Osteotomias del hallux
The osteotomies of the hallux

Docteur E. Toullec
Centre de Chirurgie du Pied
Polyclinique de Bordeaux – Tondu
Osteotomias del hallux

The first question: how is the 1srt metatarsal?
Osteotomias del hallux

The second question: how are the joints?

- arthritis
- MTP1
- Cuneometatarsal
- arthritis
- hypermobility

Osteotomy or fusion?
The third question: *when is the good moment?*

**Age and osteotomy**

*Old patient:*
- Osteoporosis
- Degenerative joint
- Not really a problem

*Child: better after physeal fusion*
1 - Preoperative planning

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X ray

1 - dorsoplantar view

M1 length/ M2

DMAA

M1-M2 angle

In weightbearing

talM1 flatfoot
Preoperative planning

2 - Sagittal view

Pes cavus

Metatarsus elevatus

taloM1 angle

In weightbearing

flatfoot
Osteotomias del hallux

Preoperative planning

3 - Sesamoid view (Guntz)

More to see the position of the sesamoid than to understand the rotation of the 1srt metatarsal
Preoperative planning

4 - Oblique view

Not interesting to evaluate the elevation of the 1st metatarsal
Only for M2 M3 length (LS Barouk)
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Preoperative planning

3 D Scan

Useful in severe deformities but not in weightbearing
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Preoperative planning

Dynamic Pedobarography

flatfoot  Pes cavus  Hallux valgus

Interest to evaluate the function of the great toe, the pressure under the M1 head and P1.
But not to make measure
2- How to choose the good osteotomy?

- The possibilities of displacement
- The location of the osteotomy
- The stability
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How to choose the good osteotomy?

Take into account of the different displacements:

- Elevation / lowering
- Shortening / lengthening
- Varisation / valgisation
- Rotation: pronation / supination
- DMAA correction

To make the osteotomy on the 1st metatarsal and sometimes on P1
The different osteotomies

On M1

Distal
- Less translation
- DMAA correction

Shaft
- All displacements
  - Good stability but higher strain

Proximal
- Large displacement
  - Problem of stability

Distal and proximal = metaphyseal
- Larger surface
  - Easier bone healing
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The different osteotomies

On P1

Hallux interphalangeus

Distal shaft

proximal

- Varisation or small derotation,
- good stability (wedge osteotomy)

All displacements unstable
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The different osteotomies

The stability

The osteotomy increase the shear force on the bone when the area of contact decrease

Shear force with the different cuts
A is the most stable
The differents osteotomies

The stability → Early functional recovery

**Stable**
- chevron
- scarf
- Mau
- Mitchell: only varus / valgus plane
- wedge osteotomy = incomplete

**Unstable**
- proximal crescentic
- Ludloff
- Wilson
- Mitchell (unstable to dorsal displacement)
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The different osteotomies

The fixation

- **Pins**
  - ease of application and removal
  - resistance to translation
  - single = no control of the rotation

- **Screw**
  - better than pin
  - problem of rotation if single
  - stress riser (hole)

- **Plate**
  - more difficult and time consuming
  - strongest fixation: osteoporosis, fracture, graft
  - ideally on the plantar surface but difficult

- **Staple**
  - stability on one plane

The bandage
The fixation is not always a guarantee of stability.

The screws are zones of fragility.

Raising because of fixation failure or troughing.
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The different osteotomies

The fixation

Loss of fixation

\[ \text{malunion in dorsiflexion and medial migration} \]

= transfer metatarsalgia and recurrence

Factors (Strokes):

- weight of the patient
- inclination of M1
- length of M1 and P1
- force of plantar flexor muscles and plantar aponeurosis
- MTP1 and CM1 stiffness
The shear force increases when the inclination decreases.

M1 non-union because severe flatfoot non-treated.
Osteotomias del hallux

But what happen after?

Different osteotomies at 1 month and 1 year
3 - Indications

Hallux valgus / metatarsus varus
Hallux varus
flatfoot
Pes cavus
Hallux elevatus & rigidus
Osteotomias del hallux

I- Hallux valgus

1 - The distal osteotomies  →  Translation 4 to 7mm, DMAA

Chevron distal (Austin)++

Classical open or percutaneous?

Mitchell

Wilson

SERI
Linear distal metatarsal Osteotomy
Osteotomias del hallux

The indications

Hallux valgus

2 – The shaft osteotomies

scarf

4 displacements

translation
lowering
DMAA
shortening

Mau

Small displacement but rotation ++
Osteotomias del hallux

The indications

Hallux valgus

Scarf osteotomy

1 - The lateral translation

Not too much!
Osteotomias del hallux

The indications

Hallux valgus

Scarf osteotomy

2 - The lowering
Osteotomias del hallux

The indications

Hallux valgus

The scarf osteotomy

3 – the DMAA correction
Osteotomias del hallux

The indications

Hallux valgus

Scarf osteotomy

4 - The shortening
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Hallux valgus

Scarf osteotomy

The shortening: the solution but with Weil osteot.
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Hallux valgus

Scarf osteotomy

The shortening: Maestro cut
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Hallux valgus

3- The proximal osteotomies

Closing wedge osteot.
Stable but remove precisely

Ludloff = the best for the large corrections but unstable

Crescentic Osteot.
Unstable Easy to do correction

Chevron proximal

! Dorsal elevation
## Hallux Valgus: The Indications (Nyska)

<table>
<thead>
<tr>
<th>Stage Of the Deformity</th>
<th>M1M2</th>
<th>DMAA</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>&lt; 15−20°</td>
<td>&lt; 8°</td>
<td>Scarf or Chevron</td>
</tr>
<tr>
<td>Intermediate</td>
<td>15−20°</td>
<td>8−15°</td>
<td>Scarf</td>
</tr>
<tr>
<td>Severe</td>
<td>&gt; 20°</td>
<td>&gt; 15°</td>
<td>Shortening Scarf</td>
</tr>
</tbody>
</table>
Osteotomias del hallux
Osteotomias del hallux

Hallux valgus

The basal osteotomies

Load simulation test

Derotation = plane oblique (Diebold)

varisation
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Hallux valgus

The shaft osteotomies

- shortening
- derotation
- varisation
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The P1 osteotomies

Hallux valgus

Isolated P1 osteotomy

HV without metatarsus primus varus & large medial eminence

HV interphalangeus with congruous MTP1

Overriding and underriding second toe
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The indications

II - Hallux varus

M1 osteotomy used only in a few indications

Scarf reverse

Base medial wedge removal osteotomy (Denis) +++

When M1 is too closest from M2
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The indications

Hallux varus

Basal soustraction osteot. & P1 varisation
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The P1 osteotomies

Hallux varus

Sometimes, only P1 osteotomy with lateral ligamentoplasty
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The indications

III - flatfoot

Evans Calcaneal lengthening osteotomy

& medial arch reconstruction

Basal M1 lowering ost.

Lowering scarf osteot / hallux valgus
Woman – 69 years old - Flatfoot & hallux valgus - T.P. tendinopathy
Evans osteot.
& lowering scarf osteot.
Dynamic pedobarography

Before surgery

6 months after
The indications

IV - Pes cavus with flexible hindfoot

BRT osteotomy
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The indications

Pes cavus with fixed hindfoot

J. Sammarco: cavo varus foot treated with combined calcaneus and metatarsal osteotomies. Foot & Ankle Intern., vol 22, N°1, Jan 2001
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The indications

V - Hallux limitus & hallux rigidus

Grade I or II (Hatttrup and Johnson)

→ Various osteotomies

M1 Weil osteotomy

& P1 dorsal soustraction osteotomy
Osteotomias del hallux

The indications

Hallux limitus & hallux rigidus

Chevron distal (Austin)

Lowering and shortening

To avoid shortening with lowering
Osteotomias del hallux

The indications

Hallux limitus & hallux rigidus

Watermann

Shortening without lowering

Logroscino

Shortening with a large lowering
Osteotomias del hallux

The indications

Hallux limitus & hallux rigidus

Shaft osteotomy

Scarf osteotomy
**Osteotomias del hallux**

**The indications**

**Hallux limitus & hallux rigidus**

**Basal osteotomy**

- Plantar wedge basal osteot.
- To correct Metatarsus elevatus

**The problem**: the stability
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The indications

Hallux limitus & hallux rigidus Stage 1 - 2

Metatarsus elevatus

yes

Index plus ➔ Scarf, Weil
Index minus ➔ Basal ost.

no

Index plus ➔ Weil Chevron scarf
Index minus ➔ Botton prothesis Watermann
CONCLUSION

Before deciding an osteotomy of the hallux, it is necessary to know:
- the position of the 1st metatarsal in the space
- the possibly disease of the adjacent joints
- The dynamic function of the foot considering the axis of the legs and the rotation

and the different possibilities to correct the deformities: the displacements, the stability, ...
Sometimes, it is necessary to combine proximal and distal osteotomies
CONCLUSION
What do you do?

Woman, 35 years old
Congenital forefoot deformity
Pain above the 1st metatarsals

3 months after surgery
CONCLUSION

What do you do?

Man, 19 years old, Pain on the dorsal part of the MTP1

Scarf osteotomy or Proximal and distal Osteotomies?
Gracias por su atención