The Foot in Childhood

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Disclosures & Objectives

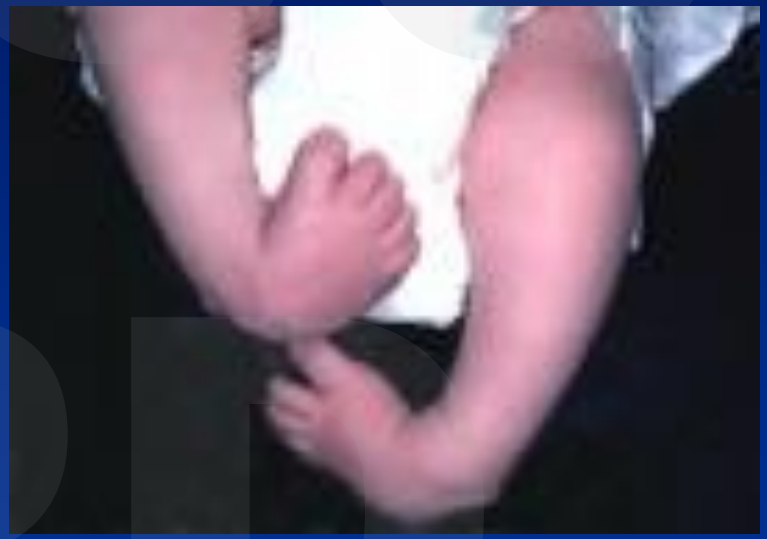
- No financial disclosures
- Objectives
  - The participant will be able to describe common musculoskeletal findings and abnormalities in the pediatric foot
  - The participant will feel comfortable describing and managing normal physiologic foot findings throughout child development

Congenital Foot Deformity

- Clubfoot
- Metatarsus Adductus
- Calcaneovalgus
- Vertical talus

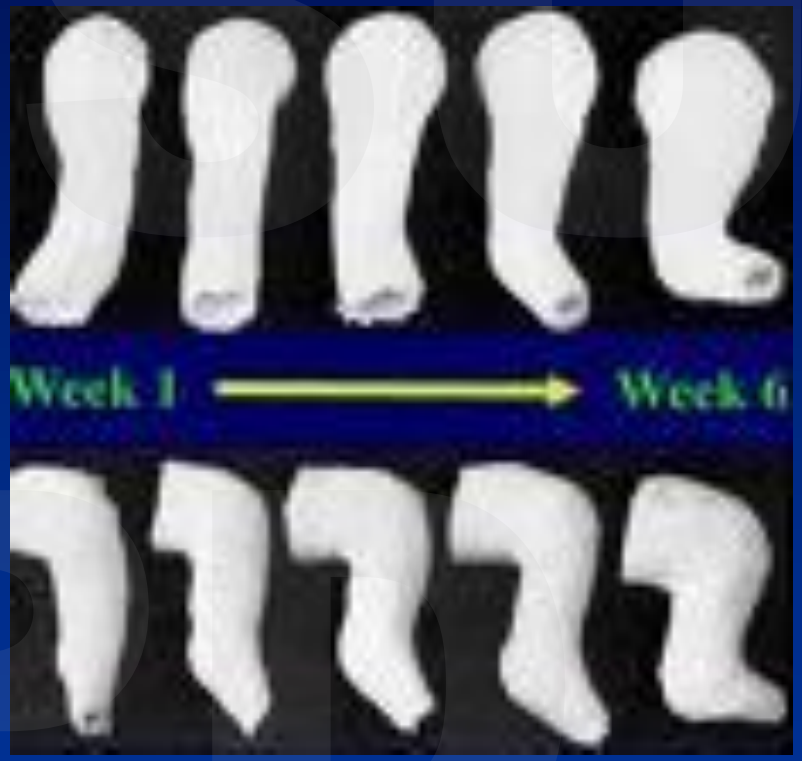
Clubfoot

- Rigid deformity
- Stiffness
  - C: Cavus
  - A: Adductus
  - V: Varus (heel)
  - E: Equinus (hindfoot)
- Incidence
  - 1-2/1,000; 50% bilateral; M:F::2:1



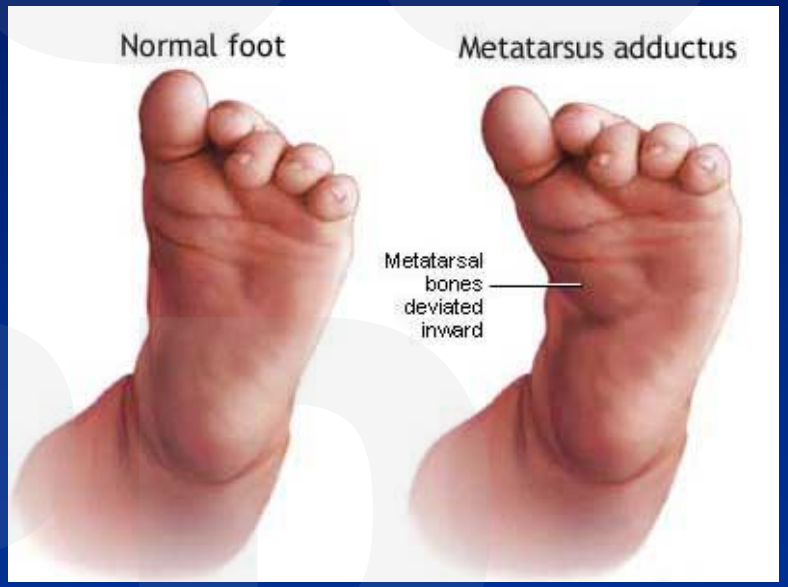
Clubfoot treatment

- Ponseti technique
  - Serial casting
  - Achilles tenotomy
  - Bracing
    - 3 months FT
    - 3 years HT
  - Stretching
  - Tendon transfer
  - Salvage surgery
    - Rarely



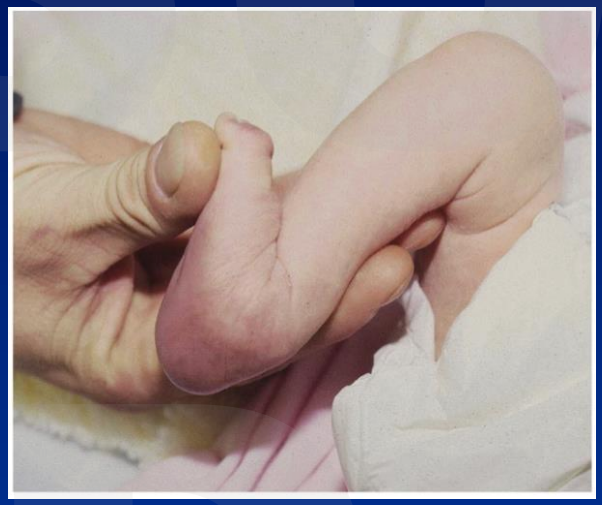
Metatarsus Adductus

- Flexible deformity
- Forefoot adduction
- Exam: Is the foot correctable?
- Treatment
  - Observation is usually sufficient
  - Reverse-last shoes or, rarely, casting
- Incidence
  - 1-2/1,000



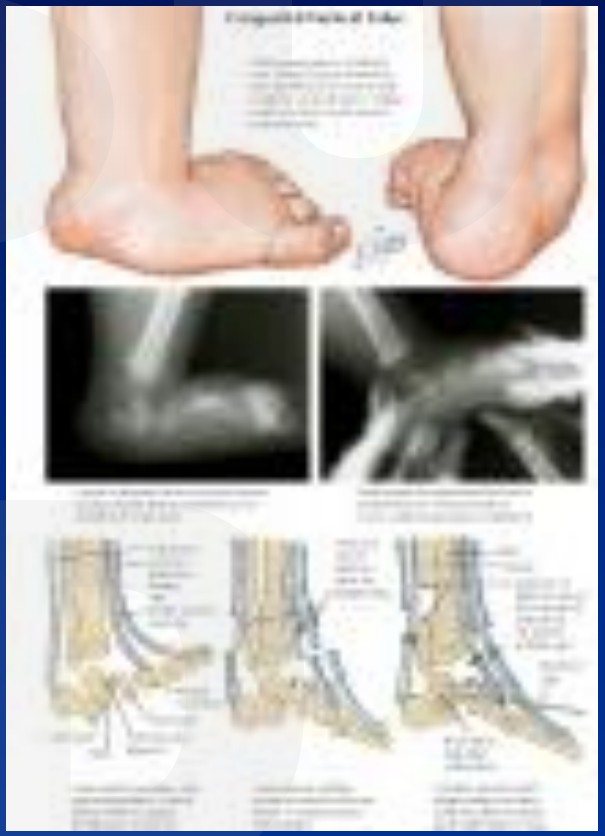
Calcaneovalgus

- Flexible deformity
- Foot position:
  - Eversion
  - Dorsiflexion
- Treatment
  - Observation
  - Stretching
- Natural History
  - Completely benign
  - May be associated with posteromedial bowing of tibia



Vertical talus

- Rigid deformity
  - Equinus, but forefoot dorsiflexed
  - Forefoot abduction
  - Prominent talus
  - “persian slipper”, “bean-shaped”
  - Can be confused with calcaneovalgus, but Achilles is contracted
- Incidence
  - 1/10,000; 50% bilateral



Vertical talus treatment

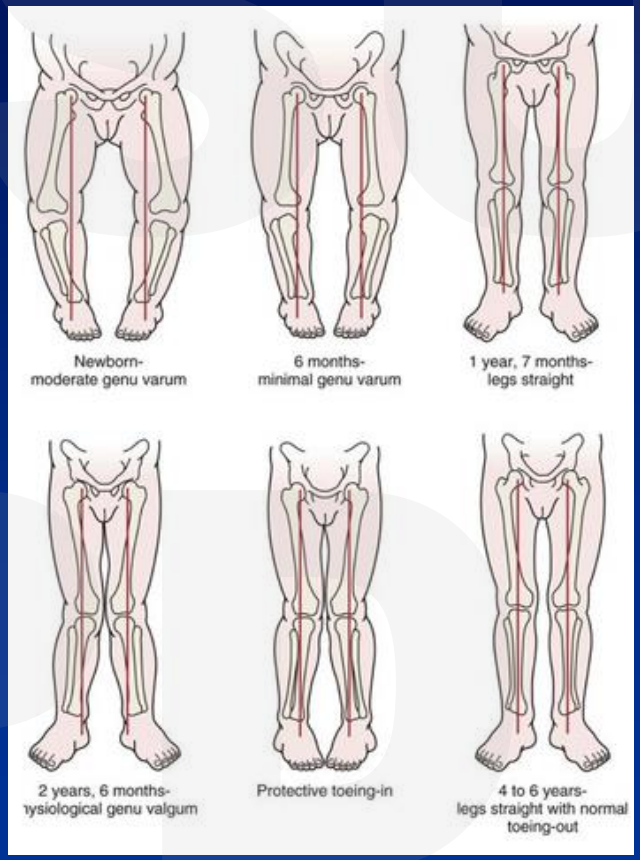
- Serial casting
  - Reduce talonavicular joint
  - Like Ponseti, but going in opposite direction
- Surgery
  - Closed/open pinning of talonavicular joint
  - Achilles tenotomy
- Bracing
  - 3 months FT
  - 1-2 years HT

Summary

- Congenital foot deformities
  - Flexible deformities have a benign natural history and rarely require treatment
  - Refer when the deformity is stiff
    - Can the foot be positioned “flat-to-the-ground”
  - Clubfoot and vertical talus require serial casting, Achilles tenotomy, and long-term bracing
    - Goal: Plantigrade, mobile foot (but not normal)

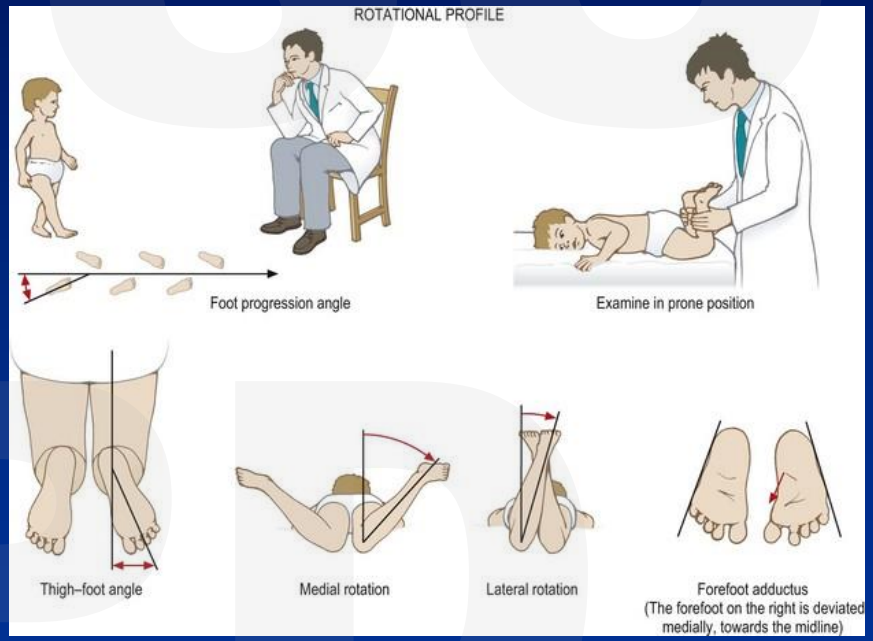
Toddler Foot Issues

- In-toeing
- Toe-walking
- Pes planovalgus



In-toeing

- Common physiologic finding
- Etiology
  - Metatarsus adductus (infant)
  - Internal tibial torsion
  - Femoral anteversion
- Diagnosis
  - Rotational profile
  - Running v walking foot preogression angle
- Treatment
  - Observation – Natural hx
  - Surgery rarely indicated and unlikely before 10 years of age

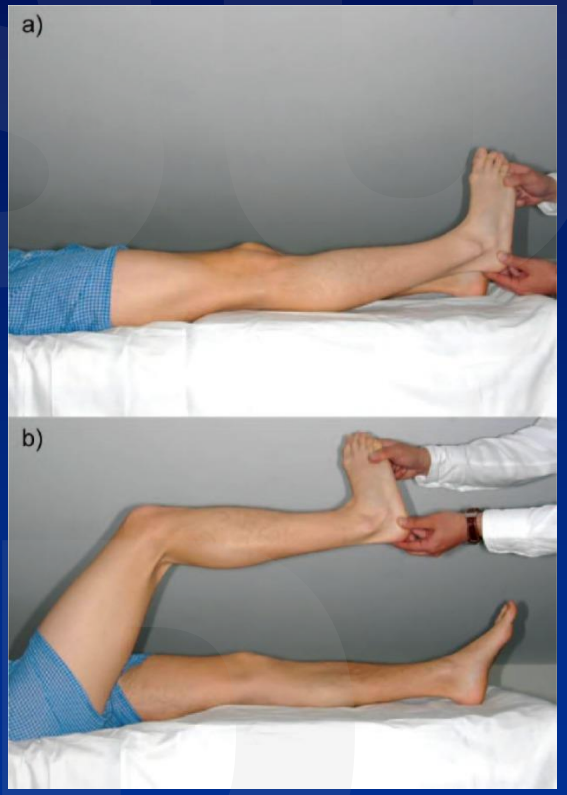


Toe-walking

- Common
  - 7-24% prevalence for idiopathic toe-walking
- Etiology
  - Physiologic: <3 years of age
  - Habitual: Normal dorsiflexion
  - Contracture: Bilateral, more prevalent later
  - Unilateral: hemiplegia, dislocated hip, congenital short femur

Toe-walking

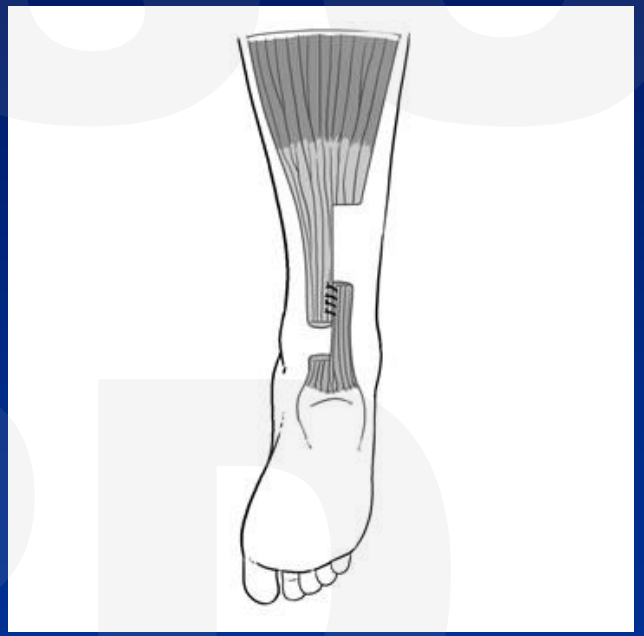
- Examination
  - Check stance and gait, with toe-walking and heel-walking
  - Check for reflexes, clonus and Babinski
  - Check ankle dorsiflexion with knee flexed and then extended (Silfverskiold)
- Imaging
  - Consider spine MRI if neuro exam abnormal or history of increasing incontinence



Bauer, Jeremy P. MD; Sienko, Susan PhD; Davids, Jon R. MD. Idiopathic Toe Walking: An Update on Natural History, Diagnosis, and Treatment. Journal of the American Academy of Orthopaedic Surgeons 30(22):p e1419-e1430, November 15, 2022. | DOI: 10.5435/JAAOS-D-22-00419

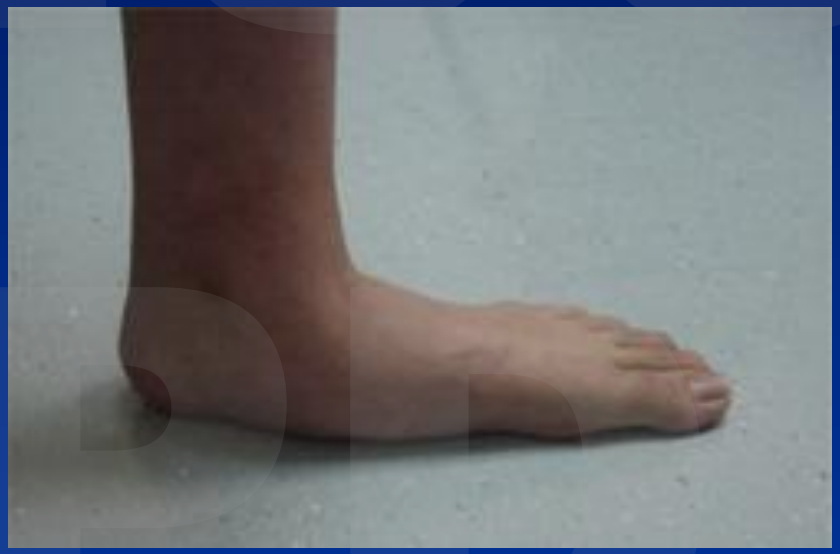
Toe-walking

- Treatment for idiopathic toe-walking
  - Observation
    - For habitual toe-walker
  - Serial casting
    - Consider for borderline cases
    - Limited efficacy (Cochrane review 2019)
    - Cast complications
  - Surgery
    - For true Achilles contracture
    - Contracture may recur if performed at young age
    - Various methods, but all share similar results with respect to motion and strength



Pes planovalgus

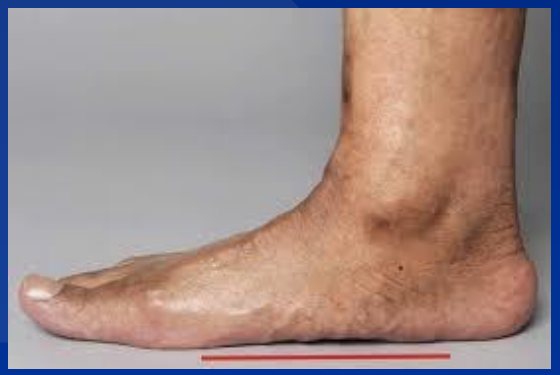
- Flatfoot – a common benign condition
- Defined by flattening of the arch in stance



- Prevalence:
  - <2yo: 97%
  - At 3yo: 54%
  - At 10yo: 4%
- Natural History: Benign

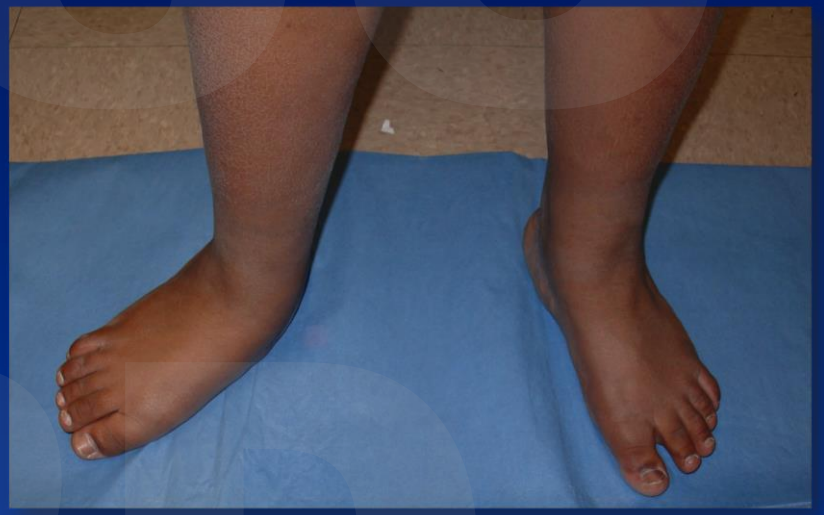
Pes planovalgus

- History
  - Ask about pain, specifically in the arch
- Exam
  - Foot position
    - Seated
    - Standing flat
    - Standing on toes
  - Arch form in different positions
  - Subtalar motion
    - Assess for flexibility v stiffness
    - Heel position flat and on toes
  - Assess for Achilles contracture



Pes planovalgus

- Differential
  - Flexible, physiologic pes planovalgus
  - Vertical talus (infant/toddler)
  - Tarsal coalition presenting as a peroneal spastic flatfoot (adolescent)



Pes planovalgus

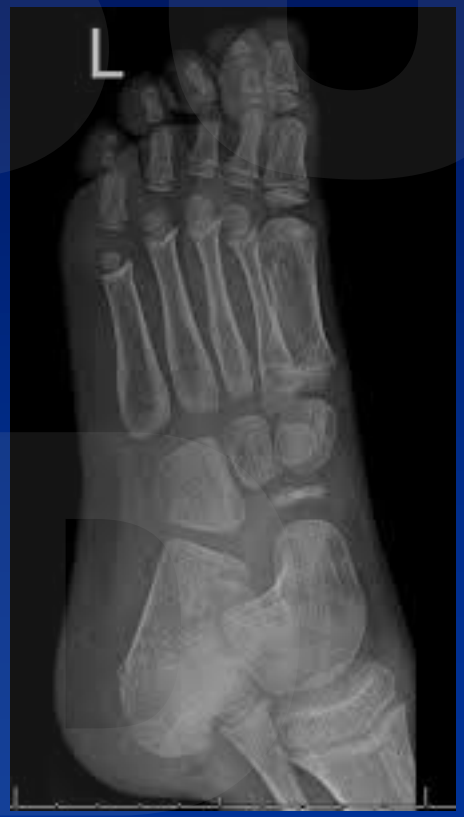
- Treatment
  - Observation only, if flexible and pain-free
  - Orthotics, if flexible and painful
  - Imaging to identify possible coalition, if stiff
  - Achilles tendon lengthening, if Achilles contracture identified
  - Supramalleolar orthotics are not indicated for flexible flatfoot deformity in toddlers (Cochrane Review 2022)
    - Evans AM, RomeK, CarrollM, HawkeF.Foot orthoses for treating paediatric flat feet. Cochrane Database of Systematic Reviews 2022, Issue 1. Art. No.: CD006311. DOI: 10.1002/14651858.CD006311.pub4.

Summary

- Toddler foot issues are usually physiologic and resolve spontaneously
- In-toeing and flatfeet rarely, require surgical intervention in neurotypical children
- Toe-walking typically resolves but does warrant evaluation if persistent

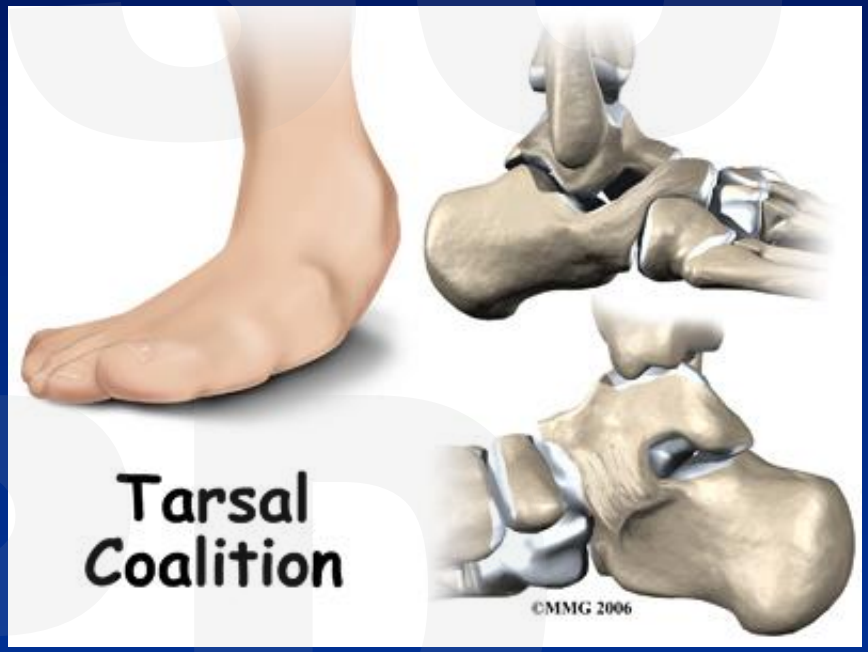
School-age foot pains

- Tarsal coalition
- Accessory navicular
- Osteonecrosis
- Sever's Condition



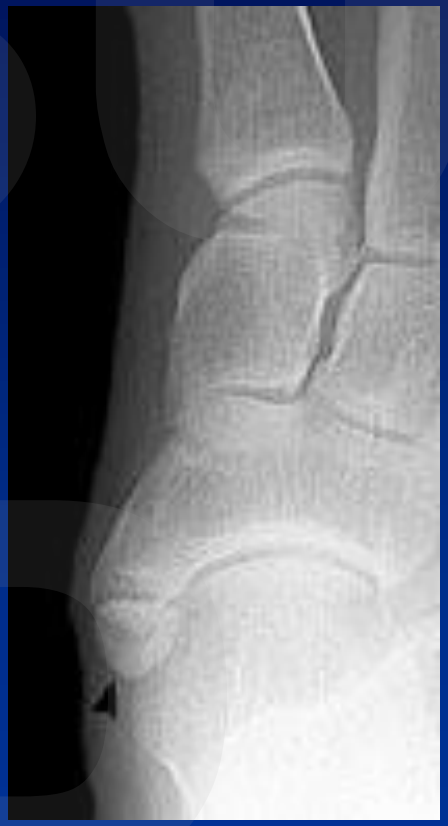
Tarsal Coalition

- Incidence: 1-6%, but many are asymptomatic, 50% bilateral
- History and Physical
  - Increasing pain after age 10
  - Multiple ankle sprains
  - Exam notable for stiffness in subtalar range of motion and flatfoot
- Imaging
  - X-ray and then CT
- Treatment
  - Casting
  - Surgical resection



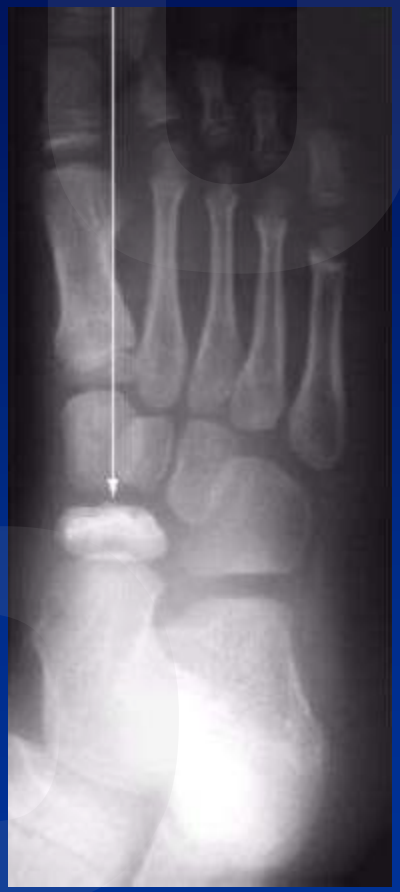
Accessory navicular

- Adolescent medial foot pain
- Medial prominence, erythema, callosity
- Radiographs: extra bone
- Treatment:
  - PT/PT/PT
  - Surgery to remove prominence, but results sometimes suboptimal



Osteonecrosis

- Kohler's
  - Osteonecrosis of navicular bone
  - Symptomatic treatment only
- Frieberg's
  - Osteonecrosis of 2nd metatarsal
  - Symptomatic treatment only



Sever's Condition

- Common overuse injury
- School-age and adolescents
- Associated with flat shoes (athletic and everyday)

Sever's Condition

- Treatment
  - Activity modification as needed
  - Alter shoewear, suggest higher heel or heel cup
  - NSAIDs
  - Casting in worst cases
  - "The Rule" – you can play or you can complain, but you can't do both

Shoe recommendations

- Do not recommend any particular brand
- Encourage bare feet at home and shoes outside for protection
- Shoes should be comfortable and fit well
- Avoid narrow or short toe box
- Arch support needed in certain conditions but not needed for normal development
- Slightly elevated heel

Questions

- Contact information
  - halseyma@ohsu.edu
  - Pediatric Orthopedic Surgery scheduling: (503) 494-4122
  - OHSU Physician Consult Line: (503) 494-4567

Thank You