

## Posterior Tibial Tendon Dysfunction (PTTD)

Posterior tibial tendon dysfunction (PTTD), also known as posterior tibial tendonitis, is one of the leading causes of acquired flatfoot in adults. The onset of PTTD may be slow and progressive or sudden. An abrupt starting point is normally linked to some form of trauma, whether it be simple (stepping down off a curb or ladder) or severe (falling from a height or car accident). PTTD is seldom seen in children and increases in frequency with age.



### The Characteristic Finding of PTTD Include;

Loss of medial arch height.

### Edema (Swelling) of the Medial Ankle

Loss of the ability to resist force in order to abduct or push the foot out from the midline of the body.

### Pain on the Medial Ankle With Weight Bearing

Inability to improve up on the toes without pain.

### Too Many Toes Sign

Lateral subtalar joint (outside of the ankle) pain.

Common test to evaluate PTTD could be the 'too many foot sign'. The too many toes sign' is a test used to measure abduction deviation away from the midline of the body) with the forefoot. With damage to the rear tibial tendon, the forefoot will abduct or move out in relationship to the rest of the foot. In cases of PTTD, when the foot is viewed from behind, the toes show up as 'too many' on the outside of the foot due to abduction of the forefoot.

*“ Advanced cases of PTTD, in addition to the pain of the tendon itself, pain will also be noted at the sinus tarsi. The sinus tarsi refers to a small tube or divot on the outside of the ankle that can actually be felt. This tunnel is the entry to the subtalar joint. The subtalar joint is the joint that controls the side to side motion of the foot, motion that would occur with uneven surfaces or sloped hills. As PTTD progresses and the ability of the rear tibial tendon to support the arch becomes diminished, the arch will collapse overloading the subtalar combined. As a result, there is increased pressure placed on the joint floors of the lateral aspect of the subtalar joint, resulting in soreness.*

There have been many proposed explanations for PTTD over time because this condition was first described by Kulkowski in 1976. The most contemporary explanation refers to an area of hypovascularity (limited blood flow) in the tendon just below the ankle. Tendon derives nearly all of its' nutritional support from synovial fluid produced by the actual outer lining of the tendon. Very small blood vessels also permeate the muscle sheath to arrive at tendon. This makes all tendon notoriously slow in order to heal. In the case of the posterior tibial muscle, this problem is exacerbated by a distinct area of bad blood flow hypovascularity). This area is located in the posterior tibial tendon just below or distal to the inside ankle bone (medial malleolus).

Tendon is also many vulnerable to fatigue and failure at a place where the tendons changes direction. As the posterior tibial tendon descends the leg and comes to the inside of the ankle, the tendon follows a well defined groove in the back of the tibia (bone of the lining of the ankle). The tendon then takes a dramatic turn towards the arch of the foot. If the tendon is placed into a situation where significant load is applied to the foot, the tendon responds by pulling up as the load of the body (in addition in order to gravity) pushes down. At the location where the tendon modifications course, the tibia acts as a wedge and may even use enough force to actually damage or shatter the tendon.

### Equinus is Also a Contributing Factor to PTTD

Equinus is the term used to describe the ability or lack of ability to dorsiflex the feet in the ankle (move the toes toward you). Equinus is usually as a result of tightness in the leg muscle, also known as the gastroc-soleus complex (a combination of the gastrocnemius and soleus muscles). Equinus may also be due to a bony block in the front of the ankle. The presence of equinus makes the posterior tibial tendons to accept additional insert during gait.

*Additional contributing factor to the onset of PTTD may include hypertension, diabetes, peripheral neuropathy, smoking or arthritis.*

- The progression of PTTD may well bring about tendonitis, partial tears of the tendon or complete tendons shatter.
- Many classifications have been developed to describe PTTD.
- The category as described by Johnson and Strom is most commonly used today.
- Stage I Tendon status Attenuated (lengthened) with tendonitis but no rupture Clinical findings Palpable pain in the medial arch.
- Foot is actually supple, versatile with way too many foot indication X-ray/MRI Mild to moderate tenosynovitis on MRI, no X-ray changes
- Stage II Tendon status Attenuated with possible partial or complete shatter Clinical findings Pain in arch.
- Unable to raise on toes.
- A lot of toes indicator present X-ray/MRI MRI notes tear in tendons.
- X-ray noting abduction of forefoot, collapse of talo-navicular joint

Stage III Tendon status Severe degeneration with likely rupture Clinical findings Rigid flatfoot with inability to raise up on toes X-ray/MRI MRI shows tear in tendon. X-ray observing abduction of forefoot, collapse of talo-navicular joint.

### Treatment of posterior tibial tendon dysfunction and posterior tibial tendonitis

Treatment for PTTD is dependant on the clinical stage and the health status of the patient. It is important to recognize that PTTD is a mechanical problem that will require a mechanical solution. This means that treating PTTD with medicine alone is fraught with failure. Timely introduction of some form of mechanical support is imperative.

*“ Natural Remedies for Gout Gout is a form of joint inflammation that is caused by excess uric acid in the body. This happens due to poor diet, stress and not enough sleep. Gout causes a sudden and severe pain - you'll notice the skin over the affected joint is usually red and...*



Surgical procedures which usually focus on primary repair of the posterior tibial tendon happen to be very unsuccessful. This is due to the fact that tendons heal slowly following damage and cannot be relied upon as a sole solution for PTTD cases. Operative success is usually achieved through stabilization of the rearfoot subtalar joint) which significantly reduces the work performed by the rear tibial muscle.

### Stage I Might Respond to Sleep, for Instance a Walking Cast

Pain and inflammation could be controlled with anti-inflammatory medications. It is important to be sure that Stage I patients realize that the use of shoes with additional arch support and heel elevation, for the rest of their lives, is essential. Arch support, whether constructed into the shoe or added as an orthotic, helps support the posterior tibial tendon and decrease its' work. Elevation of the heel, reduces equinus, one of the most significant contributing factors to PTTD. When Stage I patients go back to low heels without having arch support, PTTD can recur.

Stage II patients, or Stage I patients that do not respond to rest and help, require surgical correction to be able to stabilize the subtalar joint prior to further damage to the posterior tibial tendon. Subtalar arthrodesis is a procedure used to strengthen the subtalar joint. Arthrodesis is a term that means the motion of the joint is blocked without fusion. Subtalar arthrodesis can only be used in cases of Stage I or II wherever mild in order to moderate deformation of the arch has occurred and MRI findings show the muscle to be only partially ruptured. Subtalar arthrodesis is typically performed in conjunction with an Achilles tendon lengthening procedure to correct equinus. These treatments require casting for a period of weeks following the process.

Stage III patients require stabilization of the rearfoot with procedures that fuse the primary joints of the arch and foot. These types of procedures are salvage procedures and require prolonged casting and disability following surgery. A common procedure for Stage III is called triple arthrodesis which is a technique used to fuse the particular subtalar joint, the talo-navicular joint and the calcaneal cuboid joint.

PTTD is a condition that increases in frequency with age and the prevalence of poor health indicators such as diabetes and obesity. As a result, many patients with PTTD are poor surgical individuals for correction of PTTD. Prosthetics such as an ankle foot orthotic (AFO), Arizona Brace or other bracing may be very helpful to control the symptoms of PTTD. Anatomy:

The posterior tibial muscle is the extension of the posterior tibial muscle that lies deep to the calf. The origin of the rear tibial muscle is the posterior aspect of both the tibia and fibula and the interosseus membrane. The insertion of the posterior tibial muscle is the medial navicular the location where the tendon divides into nine different insertion site on the bottom of the foot.

### Biomechanics:

The function of the posterior tibial tendon is always to plantarflex the base at the toe away from phase of the gait cycle and to stabilize the medial arch.

### Symptoms:

The symptoms of period I PTTD include a dull ache of the medial arch. The pain become worse with activity, better on days with limited time on the feet. Considerable activity may result in a partial rupture of the tendon, relocating to stage II.

- Stage II signs and symptoms are seen with more regularity.
- Pain is present at the onset of standing and walking.
- Some restriction of to be able to raise up on the feet will be present.
- Stage III signs are severe with an inability to accomplish most normal daily activities such as laundry or going to the store.
- Collapse of the medial arch will be obvious.
- Abduction of the forefoot will show 'too many toes sign'.

### Differential Diagnosis:

Conditions that may resemble PTTD include tarsal tunnel syndrome, tibial stress fractures, posterior tibial tendons rupture, flexor hallucis longus tendonitis, gout, joint disease of the subtalar joint or a fracture of the posterior process of the actual talus.

### Additional References Include;

Cantanzariti, A.R., Lee, M.S., Mendicino, R.W. Posterior Calcaneal Displacement Osteotomy for Adult Acquired Flatfoot. J. of Foot and Ankle Surgery. 39-1: 2-14, 2000

- Myerson, M.S., Corrigan, J.
- Treatment of posterior tibial muscle inability with flexor digitorum longus tendons transfer and calcaneal osteotomy.
- Orthopedics 19:383-388, 1996

Myerson, M.S. Adult purchased flatfoot deformity. J. Bone and Joint Surgery. 78-A:780, 1996

Johnson, K.A., Tibialis posterior tendon rupture. Clin. Orthop. 177:140-147, 1983

### About the Particular Author: Jeffrey a

Oster, DPM, C.Ped is a board certified foot and ankle surgeon. Dr. Oster is also board certified in pedorthics. Dr. Oster is medical director of Myfootshop.com and is in active practice in Granville, Ohio.

**Disclaimer: Content in this document is an advertisement**, therefore it may be biased and should not be considered an objective or independent review. Owner of this document may be compensated when you purchase a product by clicking a link in this document. The views and opinions expressed in this document are purely of the author. Any product claim or other representation about a product or service should be verified with the manufacturer, provider or party in question. Any health information in this document is for educational purposes only and is not intended to replace the advice of your health care provider.