Adult Acquired Flatfoot and Posterior Tibial Tendon

Steven D. K. Ross MD
Professor of Orthopaedics
University of Calif. Irvine
Posterior Tibial Tendon

– Adult Acquired Flat Foot

▪ Peri-Talar instability
▪ Pathology in the tendon, Spring and other ligaments
▪ Degenerative changes in the tendon near it’s insertion on the navicular
▪ Myxoid degeneration
Etiology of Tendon Dysfunction

- Trauma - Direct and Indirect
- Structural - Accessory navicular
- Anatomic - Exostosis
- Inflammatory - Rheumatologic
- Neoplastic - PVNS
- Degenerative - associate with obesity, diabetes, female, overuse, hypertension
Presentation of PTTD

- Gradual onset of medial foot and ankle pain
- Swelling
- Local tenderness
- Pain or weakness in single limb toe-rise
- Deformity- acquired flat foot
Physical Examination

- Standing alignment
  - Hindfoot valgus and medial tibial translation
  - Forefoot abduction
  - Forefoot supination
- Achilles contracture
- Joint flexibility
- Hindfoot inversion on single limb toe-rise
Acquired Adult Flatfoot Deformity

TYPICAL PHYSICAL EXAMINATION
Acquired Adult Flatfoot Deformity

TYPICAL PHYSICAL EXAMINATION

- Inability to perform single leg heel rise
  = incompetent posterior tibial tendon

Normal Single Leg Heel Rise
Heel Rises and inverts
Opposite foot is off the ground

Unable to Perform Single leg Heel Rise
-Heel does Not Invert
Classification of PTTD

- **Stage 1**
  - Pain and tenderness over the tendon without deformity

- **Stage 2**
  - Pain and tenderness, swelling, and a flexible deformity

- **Stage 3**- Rigid with arthrosis

- **Stage 4**- Add ankle involvement
Acquired Adult Flatfoot Deformity

X-Rays

- Must be WB to assess bony alignment
- AP and Lateral Foot Views
- Lateral View will show a break in Talo-1st MT line (Meary’s Line)
Acquired Adult Flatfoot Deformity

X-Rays

- Must be WB to assess bony alignment
- AP view will show Talonavicular uncovering

![Normal](image1.png)  ![Acquired Flatfoot](image2.png)

Normal $< 7^\circ$  Acquired Flatfoot $> 7^\circ$
Acquired Adult Flatfoot Deformity

Posterior Tibial Tendon Biomechanics

- PT muscle inverts subtalar joint
- Controls mobility of transverse tarsal joints
  - "Locks" the transverse tarsal joint prior to heel rise
- PT helps maintains longitudinal arch
- Loss of longitudinal arch = attenuation of:
  - PT tendon, talonavicular joint capsule, spring ligament, deltoid ligament complex
The primary problem is instability

- External stabilization
  - Bracing- UCBL, Short articulated AFO, Aircast

- Internal Stabilization
  - Surgical
Treatment PTTD

- **Stage 1- Non-operative**
  - NSAIDS, immobilization, ice, physical therapy
  - Treat the underlying disease
- **Stage 1- Operative**
  - Tenosynovectomy and repair
Treatment PTTD

- Stage 2- Non-operative
  - Orthosis and physical therapy
  - NSAIDS
  - Activity modification

- Stage 2 – Operative
  - Extra-articular stabilization
  - Fix each part of the deformity- posterior contracture, heel valgus, forefoot abduction, forefoot supination, repair of the soft tissues
Acquired Adult Flatfoot Deformity

Medializing Calcaneal Osteotomy
- Addresses hindfoot valgus
- Preserves hindfoot motion
- Usually combined with:
  - Post Tibial tendon augmentation (FDL)
- Can be combined with:
  - +/- Spring ligament repair
  - +/- Equinus correction
  - +/- Medial column stabilization
Acquired Adult Flatfoot Deformity

“All American” or “Around the World”

– Lateral Column Lengthening
– + Medializing calcaneal osteotomy

▪ Addresses
  – hindfoot valgus
  – forefoot abduction

▪ Preserves Hindfoot Motion

▪ Usually combined with PT augmentation

▪ Can be combined with:
  ▪ +/- Spring ligament repair
  ▪ +/- Equinus correction
Treatment PTTD

- Stage 3- Non-operative
  - Same as stage 2
  - Orthosis

- Stage 3- Operative
  - Triple arthrodesis
Acquired Adult Flatfoot Deformity

Joint Sacrificing Procedures

- Subtalar arthrodesis
- Triple arthrodesis
  - Allows reduction of midfoot on hindfoot
  - Treatment for Stage 3 Acquired Adult Flatfoot Deformity
- Important Hindfoot motion is lost
Treatment PTTD

- **Stage 4**
  - Ankle instability
    - Triple arthrodesis
    - Ankle ligament reconstruction - Deltoid
  - Ankle Arthrosis
    - Pantalar arthrodesis
    - TTC fusion
Summary

- Surgical treatment should create a stable plantigrade foot
- Recovery is long
- No single procedure is applicable for all patients
- Customize the procedure to the patient