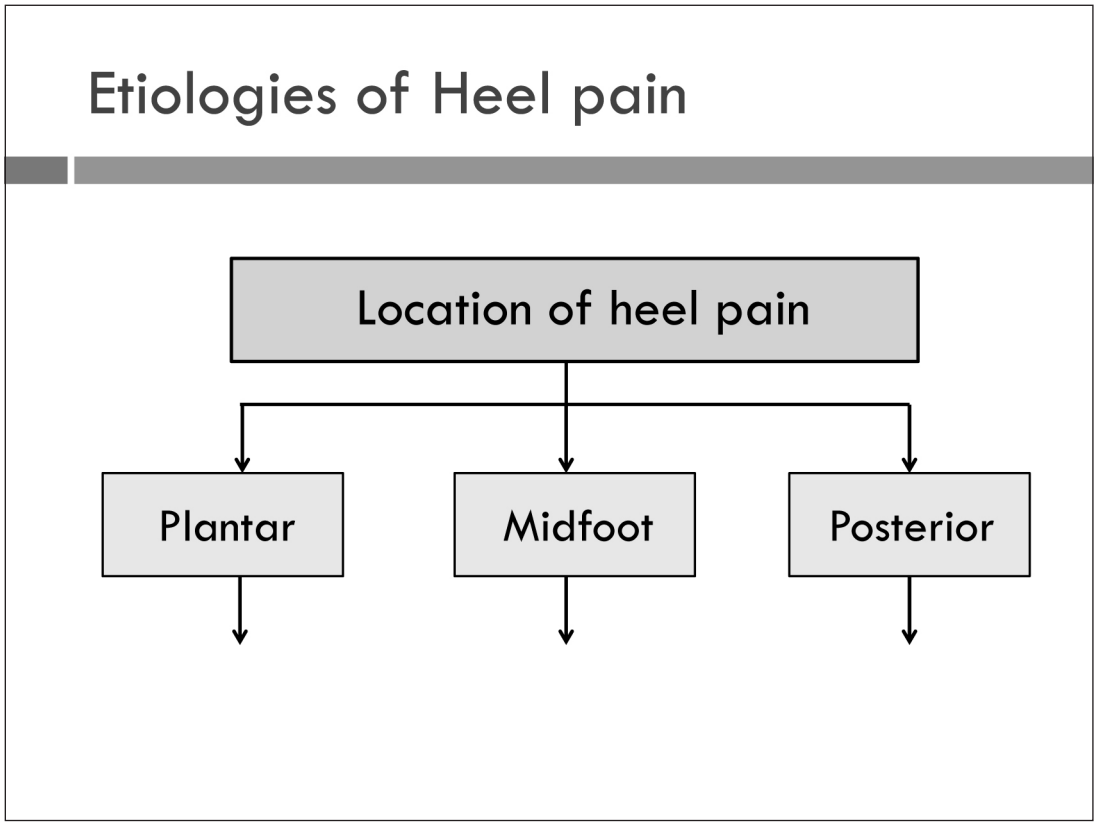
Medial midfoot

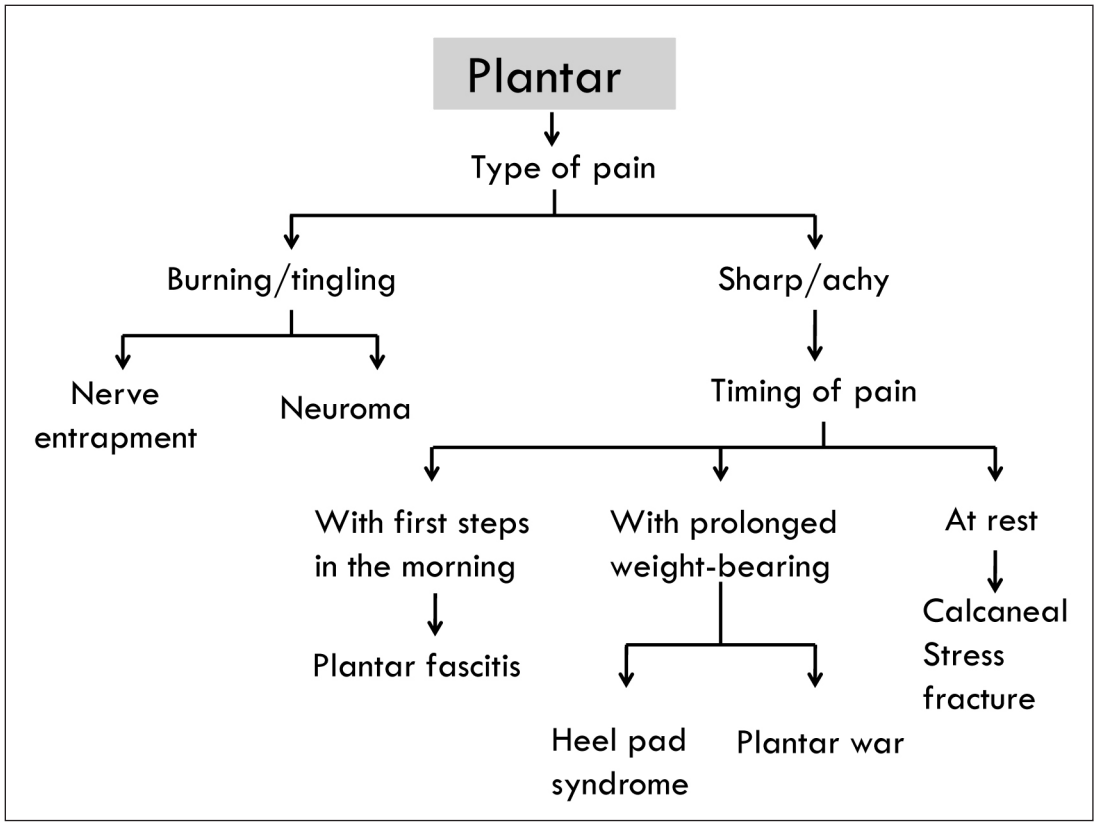
- Posterior tibialis tendinopathy
  - Tenderness at navicular & medial cuneiform
- Flexor digitorum longus tendinopathy
  - Tenderness posterior to medical malleolus and obliquely across sole of foot to base of distal phalanges of lateral toes
- Flexor hallucis longus tendinopathy
  - Tenderness posterior to medical malleous and on plantar surface of greater toe

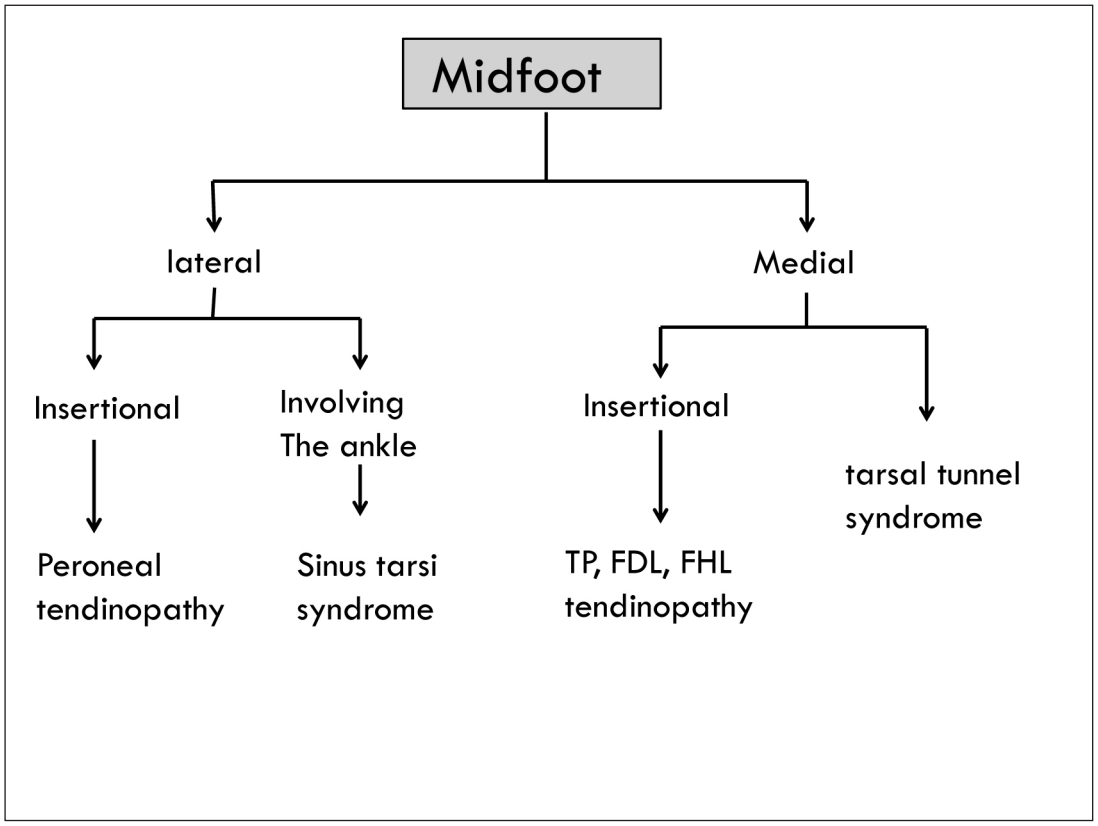


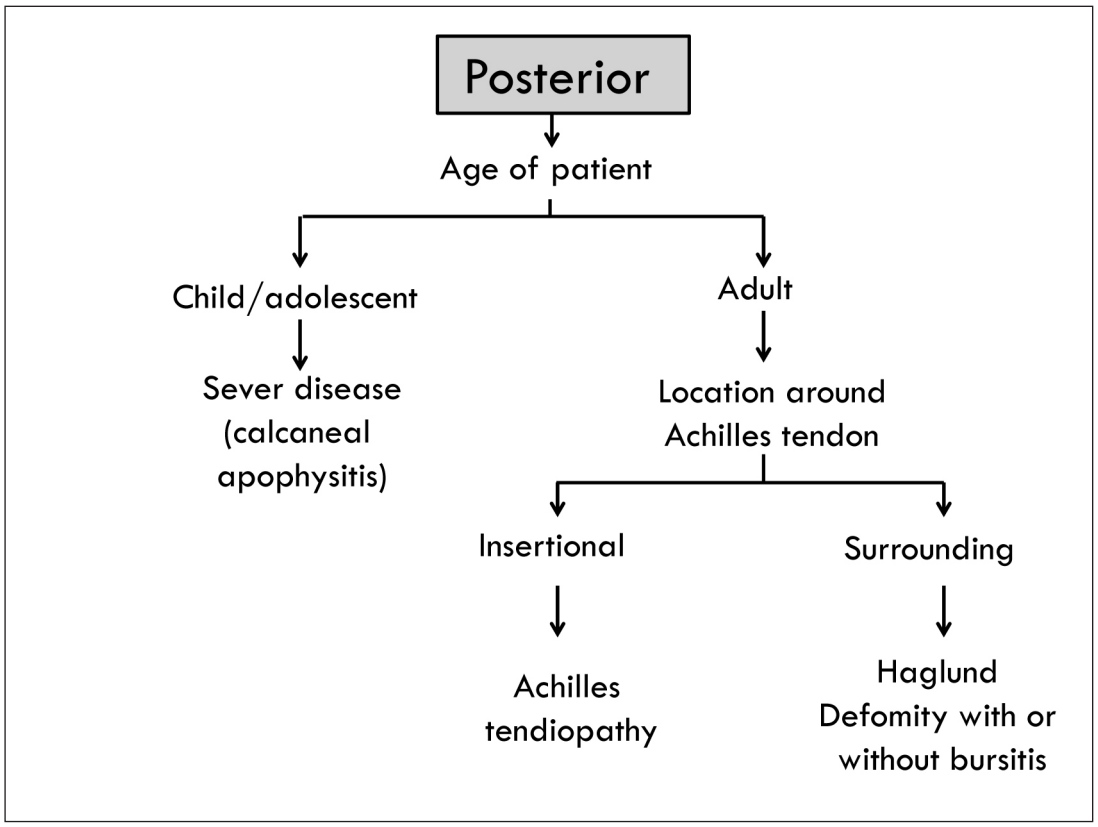
Lateral midfoot

- Peroneal tendinopathy
  - Tenderness in lateral calcaneus along path to base of fifth metatarsal
- Sinus tarsi syndrome
  - Talocalcaneal sulcus, bound by the calcaneus, talus, talocalcaneonavicular joint, and posterior facet of the subtalar joint
  - Lateral calcaneal pain, worse after walking on an uneven surface
  - Repeated lateral sprains or hyperpronation


Etiologies of Heel pain
Location of heel pain
Plantar
Midfoot
Posterior


Plantar
Type of pain
Burning/tingling
Sharp/achy
Nerve entrapment
Neuroma
Timing of pain
With first steps in the morning
With prolonged weight-bearing
At rest
Plantar fascitis
Calcaneal Stress fracture
Heel pad syndrome
Plantar war


Midfoot
lateral
Medial
Insertional
Involving
The ankle
Insertional
tarsal tunnel
syndrome
Peroneal
tendinopathy
Sinus tarsi
syndrome
TP, FDL, FHL
tendinopathy


Posterior
Age of patient
Child/adolescent
Adult
Sever disease
(calcaneal
apophysitis)
Location around
Achilles tendon
Insertional
Surrounding
Achilles
tendiopathy
Haglund
Defomity with or
without bursitis