

Posterior Tibial Tendon Dysfunction (PTTD)

Posterior tibial tendon dysfunction (PTTD), also called rear tibial tendonitis, is one of the leading causes of acquired flatfoot in adults. The onset of PTTD may be slow and progressive or unexpected. 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 vehicle 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 to be able 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 foot without pain.

Too Many Toes Sign

Lateral subtalar joint (outside of the ankle) pain.

“ Common test to evaluate PTTD could be the 'too many toes sign'. The way too many toes sign' is a test used to calculate abduction deviation away from the midline of the body) with the forefoot. With damage to the posterior tibial tendon, the forefoot will abduct or relocate in relationship to the rest of the foot. In the event of PTTD, once the foot is viewed from at the rear of, the toes seem 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 declined, the arch will collapse overloading the subtalar joint. As a result, there is increased pressure applied to the joint areas of the lateral aspect of the subtalar joint, resulting in soreness.

There have been many proposed explanations for PTTD over the years given that this condition was first described by Kulkowski. The most modern day explanation refers to an area of hypovascularity (limited blood flow) in the tendon just below the ankle. Tendon derives most of its' nutritional support from synovial fluid produced by the actual outer lining of the tendon. Extremely small blood vessels also permeate the tendon sheath to reach tendons. This makes all tendon notoriously slow to be able to heal. In the case of the posterior tibial tendon, this problem is exacerbated by a distinct part 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 most prone to fatigue and failure at a place where the tendon 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 interior of the ankle). The tendon then takes a dramatic turn towards the arch of the foot. If the muscle is put 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 to gravity) pushes down. At the location where the tendon alterations course, the tibia acts as a wedge and could use enough force to actually damage or break 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 foot on the ankle (move the toes toward you). Equinus is usually as a result of tightness in the leg muscle mass, also known as the gastroc-soleal 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 causes the posterior tibial tendons to accept additional fill 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 even complete muscle break.
- Many types have been developed to describe PTTD.
- The classification as described by Johnson and Strom is most commonly used today.
- Stage I Tendon status Attenuated (lengthened) with tendonitis but simply no rupture Clinical findings Palpable pain in the medial arch.
- Foot is actually supple, versatile with too many toes indication X-ray/MRI Mild to moderate tenosynovitis on MRI, no X-ray changes
- Stage II Tendon status Attenuated with possible partial or complete break Clinical findings Pain in arch.
- Unable to raise on foot.
- Way too many toes sign present X-ray/MRI MRI notes tear in muscle.
- 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 jutting abduction of forefoot, collapse of talo-navicular joint.

Treatment of posterior tibial muscle 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 requires a mechanical solution. This means that treating PTTD with medication on your own is fraught with failure. Timely introduction of some form of physical support is imperative.

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Surgical procedures which usually focus on primary repair of the posterior tibial tendon have been 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. Surgical success is usually accomplished through stabilization of the rearfoot subtalar joint) which significantly reduces the work done by the posterior tibial tendons.

Stage I Might Respond to Rest, Like a Walking Throw

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 as well as heel elevation, for the rest of their lives, will be crucial. Arch support, whether included in the shoe or added as an orthotic, helps support the posterior tibial muscle and decrease its' perform. Elevation of the heel, reduces equinus, one of the most significant contributing factors to PTTD. When Stage I patients return 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 in order to strengthen the subtalar joint prior to further damage to the posterior tibial tendon. Subtalar arthroeresis is a procedure used to strengthen the subtalar joint. Arthroeresis is a term that means the motion of the joint is blocked without fusion. Subtalar arthroeresis can only be used in cases of Stage I or II exactly where mild to be able to moderate deformation of the arch has occurred and MRI findings show the tendons to be only partially ruptured. Subtalar arthroeresis 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 feet. These procedures are salvage procedures as well as 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 combined, the talo-navicular joint as well as 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 weak 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 leg. 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 where the tendon divides into nine different insertion website on the bottom of the foot.



Gout

Biomechanics:

The function of the posterior tibial tendon would be to plantarflex the foot in the toe away phase of the gait cycle and to strengthen the medial arch.

Symptoms:

The symptoms of phase 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. Substantial activity may result in a partial rupture of the tendon, relocating to stage II.

- Stage II symptoms are seen with more regularity.
- Pain is present at the onset of weight bearing.
- Some constraint of to be able to raise up on the toes will be present.
- Stage III signs and symptoms are severe with an inability to finish most normal daily activities such as laundry washing 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 tendon break, flexor hallucis longus tendonitis, gout, joint disease of the subtalar joint or a fracture of the posterior process of the particular talus.

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