Dysfunction of the tibialis posterior tendon

Dr. N. Ian Dale
Dr. W Husain
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Anatomy

Origin: interosseous membrane and proximal adjacent surfaces of the tibia and fibula

Inserts: navicular tuberosity, medial naviculocuneiform and the medial cuneiform. A second slip inserts on the planter aspect of the cuneiforms and the base of 2nd, 3rd, and fourth metatarsals.
Blood supply


Blood supply divided into proximal and distal areas

The proximal area is supplied by branches of the posterior tibial artery

The distal which is the bone-tendon interface is supplied by branches of posterior tibial and dorsalis pedis arteries

This pattern of blood supply produces a zone of hypovascularity of 14 mm, beginning 4 cm proximal to the insertion of the tendon
Etiology and epidemiology


76 patients with inflammation and/or rupture of the PTT

Group A younger (mean age 39 years)

Group B elderly (mean age 64 years)

Group A demonstrated local manifestations of a systemic inflammatory disease

Group B exhibited the effects of mechanical trauma and degeneration

Increased incidence of rupture in obese middle-aged women and in patients with hypertension or diabetes
History & examination

Pain medially in early stages as well as fatigue and planter pain
Swelling on the course of the tendon
Later stages the pain becomes lateral as the fibula impinges against the calcaneum


Prospective study 21 consecutive feet with TP tendon dysfunction (19 patients).

When the shank of the affected foot was taken with one hand and externally rotated, the head of the first metatarsal raised in the case of TP dysfunction and remained on the ground in normal TP.
History & examination

Compare its sensitivity with other common clinical signs.

The deformity was supple in 12 feet and fixed in 9 feet.

Too many toes and the single-heel rise negative in 20% to 35%.

First metatarsal rise sign to be positive in all cases of TP tendon dysfunction.

This simple clinical test recognizes dysfunction of the TP tendon at an early stage, when the foot is still supple.

As the foot deformation progresses, early treatment may be the most effective measure in preventing long-term functional impairment.
**Investigations**

Radiography for staging

Tenography not used any more

Results disappointing

Procedure involves considerable discomfort

**Ultrasound**

Ultrasound in the diagnosis of posterior tibial tendon pathology. Miller SD, Van Holsbeeck M, Boruta PM, Wu KK, Katcherian DA. Foot Ankle Int 1996;17;555-8

Retrospectively comparing the preoperative ultrasonograms for 17 patients with their recorded surgical findings.

In all cases, the surgical findings confirmed the ultrasonographic diagnoses:

- 3 inflammations
- 4 partial tears
- 10 ruptures

Ultrasonography reliable means of visualizing the extent of pathology of the symptomatic posterior tibial tendon, valuable tool in surgical planning.
Investigations & classification

MRI is the best method for assessing the integrity of the tendons


Classification and management of tibialis posterior tendon injuries according to magnetic resonance imaging findings

MRI performed on 29 feet in 28 patients suspected TP tendon dysfunction prior to treatment

MRI scan enabled classification

- Tenosynovitis/tendinitis was demonstrated in five cases (17%).
- Hypertrophic longitudinal tears were classified as type I (5 cases, 17%)
- Atrophic partial ruptures were classified as type II (3 cases, 10%)
- Complete ruptures were classified as type III (4 cases, 14%)

The radiological abnormalities were confirmed in all cases treated surgically
# Stages

## TABLE 1

<table>
<thead>
<tr>
<th></th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posterior tibial tendon</td>
<td>Tenosynovitis or degeneration, or both</td>
<td>Elongation and degeneration</td>
<td>Elongation and degeneration</td>
<td>Elongation and degeneration</td>
</tr>
<tr>
<td>Deformity</td>
<td>Absent</td>
<td>Flexible, reducible pes planovalgus deformity with hindfoot held in equinus</td>
<td>Fixed, irreducible pes planovalgus deformity</td>
<td>Fixed, irreducible pes planovalgus deformity</td>
</tr>
<tr>
<td>Pain</td>
<td>Medial</td>
<td>Medial or lateral, or both</td>
<td>Medial or lateral, or both</td>
<td>Medial or lateral, or both</td>
</tr>
<tr>
<td>Single-limb heel-rise</td>
<td>Mild weakness; hindfoot inverts normally</td>
<td>Marked weakness; no or weak inversion of hindfoot</td>
<td>Unable to perform test; no inversion of hindfoot</td>
<td>Unable to perform test; no inversion of hindfoot</td>
</tr>
<tr>
<td>Too-many-toes sign</td>
<td>Negative</td>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
</tr>
<tr>
<td>Valgus deformity and arthritis of ankle</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Stage I tendinitis but normal length
Initial management consists of non-operative ice, physiotherapy, medial arch support and NSAID
Surgery is rarerly required as most cases settle


**Objective**: The aim of this study was to assess the outcome of surgical decompression for stage I TPT dysfunction

**Method**: prospect study of 10 consecutive patients who underwent surgical decompression for stage I TPT dysfunction.

**Results**: surgical decompression
 reduces pain
 permits an early return to normal activities

**Conclusion**: Surgical decompression should be performed for stage I TPT dysfunction if non-operative measures have failed to provide symptomatic relief.
Calcaneal osteotomy and transfer of the tendon of flexor digitorum longus for stage II dysfunction of tibialis posterior

Prospective study of surgery outcomes

51 with stage II TP dysfunction treated with medial displacement calcaneal osteotomy and transfer of the tendon of flexor digitorum longus

44 were reviewed with mean 51 months of F/U (38-62)

The American Orthopedic Foot and Ankle Society (AOFAS) foot/ankle score

They also assessed their pain before and after surgery on a visual analogue scale of 1-10

AOFAS foot and ankle score improved from 48.8 to 88.5

The visual analogue scale improved from 7.3 to 1.7

When asked to undergo the procedure again all answered yes except for three 2 of them needed a calcaneocuboid fusion
Medial flexor digitorum longus tendon augmentation and lateral foot column lengthening or reorienting triple arthrodesis as surgical therapy of posterior tibial tendon dysfunction

Evaluate the alignment and functional outcome after surgical augmentation of the tibialis posterior by tendon transfer and lateral column lengthening by osteotomy of the oscalcis, calcaneo-cuboidal arthrodesis or reorientating triple arthrodesis.

Methods  From 1991 to 1999
41 patients with the clinical and radiological diagnosis of dysfunction of the TPT underwent surgical exploration and repair.
These 41 patients (22 women, 19 men) average age of 44.3 years
Flexor digitorum longus (FDL) tendon transfer as reconstruction of the tibialis posterior tendon was performed in the cases without major deformity (n = 77)
Patients underwent FDL transfer and lengthening osteotomy (n = 15) of the oscalcis
Calcaneocuboidal (c-c) arthrodesis (n = 12)
Triple arthrodesis (n = 7) when a fixed flatfoot deformity had developed
Medial flexor digitorum longus tendon augmentation and lateral foot column lengthening or reorienting triple arthrodesis as surgical therapy of posterior tibial tendon dysfunction

RESULTS the AOFAS score
stage I patients with FDL transfer from a preoperative mean of 54 to 84 points
stage II patients with FDL transfer and lengthening osteotomy from 47 to 92 points
    with calcaneocuboidal arthrodesis from 48 to 86 points
stage III patients with triple arthrodesis from 42 to 72 points

In two patients, the deformity failed to improve (stage I) necessitating a revision surgery with a calceneo-cuboidal lengthening arthrodesis for relapsing deformity.

CONCLUSION: In order to correct deformity and provide substantial relief of foot pain and dysfunction, we recommend the transfer of the FDL tendon in flexible flat foot deformity together with lengthening osteotomy.

This treatment will provide optimal restoration of a dynamic support along the medioplantar aspect of the foot and functionally superior to calcaneocuboidal arthrodesis
**Treatment options**


**Triple arthrodesis in the management of acquired flatfoot deformity in the adult secondary to posterior tibial tendon dysfunction. A retrospective study of 20 cases**

20 cases of valgus flatfoot deformity in the adult with insufficiency of the tibialis posterior tendon

Treated by triple arthrodesis from 1983 to 1998

Diffuse osteoarthritis was present preoperatively in 14 cases

Fusion of the arthrodesis was achieved in 18 cases

There were two nonunions
Treatment options


Triple arthrodesis in the management of acquired flatfoot deformity in the adult secondary to posterior tibial tendon dysfunction. A retrospective study of 20 cases

Results evaluated according to Kitaoka's criteria
- excellent in 35%
- good in 35%
- fair in 20%
- poor in 10%.

Bone resection must be kept minimal and bone grafts should be used in addition to internal fixation

Triple arthrodesis was found to give good result in the treatment of acquired flat foot deformity due to insufficiency of the tibialis posterior tendon

However on the long term it promotes degenerative changes in neighbouring joints
Outcomes for surgical correction for stages 2 and 3 tibialis posterior dysfunction

Between the years 1991 and 1996
13 patients with stage 2 or 3 tibialis posterior dysfunction
5 patients in stage 2 age from 53 to 80 years
8 patients in stage 3 age from 41 to 73 years
Stage 2  Cobb reconstruction utilizing a split tibialis anterior tenodesis
Stage 3 underwent an Evans lateral column-lengthening procedure combined with a Cobb procedure
Treatment options


Outcomes for surgical correction for stages 2 and 3 tibialis posterior dysfunction

Results indicated that patients in stage 2 had a better patient satisfaction than those patients in stage 3

Both patient groups had a 6-point average decrease in pain according to the 0- to 10-point visual analog pain scale

50% of the patients undergoing a Cobb-Evans procedure felt that the procedure did not meet their expectations

Only one out of the five Cobb procedure patients felt that the procedure did not meet his expectations

Calcaneal osteotomies and arthrodesing procedures of the hindfoot may render a more satisfactory outcome
Thank you very much