Pes Planovalgus
and posterior tibial tendinopathy:
*Therapeutic choices in terms of staging the lesions*

Dr de Halleux Jacques

SPA, 2011 september 17
TIBIALIS POSTERIOR TENDON

- Inversion of the heel
- Adduction forefoot
- Plantar flexion of the Ankle
PES PLANO VALGUS

Calcaneum
Subtalar joint
Talus
T-N and N-C
Midtarsal joints

Valgus
tilted medially
medially and down
subluxation
Abduction + suppination

Valgus hindfoot

Achilles tendon =
evertor
DIAGNOSIS

tibialis posterior dysfunction

- flattening longitudinal arch
DIAGNOSIS

* tibialis posterior dysfunction

- valgus of the hindfoot
DIAGNOSIS
tibialis posterior dysfunction

- abduction of the mid and forefoot
- „too-many-toes sign“
DIAGNOSIS

tibialis posterior dysfunction

„single-heel-rise test“

Normal Tib Post
DIAGNOSIS

"single-heel-rise test"

Tib Post Dysfunction
## STAGES
tibialis posterior dysfunction

<table>
<thead>
<tr>
<th>Stage</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retromalleolar pain</td>
<td>+</td>
<td>++</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Hindfoot valgus</td>
<td>(+/−)</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Arch flattening</td>
<td>(+/−)</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Forefoot supination</td>
<td>(+/−)</td>
<td>(+)</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Forefoot abduction</td>
<td>(+/−)</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Deformity</td>
<td>supple</td>
<td>supple</td>
<td>rigid</td>
<td>rigid</td>
</tr>
<tr>
<td>Ankle pain</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>++</td>
</tr>
</tbody>
</table>

Stages 1, 2, 3 = Johnson and Strom, Clin Orthop, 1989
Stage 4 = Myerson, JBJS Am, 1996
Posterior Tibial Tendon Dysfunction
Stage 1

- retromalleolar pain
- X Ray Normal
- Stages A : inflammation, no deformation
  - B : partial PTT tear, no deformation
  - C : partial PTT tear, little hindfoot valgus

Tenosynovitis or partial rupture

Haddad St, Myerson MS and al, Foot and Ankle Int, 2011, Jan.
Posterior Tibial Tendon Dysfunction
Stage 2

Supple pes plano valgus

- A: valgus hindfoot; (<50% uncovering TN)
- B: forefoot supination flexible (>50% uncovering TN)
- C: A or B with forefoot supination fixed
- D: Forefoot abduction
- E: medial column (TN, NC, CMT) instability

Elongation, tendinosis
(partial) rupture

Haddad St, Myerson MS and al, Foot and Ankle Int, 2011, Jan.
Posterior Tibial Tendon Dysfunction

Stage 3

- Rigid pes plano valgus
  - A: Hindfoot valgus
  - B: Forefoot abduction

More advanced course of tendon rupture

Haddad St, Myerson MS and al, Foot and Ankle Int, 2011, Jan
Posterior Tibial Tendon Dysfunction

Stage 4

- Rigid pes plano valgus
- Lateral ankle pain

- A: reductible ankle valgus
- B: rigid ankle valgus (more common presentation)

Rupture

Ankle arthrosis

Myerson MS and al, Foot and Ankle Int, 2011, Jan
Posterior Tibial Tendon Dysfunction

TREATMENT

➢ Stage 1

- conservative

> Surgery?

- physiotherapy
- shoe corrections
- medial support

Ténosynovectomy?
Posterior Tibial Tendon Dysfunction

TREATMENT

- Stage 2

What to do?

- Valgus hindfoot?
- Forefoot abduction?
- Forefoot suppination?
- Medial column instability?
- Spring ligament?
- Tibialis posterior?
- Achilles tendon?
PTT dysfunction St II

complex problem that has multiple treatment options *

* Hill K, Foot Ankle Clin.8(1):91-104, 2003 Mar
Posterior Tibial Tendon Dysfunction Stage II

Treatment

**SURGICAL**

- Calcaneal osteotomy
  
  (>< valgus : Koutsogiannis and others)
  
  (>< abd forefoot : lateral column lengthening)

- Arthrodesis
  
  (>< abd forefoot : lateral column lengthening)
  
  (>< supp forefoot : medial column)

- Tendon reconstruction
  
  (suture, plasty, transfert FHL or FDC, Cobb)

- Ligament reconstruction
  
  (spring ligament)

- Others
  
  (Achilles tendon lengthening, TN arthrodesis, subtalar arthrodesis, subtalar arthroereisis, medial cuneiform osteotomy, 1st MT osteotomy)
CALCANEAL OSTEOTOMY
(valgus correction)

Line of weight-bearing transmitted through the talus medial to the calcaneus
CALCANEAL OSTEOTOMY
(valgus correction)

- 1893: posterior fragment forwards, medially and downwards (Gleich)

- 1967: lateral opening wedge (Silver)
CALCANEAL OSTEOTOMY
(valgus correction)

- 1971: medial translation of the posterior fragment
  (Koutsogiannis) – JBJS, febr 1971-
Surgical technique Koutsogiannis osteotomy

- Lateral incision (parallel and behind peroneal tendon) sural nerve!
Surgical technique Koutsogiannis osteotomy

- Incision periostum parallel to the incision
Surgical technique Koutsogiannis osteotomy

- MEDIAL TRANSLATION
- POSTERIOR PART
- CALCANEUM (1/3 to 1/2 of the width of the calcaneus; 1 cm)
Surgical technique Koutsogiannis osteotomy
Surgical technique Koutsogiannis ostectomy
CALCANEAL OSTEOTOMY
(valgus correction)

LATERAL OPENING WEDGE OSTEOTOMY

2005 : Z osteotomy
(Malerba)

pictures from: Th Leemrijse, B Valtin, Pathologie du Pied et de la cheville, 2009
MALERBA OSTEOTOMY
Lateral *opening* wedge osteotomy

RESULTS CALCANEAL OSTEOTOMY
(valgus correction)

- Correction of the valgus and the eversion force of the Achilles tendon

- Medial arch + forefoot abduction: deformation corrected only if no severe flatfoot

Calcaneal osteotomy alone not enough!
CALCANEAL OSTEOTOMY
(St IID: forefoot abduction)
lateral column lengthening
CALCANEAL OSTEOTOMY: Lateral column lengthening

Hintermann B:
Techniques in Orthopaedics and Traumatology 2000
Lateral column lengthening

Increasing of calcaneo-cuboidal arthrosis
  Evans: 65% at 13 years follow-up
  Mosier-Laclair: 14% at 5 years follow-up *

Alternative = calcaneocuboid distraction arthrodesis
  - less motion hindfoot,
  - increasing arthrosis hind and midfoot
    (motion subtalar loss of 18 to 30% and TN loss of 40%**)

* Mosier-Laclair, Foot Ankle Clinic (6):95-119, 2001 Mar
** Deland J et al, Foot Ankle.16(11), 1995
Medial column restauration
PTT dysfunction II C (rigid forefoot supination)

- Arthrodesis naviculo-cuneiform 123 *
- Arthrodesis 1st tarso-metatarsal
- Cotton osteotomy (plantar flexion opening wedge cun 1)**
- Plantar flexion osteotomy MT1

• Alastair Younger, Foot Ankle Int. 32 (1) : 101-3, 2011
** Hirose CB, Foot Ankle Int. 25 : 568-74, 2004
Stephen J Pinney, Foot Ankle Int, 27 (1) : 66-75, 2006 jan
TENDON RECONSTRUCTION: suture
TENDON RECONSTRUCTION: Z-lengthening
TENDON RECONSTRUCTION: FHL or FDC transfert
TENDON RECONSTRUCTION: Transfert Tibialis anterior (Cobb)
Cobb Procedure
restore plantar flexion power of the 1st ray
( more distal insertion of the Tib Ant)

Knupp M, Hintermann B

- n = 22 PTT dysfunction st II B
- FU : 24 months
- results : AOFAS score 53,2 to 88,5
  excellent / good results : 95 %
  no decreasing Force of TA

- Cobb technique = apropiate alternative to arthrodesis
  in st II B PTT dysfunction ( in addition with other technique)

LIGAMENT RECONSTRUCTION

spring ligament suture
RESULTS
FDL transfert + medial translation calcaneal osteotomy

Myerson M S *
- n:32 st II PTT dysfunction
- mean age : 58 y
- FU : 20 months (14 to 48)
- results : **AOFAS score 48 to 84**
  94% pain relief, improvement arch of the foot

Wacker J T **
- n : 44 st II PTT dysfunction
- mean age 61 y
- FU : 51 months ( 38 to 62 )
- results : **AOFAS score 48 to 88,5**
  95% pain relief
  80% improvement arch of the foot

* Myerson MS, Orthopedics. 19:383-8,1996
** Wacker JT, JBJS. 84-B : 54-8, 2002
RESULTS

FDL transfert + medial translation calcaneal osteotomy + lateral column lengthening (Mosier-Laclair**)

Satisfaction rate high

No medial arch restoration in all patients

Cc arthrosis 14%

** Mosier-Laclair, Foot and Ankle Clinic, Mar 2001: (6):95-119;
RESULTS

CC arthrodesis + PTT repair + Achilles tendon lengthening (Lauwerens, 2006)

N = 20; FU = 24 months

85% complete relief of pain
10% nonunion
15% sural nerve damage

Posterior Tibial Tendon Dysfunction

Treatment

- Stage 3
  - A: + Medial transl calc ost
  - B: + length lat column

- surgical
  - triple arthrodese
Posterior Tibial Tendon Dysfunction
Treatment

- Stage 4

Surgical
treatment

A: ankle soft tissue repair + Triple Arthrodesis
B: Panarthrodesis / TTC arthrodesis

*Bluman EM, Myerson MS, Foot Ankle Clinic, 12(2): 341-62, 2007
# Posterior Tibial Tendon Dysfunction Treatment

## Conclusion

<table>
<thead>
<tr>
<th>I</th>
<th>II</th>
<th>III / IV</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservative</td>
<td>MTCO</td>
<td>PTT repair</td>
<td>Spring</td>
</tr>
<tr>
<td>Synovectomy</td>
<td>Spring</td>
<td>Medial</td>
<td>Lateral</td>
</tr>
<tr>
<td>Triplearthrodesis</td>
<td>Soft tissue</td>
<td>Pantalar</td>
<td></td>
</tr>
</tbody>
</table>

### I Pain

A. PTT inflam; no deform

B. Partial PTT tear; no deform

C. Partial PTT tear, little valgus

### II Supple PPV

A. Calc valgus

B. Supple forefoot supp

C. Rigid forefoot supp

D. Forefoot abd

E. Med column instability

### III Rigid PPV

A. Calc valgus

B. Forefoot abd

### IV Ankle Valgus

A. Supple

B. Rigide
Posterior Tibial Tendon Dysfunction

CONCLUSION

• Good physical examination
• Good treatment indication
• Good results