Paediatric Idiopathic Flatfoot
Behind surgical eyes…

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I will **not** talk about…

- Stiff flatfoot
  - Bone coalition
  - JIA
- Neurological flatfoot
  - Neuromuscular
  - Cerebral palsy
  - CMT
- Hyperlaxity syndromes (Marfan, ED, …)
- Post traumatic flatfoot
I will talk about…

<table>
<thead>
<tr>
<th>Non Weight Bearing</th>
<th>Weight Bearing</th>
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<tbody>
<tr>
<td>• Normal aROM</td>
<td>• Reduction of medial arch</td>
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<tr>
<td>• Normal pROM</td>
<td>• Wider footprint</td>
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<tr>
<td>• Normal shape</td>
<td>• Valgus of the rear foot</td>
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IDIOPATHIC FLEXIBLE FLATFEET
Medial arch reduced

Valgus of the rear foot

Wider foot print
Functional Anatomy of the Foot

Leg-Talus Unit (LTU)

Foot-Calcaneus Unit (FCU)

Interosseous talocalcaneal ligament
Functional Anatomy of the Foot

Subtalar and talonavicular joints work together

Plantar Calcaneonavicular (spring) ligament
Functional Anatomy of the Foot

Acetabulum Pedis (Scarpa, 1803)

Plantar Calcaneonavicular (spring) ligament
Weight Bearing Foot

Mechanical axis

Valgus force

Heel contact

Physiological offset
Foot and Gait

- LTU in IR
- FCU in ER
  1. Calcaneus in Valgus
  2. Talus in PF (less supported)
  3. Navicular move lateral

FLEXIBLE FOOT
(reception/absorption)
Foot and Gait

- LTU in IR
- FCU in ER

1. Calcaneus in Valgus
2. Talus in PF (less supported)
3. Navicular move lateral

- LTU in ER
- FCU in IR

1. Calcaneus in Varus
2. Talus supported
3. TN in PF and ADD

FLEXIBLE FOOT
(reception/absorption)

RIGID FOOT
(propulsion)
Flexible Flatfeet and Gait

**Aetiology:**

Excess of **LAXITY** of the soft tissues

(“Collagens syndromes”,
“Hypermobility”, Idiopathic)
Normal or Abnormal?

- True incidence unknown
- Reduced flatfoot with age

Natural history?

3-5 yo: 42%
Teenagers: 6%
Natural History – Genu Valgum
Natural History – Genu Valgum

A mechanical axis in (Genu) VALGUM will increase the offset

Genu VALGUM spontaneously improved until 10 years old
Natural History – Ankle Valgum

... a VALGUS of the ankle will also increase the offset!

Ankle VALGUM corrects spontaneously by 12yo
Reasons for referral

- “Ruining shoes too quickly”
- Familial history of insole
- Genu valgum
- Ankle deformity
- Gait in ER, PE difficulties
- Cosmetic
- Pain
Clinical Assessment

1st Goal: Exclusion of any other aetiologies

- Neurological examination
- aROM
- pROM (Achilles contracture)
- …
Clinical Assessment

2nd Goal: Confirm flexibility/reducibility

Jack test

Tiptoes test
Clinical Assessment

Additional tests:
- Hindfoot stability/strength
- Fixed supination of the forefoot

Tiptoe on 1 leg

Forced supination of the forefoot by compression
Preoperative X-rays

ALWAYS WEIGHT BEARING!!
Preoperative X-rays

ALWAYS WEIGHT BEARING!!

Abduction

Weight Bearing: 30 degrees

Non Weight Bearing: 25 degrees
Preoperative X-rays

ALWAYS WEIGHT BEARING!!

Weight Bearing

Non Weight Bearing
Preoperative X-rays

ALWAYS WEIGHT BEARING!!

Weight Bearing:
60 degrees

Non Weight Bearing:
40 degrees
Several angle measurements:
Cobey View

Posterior view

Flatfoot with valgus of the hindfoot
Treatment ?
1st Treatment

Always non-surgical

• Physiotherapy (Achilles, TP)
• Insole (pain)
• ...

Surgery when PAIN or DISCOMFORT after failure of conservative treatment
Surgical Options

- Historical treatment
  - Isolated soft tissues procedures
  - Fusion
- Minimal invasive treatment (Arthroereisis)
- Temporary ST fixation
- Corrective osteotomy(ies)
  - Mosca/Evans
  - Triple C
  - My preferred procedure
Soft Tissues Surgery

- Achilles lengthening
- Peroneus Brevis lengthening
- ...
Arthrodesis (Fusion)

- CN fusion
- ST fusion or Grice
- Triple fusion

Stiff foot
Bad long term outcomes
Arthroereisis – Technique 1

- Interposition of material in tarsal sinus
- Metal or plastic
My personal experience...

I never had to put any... but I remove quite a few!
Arthroereisis

**CONS**
- Inflammatory reaction
- Secondary displacement
- Use and abuse

**PROS**
- Simple surgery

Contradictory outcome results
Temporary ST Fixation

- Reduction of FCU under LTU
- 1 screw in ST mechanical axis
- Avoid ST joint surface
- Soft tissues surgery associated:
  - TN reefing
  - PB lengthening (?)
  - Achilles lengthening (?)
4yo, DW Syndrome

+2y
Temporary ST Fixation

**CONS**
- Before 8yo
- Removal of the screw

**PROS**
- “Internal splint”
- Best indication:
  - Syndromes
  - Spina Bifida
Mosca or Evans Osteotomy

- **Calcaneum lengthening osteotomy**
- **Associated procedures:**
  - 1\textsuperscript{st} Cuneiform closing wedge osteotomy
  - Achilles lengthening
  - PB lengthening

![1st cuneiform osteotomy](image1)

![Calcaneum osteotomy](image2)
Mosca or Evans Osteotomy

**CONS**
- Required iliac graft
- CC subluxation
- Calcaneum is not short!

**PROS**
- Encouraging outcomes
“Triple C” Osteotomy

Calcaneum, Cuboid and (1st) Cuneiform

1. Calcaneum medial translation
“Triple C” Osteotomy

2. **Cuboid** opening wedge osteotomy
3. **1st Cuneiform** closing wedge osteotomy
“Triple C” Osteotomy

CONS

• Indirect correction

PROS

• Mild deformity
• Better correction of the Hindfoot valgus
My Preferred Technique

• **Hintermann** Calcaneum osteotomy:
  – No pure lengthening
  – Opening wedge
• TN and spring lig reefing
• Associated procedures:
  – Achilles lengthening
  – TP reefing
  – 1st Cuneiform osteotomy

Keep medial cortical intact
My Preferred Technique

Hintermann osteotomy

- TN centre of rotation
- Graft

Medial soft tissues repair:
1. TN capsule repair
2. Spring ligament
3. Tibialis posterior
My Preferred Technique

If **FIXED SUPINATION** of the forefoot: 1\textsuperscript{st} Cuneiform osteotomy (in addition to the Hintermann osteotomy)

 Forced supination of the forefoot by compression
My Preferred Technique

CONS

• Required bone graft
• “bigger” surgery

PROS

• Makes sense mechanically
Take Home Message

• Idiopathic flexible flatfeet before 10yo: normal variant
• Idiopathic flexible flatfeet after 10yo: normal vs. disease?
• 1st treatment for flexible flatfeet is conservative management
• No PAIN (or discomfort), no surgery!
Thank you

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