



# Adult-acquired flatfoot

## Treat now to prevent arthritis later

BY BRENT HAVERSTOCK, DPM, FACFAS

Adult-acquired flatfoot or posterior tibial tendon dysfunction (PTTD) is a common entity that mostly affects middle- to older-aged individuals, women more than men. The condition results in medial ankle and arch pain, a gradual loss of arch height and a slower gait.

The tibialis posterior is a large muscle that originates off the proximal third of the posterior tibia, interosseous membrane and fibula. It becomes tendinous above the medial malleolus and then courses behind the medial malleolus, inserting primarily into the plantar and medial aspect of the navicular, the three cuneiform bones and the base of the second, third and fourth metatarsals. It functions to plantarflex the ankle joint and invert the subtalar joint. It's a stance phase muscle that contracts eccentrically to decelerate subtalar joint pronation (flattening of the arch) and internal rotation of the tibia. Concentric contraction commences in mid-stance to assist in stabilizing the midfoot joint in preparation for propulsion. At heel lift, it provides a plantarflexion torque that allows the heel to leave the ground. In this way, the tibialis posterior is an important stabilizer of the arch of the foot.

Unfortunately, PTTD is often overlooked and misdiagnosed, resulting in the disabling condition and loss of mobility of the affected individual.

### Diagnosis

- based on history and clinical presentation
- tenderness around the medial ankle along the course of the tendon
- on weight-bearing, loss of arch height on the affected side; if the individual already had flatfeet, a change occurs in one foot such that the arch begins to flatten more than before
- when viewed from behind, the individual may demonstrate a valgus hindfoot, i.e. heel falls inwards
- foot may turn out, showing "too many toes" sign, otherwise known as abducted forefoot
- single heel raise test — keeping the unaffected foot off the ground, the patient is instructed to rise up on tiptoe on the affected foot. If the posterior tibial tendon has attenuated, the heel won't rise off the floor. In less severe cases, the individual will be able to rise on the toes, albeit painfully, but the heel won't invert as it normally should.
- x-rays showing both feet when weight-bearing — useful for comparison
- magnetic resonance imaging — to evaluate the integrity of the posterior tibial tendon

### Risk factors

- flatfeet — strongest risk factor for PTTD
- obesity
- hypertension
- diabetes
- local steroid injections
- inflammatory diseases, e.g. rheumatoid arthritis, ankylosing spondylitis, psoriasis
- in athletes, excessive force placed on the foot, resulting in inflammation and tenosynovitis
- previous surgery or trauma

### Signs and symptoms

- pain and swelling around the medial ankle
- medial arch pain
- gradual loss of the arch and onset of a flatfoot deformity, or increased deformity in a previous flatfoot
- pain developing on the outer side of the foot or ankle
- weakness and inability to stand on toes
- tenderness across the midfoot, especially when stressed by activity

References:

Lee MS et al. Diagnosis and treatment of adult flatfoot. *J Foot Ankle Surg* 2005;44(2):78-113.  
Kohls-Gatzoulis J et al. Tibialis posterior dysfunction: a common and treatable cause of adult acquired flatfoot. *BMJ* 2004;329(7478):1328-33.

### Classification

- Stage I**
  - posterior tibial tendon inflamed but shows normal strength
  - little to no change in the arch
  - patient can still perform a single-limb heel rise and has a flexible hindfoot
- Stage II**
  - tendon partially torn or shows degenerative changes
  - as a result, tendon loses strength
  - considerable flattening of the arch
  - valgus hindfoot, abducted forefoot
  - patient unable to perform single-limb heel rise
  - pain now present on lateral aspect of the ankle
- Stage III**
  - posterior tibial tendon is torn and not functioning
  - arch completely collapsed with arthritic changes in the foot
- Stage IV**
  - identical to stage III, except that the ankle joint also becomes arthritic

### Treatment

- Stages I and II**
  - rest
  - non-steroidal anti-inflammatory drugs
  - immobilization of the foot for 6-8 weeks with a rigid below-knee cast or boot
  - after cast is removed, physiotherapy to strengthen the tendon
  - custom orthotics to support the arch and decrease the strain on the tendon
  - a University of California Biomechanics Laboratory (UCBL) orthotic — deep heel seat and high medial arch
  - surgery — repair of tendon, tendon transfers, medial displacement calcaneal osteotomy
- Stages III and IV**
  - ankle-foot orthosis to stabilize the arthritic foot or both the foot and ankle
  - surgery — hindfoot arthrodesis or pantalar arthrodesis

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