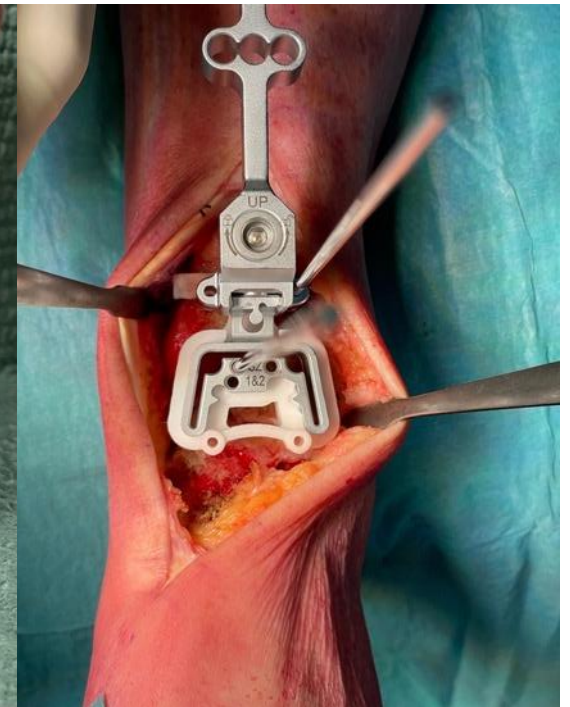
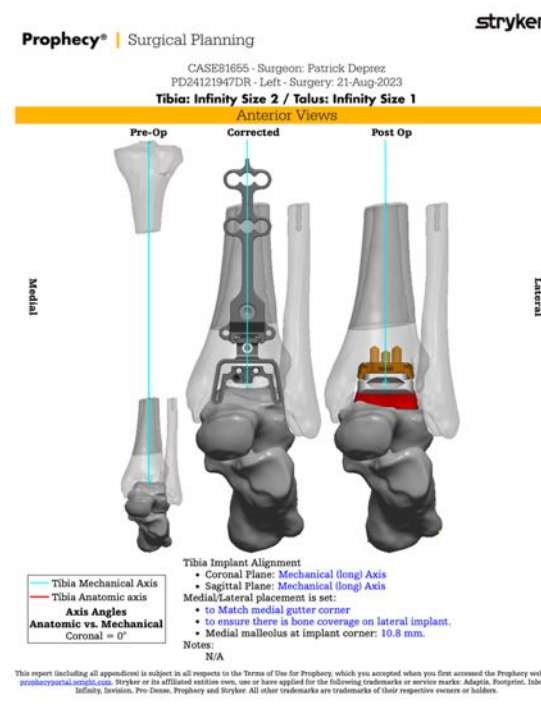


Enkelprothese:

Patiënt specifieke instrumentatie

Dr Patrick Deprez



Pathologie:



Gevorderde Enkelarthrose

(Inflammatoir, Posttrauma, primair)

Chirurgische R/:



Enkelarthrodese

Enkelprothese



Gevorderde Enkelarthrose

(Inflammatoir, Posttrauma, primair)



- <55j
- BMI 35-40
- Bonestock ↓
- Osteoporose
- Infectie/Huid
- Manual labor
- Coronal deformiteit > 25°-30°
- Hyperlaksiteit

Ankelarthrodese

- > 55j
- BMI < 35
- RA
- Reeds andere degeneratieve Av-gewrichten/fusies

Enkelprothese

Enkelarthrodese

vs

Enkelprothese

Total ankle replacement versus ankle arthrodesis for patients aged 50–85 years with end-stage ankle osteoarthritis: the TARVA RCT

NIHR | National Institute for Health and Care Research

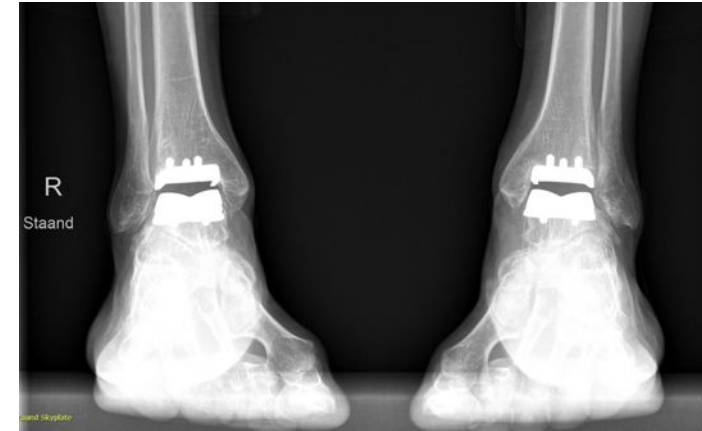
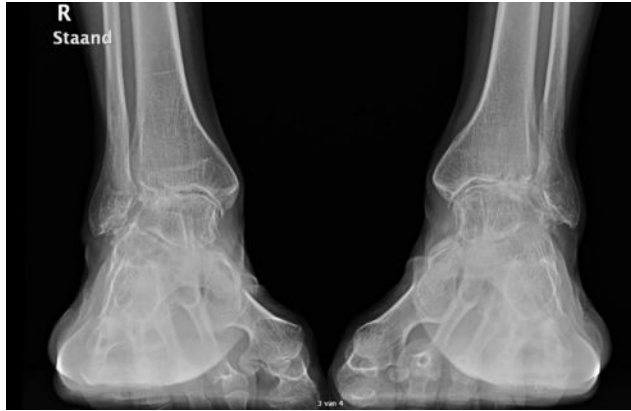
Andrew J Goldberg, Kashfia Chowdhury, Ekaterina Bordea, James Blackstone, Deirdre Brooking, Elizabeth L Dean, Iva Hauptmannova, Paul Cooke, Marion Cumbers, Simon S Skene and Caroline J Doré on behalf of the TARVA Study Group

Conclusies

1. Prothese: **beter functionele resultaten** na 2j ivm enkelfusie (4^e generatie enkelprothese)
2. Prothese: voorkeur indien **degeneratie** in **omliggende** enkelgewrichten
3. Prothese: Meer **wond- en zenuwproblemen**
4. Fusie: Meer **embolen**
5. **Prothese = Fusie**: duidelijke verbetering wb **pijnscores**
6. Prothese: Lifetime bekeken, meer **kostenefficiënt** ivm fusie

Besluit:

Niet iedereen kandidaat voor enkelprothese maar de indicaties nemen toe gezien betere prothesen , technieken en resultaten ivm fusie.



Enkelprothese

Resultaat oa afhankelijk van:

Indicatie = juiste patiënt/niet RX

Operatietechniek

- Goed **alignment**, zowel frontaal als sagitaal
- Goede **fixatie** prothese/bot (Ontstaan van botcysten)
- Juiste **prothese maat** (Vermijden van inklemming tussen bot en prothese :pijn, loosening)
- **Stabiele enkel** (ev losmaken of herstellen van ligamenten)

Revalidatie

Patient Specifieke
Instrumentatie

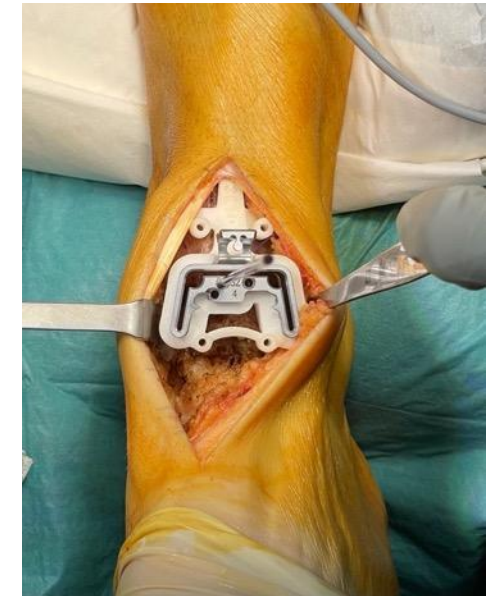
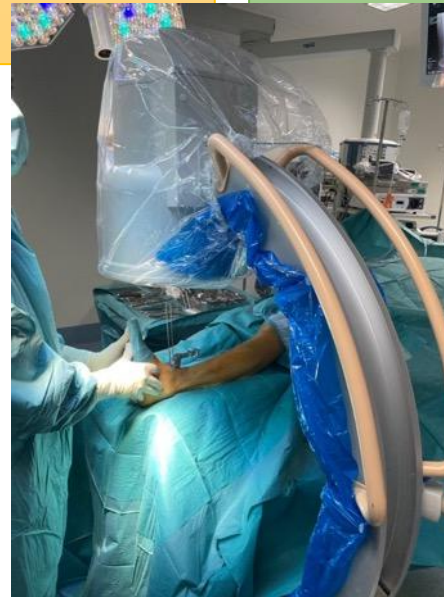
Enkelprothesetechniek: Maken van coupes om prothese te plaatsen

Klassiek instrumentarium:

- **Alignement/oriëntatie van coupes:**
Richtapparaten: onder direct zicht en met fluoroscopie:
 - Tijdrovend
 - Röntgenbelasting

Patient specifiek instrumentarium= PSI:

- **Alignement/oriëntatie van coupes:**
Preop. planning & 3D-geprinte richtapparaten
 - Snellere operatie
 - Minder Röntgenbelasting

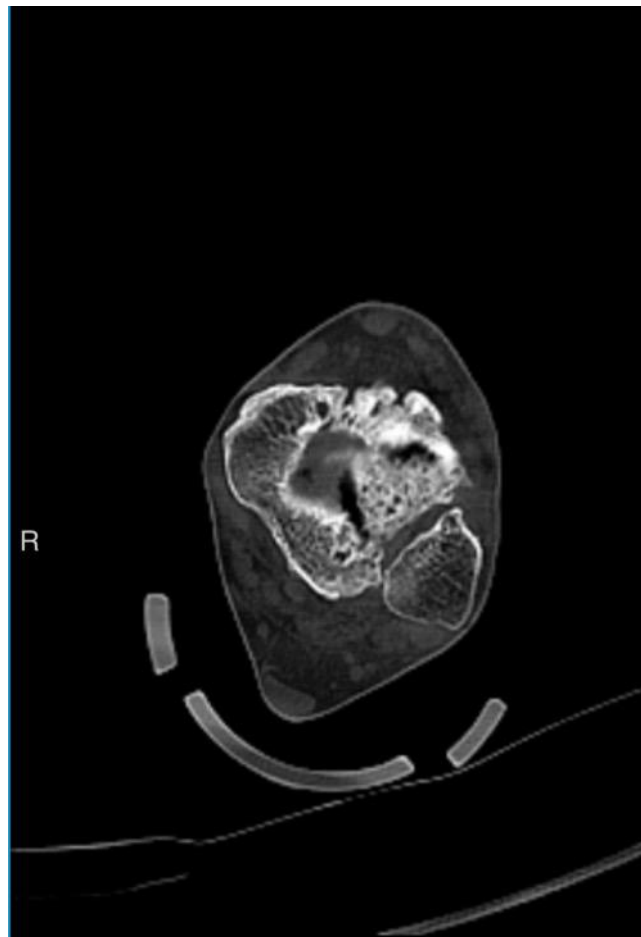
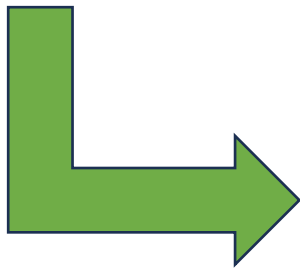


3-D geprinte coupeblokken met exacte anatomie van tibia en talus vd patiënt



Enkelprothesetechnik:

Preoperative CT



Chirurg >
ingenieur
> chirurg



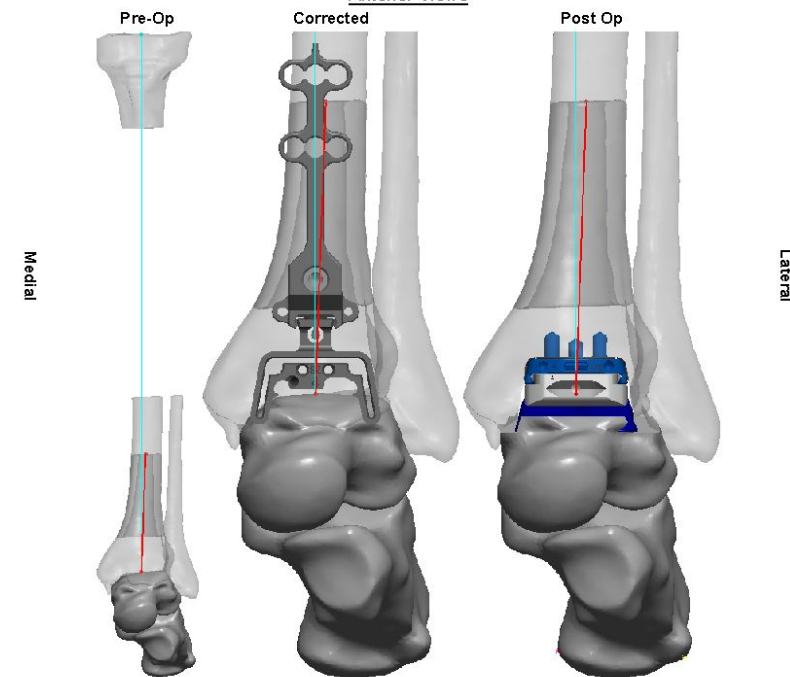
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CASE73970 - Surgeon: Patrick Deprez
PDP19121967AFC - Left - Surgery: 06-Feb-2023

Tibia: INFINITY™ Size 4 Long
Talus: INFINITY™ Size 4

Anterior Views



Tibia Implant Alignment

- Coronal Plane: Mechanical (long) Axis
 - Sagittal Plane: Mechanical (long) Axis
- Medial/Lateral placement is set:
- to Match medial gutter corner
 - to ensure there is bone coverage on lateral implant.
 - Medial malleolus at implant corner: 12.4 mm.

Axis Angles
Anatomic vs. Mechanical
Coronal = 2°

Notes:
N/A

Chirurgische planning

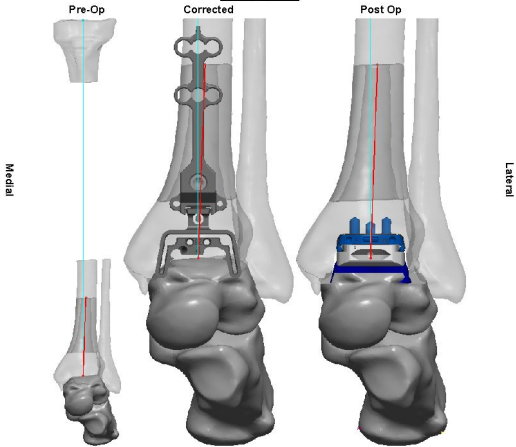
Preoperative planning

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CASE73970 - Surgeon: Patrick Deprez
PDP19121967AFC - Left - Surgery: 06-Feb-2023
Tibia: INFINITY™ Size 4 Long
Talus: INFINITY™ Size 4

Anterior Views



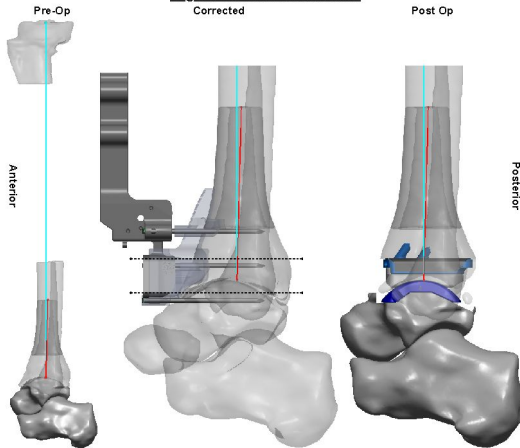
Axis Angles
Anatomic vs. Mechanical
Coronal = 2°

- Tibia Implant Alignment**
- Coronal Plane: Mechanical (long) Axis
 - Sagittal Plane: Mechanical (long) Axis
- Medial/Lateral placement is set:
- to Match medial gutter corner
 - to ensure there is bone coverage on lateral implant
 - Medial malleolus at implant corner: 12.4 mm.
- Notes:
N/A

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Tibia: INFINITY™ Size 4 Long
Talus: INFINITY™ Size 4
Sagittal Views from Lateral Side



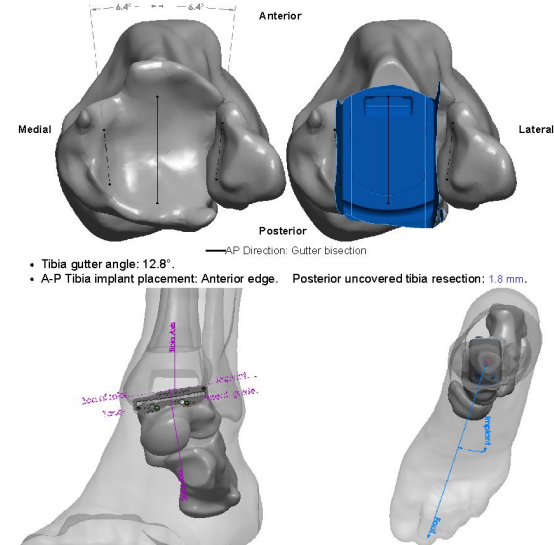
Axis Angles
Anatomic vs. Mechanical
Sagittal = 1.4°

- Implant Information**
- Tibial tray: Sz 4 Long INFINITY™ Talar dome: Sz 4 INFINITY™
- Tibial insert: Sz 4
- PROPHCY™ Part Number:
PROFINFE
- Notes:
N/A

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Tibia: INFINITY™ Size 4 Long
Tibia Rotation Distal Views



- Tibia gutter angle: 12.8°
- A-P Tibia implant placement: Anterior edge. Posterior uncovered tibia resection: 1.8 mm.

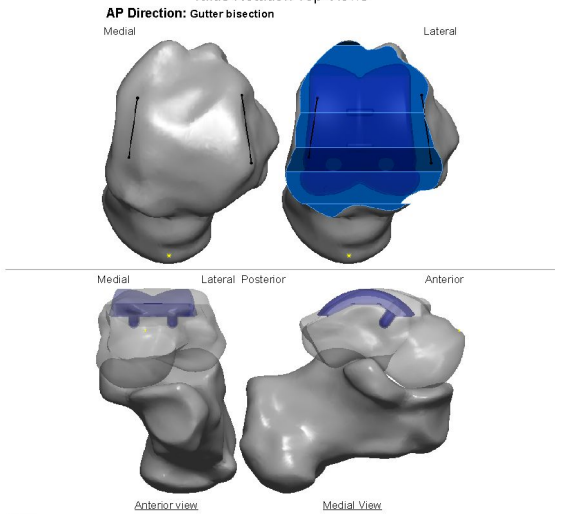
Talus resection guide relative to the talar bone and the planned tibia alignment axis. The resections will result in a correction of 9° from valgus. Ligament balancing may be necessary to achieve balance

The tibia internal/external orientation is 18.4° external to the approximate foot orientation.

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Talus: INFINITY™ Size 4
Talus Rotation Top Views



- Notes:
- Talus resection angle in Coronal Plane: parallel to the natural talar dome
 - The talus implant is selected to maximize bone coverage while minimizing implant overhang.
 - Talar Gutter angle: 16.4° Talus anterior direction: Gutter bisection.
 - The resection depth is set to 0 mm less than the thickness of the talar implant.
 - The distal flat of the talar implant is 5.9 mm proximal to the yellow talar neck point shown above.

Positionering/alignment:
frontaal en sagitaal

Rotatie componenten

Maat prothese

Preoperative planning

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Summary

Tibial Alignment Method

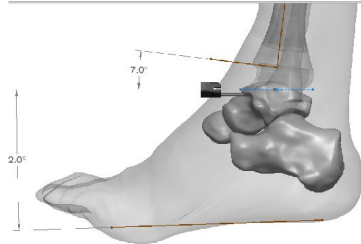
- Tibia Implant Alignment in Coronal Plane: Mechanical (long) Axis.
- Tibia Implant Alignment in Sagittal Plane: Mechanical (long) Axis.
- Anterior direction is set by the Gutter bisection.
- Medial/lateral implant placement.
- Match medial gutter corner.
- The cuts on the medial malleolus and fibula are minimized.
- Upsize for AP tibial coverage.
- Anterior/Posterior implant placement: Anterior edge.

Talar Alignment Method

- Talar Implant flexion is set to: Follow the curvature of the talar dome.
- Talar implant is selected to maximize bone coverage while minimizing implant overhang.
- Anterior direction is set by Gutter bisection.
- Resection depth: 0 mm less than the thickness of the talar implant.

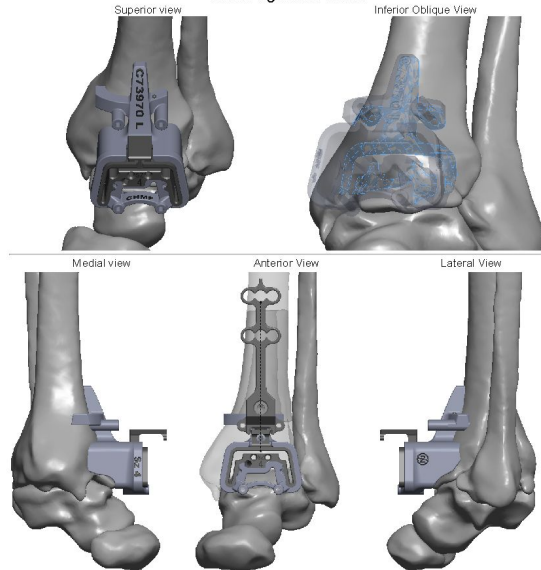
PROPHECY™ Engineering Comments

- Per Dr. Deprez's request the following changes have been applied: The talus implant is changed to size 4 Long



- Sagittal view of pre-op talus showing:
- Talar resection vs. tibia resection.
 - Talar resection vs. bottom of foot line.

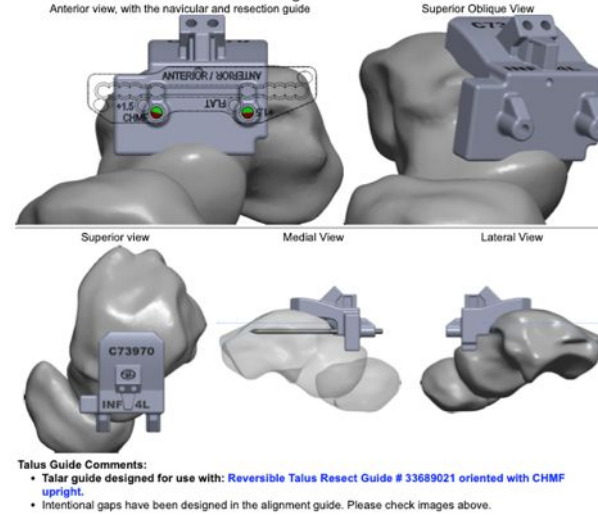
Tibial Alignment Guide



Tibia Guide Comments:

- The talus is shown in the uncorrected (as-scanned) orientation. If using the coupled-alignment talus pin holes, ensure the talus is manually adjusted into the desired varus/valgus orientation and dorsi-flexed as desired prior to pinning into the talus. Refer to pages 1 & 2 for the planned corrected talus alignment.

Talar Alignment Guide

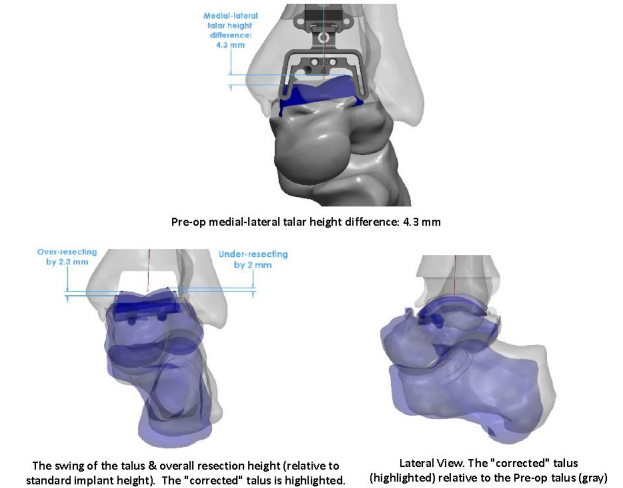


Talus Guide Comments:

- Talar guide designed for use with: Reversible Talus Resect Guide # 33689021 oriented with CHMF upright.
- Intentional gaps have been designed in the alignment guide. Please check images above.

CASE73970 - APPENDIX: Total Resection Height

- Setting the total joint resection height is subject to coronal and sagittal deformities, unknown ligament status, and intraoperative joint balancing procedures.
- The total resection height relative to the standard implants on medial and lateral side is specified below: "Over-resecting" suggests the joint could have residual laxity with the thinnest poly, while "under resecting" may result in tightness after initial implantation. Ligament balancing procedures may be required to obtain a balanced ankle.
- The "corrected" hindfoot is highlighted blue in the images below.
- See page 3 and 4 for the talus resection angle and depth.
- If using the coupled alignment talus pinholes in the tibia guide, the standard total resection height is used.



Fitting en positie guide

Correctie alignement

Preoperative planning

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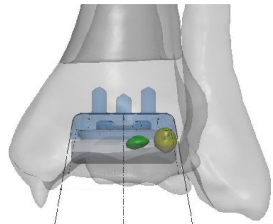


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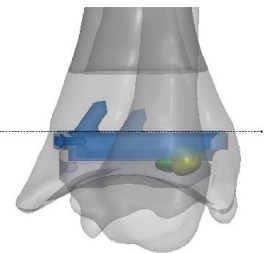


CASE73970 - APPENDIX: Tibia Bone Voids

- Any bone voids near the expected location of the implant are shown below.
- For surgically relevant open bone voids that are not intrinsic to the stability of the bony structure during your Total Ankle Replacement procedure, consider using PRO-DENSE™ Injectable Regenerative Graft.
- Please refer to the patient's CT scan for more details.



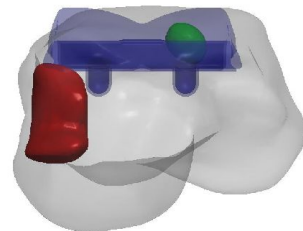
Anterior view of tibia and fibula.



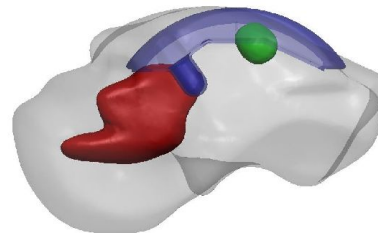
Lateral view of tibia and fibula.

CASE73970 - APPENDIX: Talus Bone Voids

- Any bone voids near the expected location of the implant are shown below.
- For surgically relevant open bone voids that are not intrinsic to the stability of the bony structure during your Total Ankle Replacement procedure, consider using PRO-DENSE™ Injectable Regenerative Graft.
- Please refer to the patient's CT scan for more details.



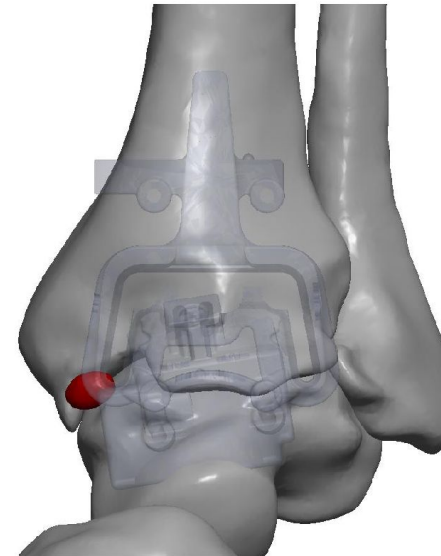
Anterior view of talus with implant.



Lateral view of talus with implant.

CASE73970 - APPENDIX: Osteophyte Appendix

Any loose body osteophytes shown below that interfere with the alignment guides will need to be removed prior to placing the guides.



Tibia alignment guide at tibia-talus joint line relative to any osteophyte(s). Anterior view

CASE73970 - APPENDIX: Alternative talus implant type

As an alternative, the INBONE II talar dome is shown below. If preferred, an intraoperative step can be used to convert the INFINITY resection to an INBONE resection.

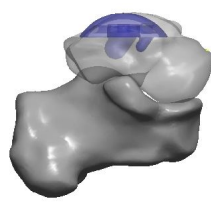
Size shown: Size 4



Talus Superior View



Talus Coronal View

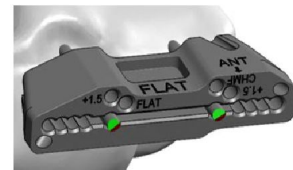


Talus Sagittal View

The approximate distance to the subtalar surfaces is given below:
7.13 mm between the talar stem and posterior facet.
11.43 mm between the talar stem and sinus tarsi.

To convert to INBONE talus resection level:
With the "FLAT" labeling upright, assemble the saw guide over the original talar pins with the pins coming through the resection slot. Then add pins in holes marked "FLAT" and remove the original pins to cut through the slot.

Representative image of step 1. Assemble saw guide over pins at cut-slot level (image does not reflect patient anatomy).

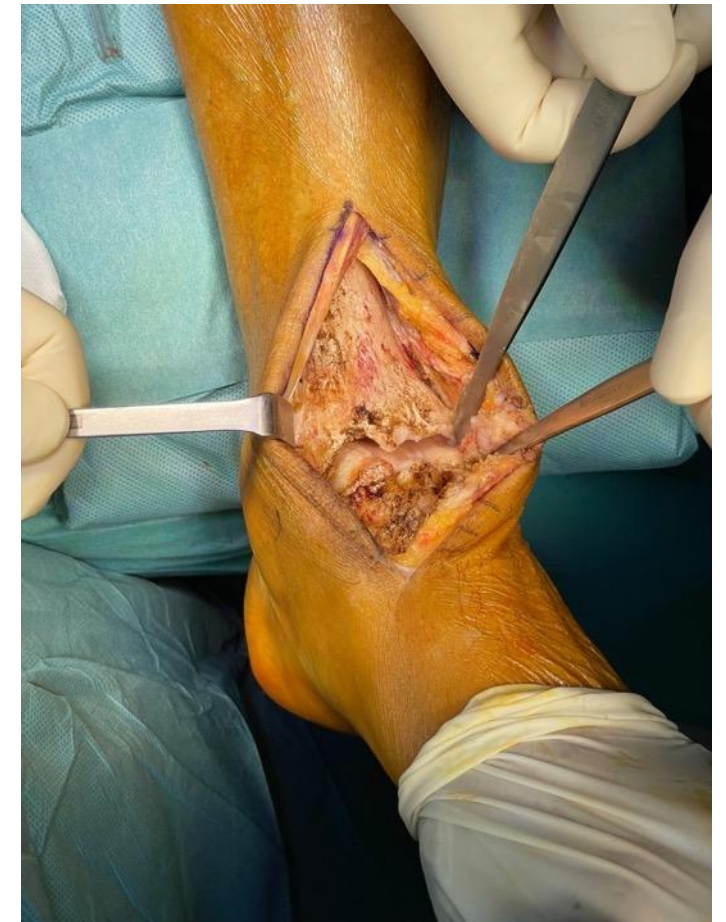


Cystes en gewrichtsmuizen

Chirurgie:
Man 65j



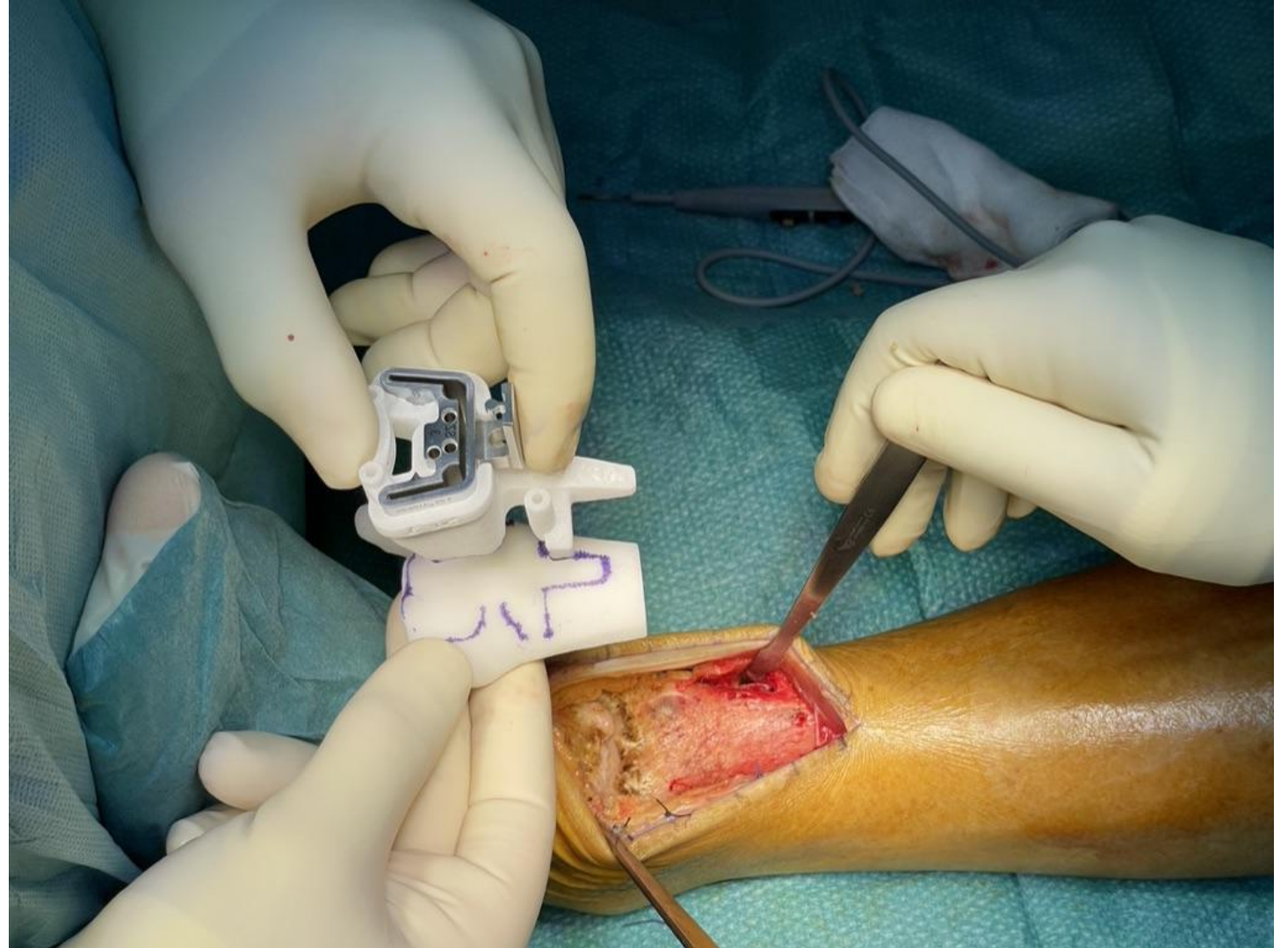
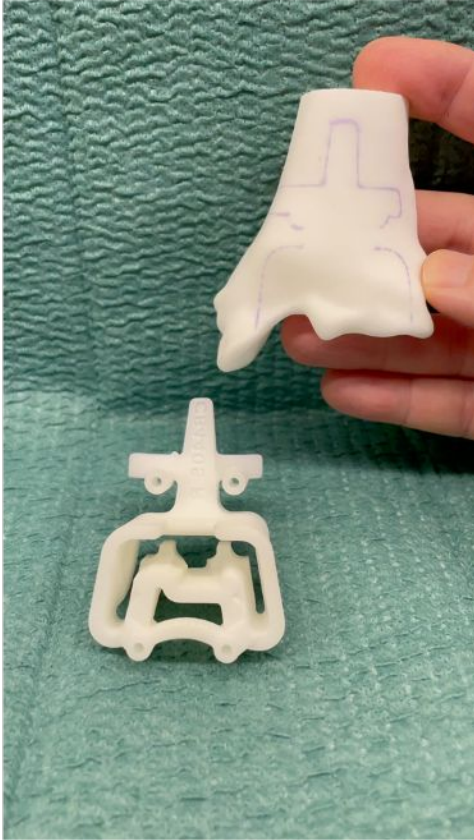
Procedure: incisie en vrijleggen van osteofyten en bot



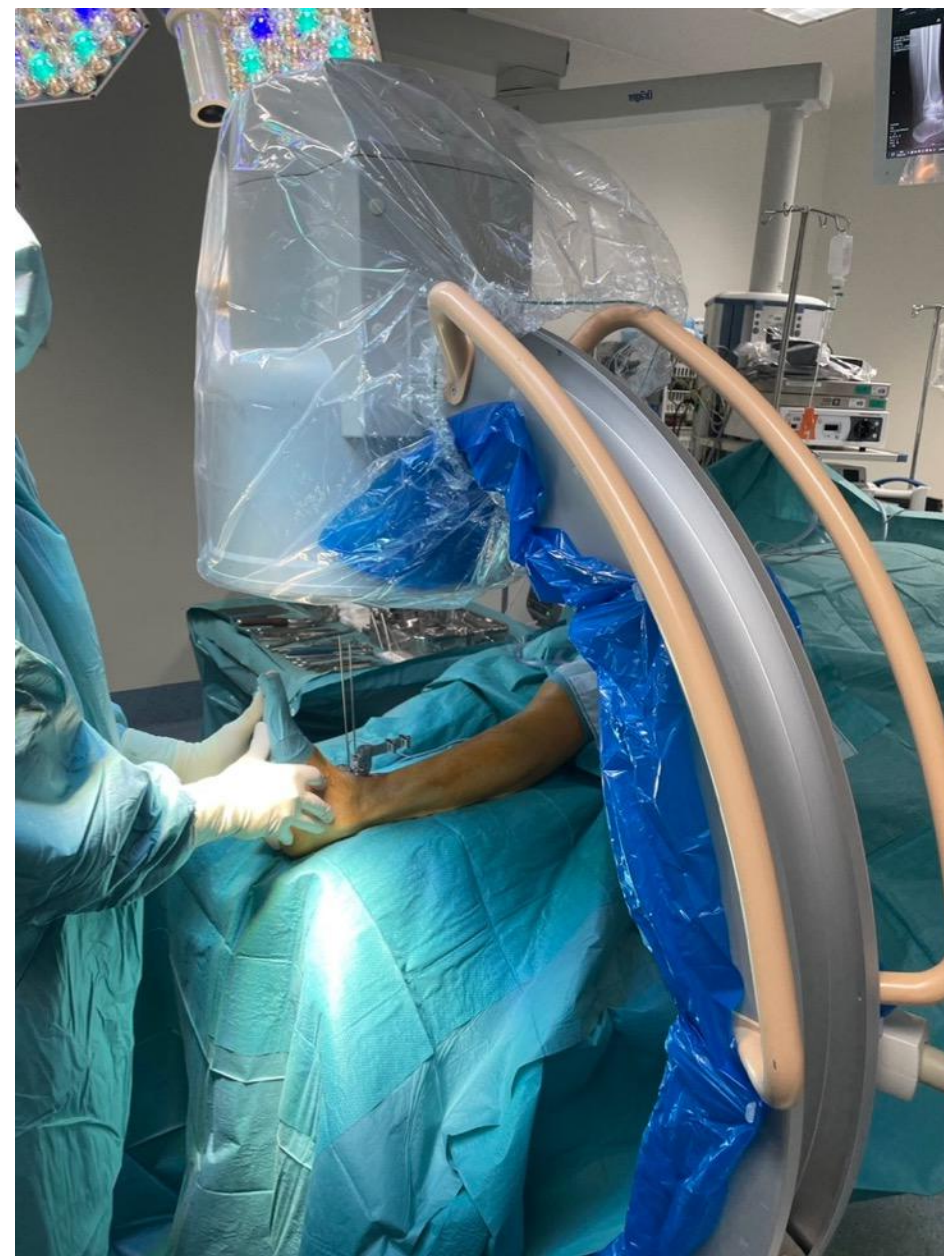
Procedure:

Check positie tibiaguide op botmodel

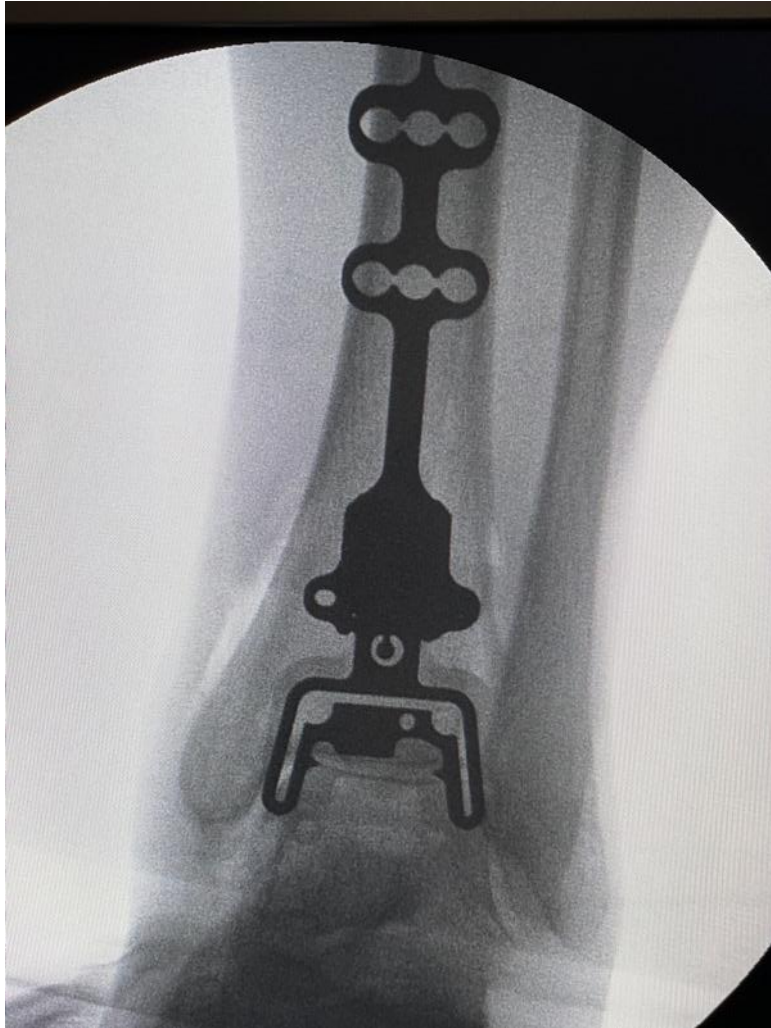
Vergelijk positie guide op botmodel en bot zelf
=Visuele en tactiele controle



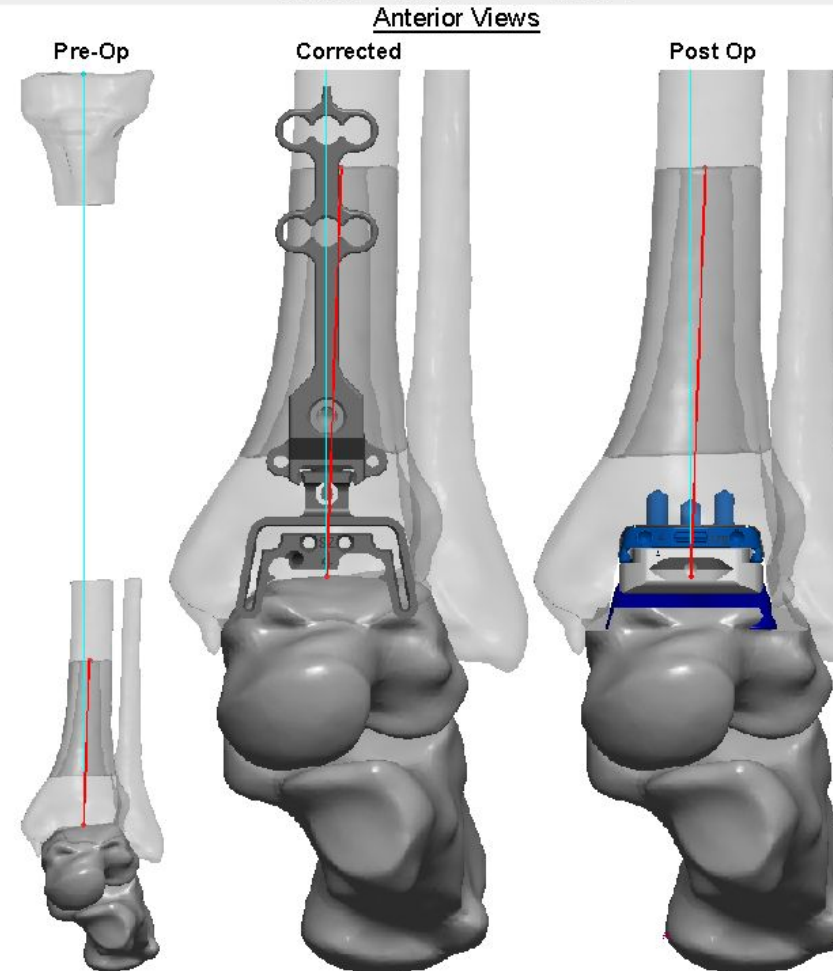
Procedure: plaatsen guide tibia



Intraoperatief= preoperatieve planning?



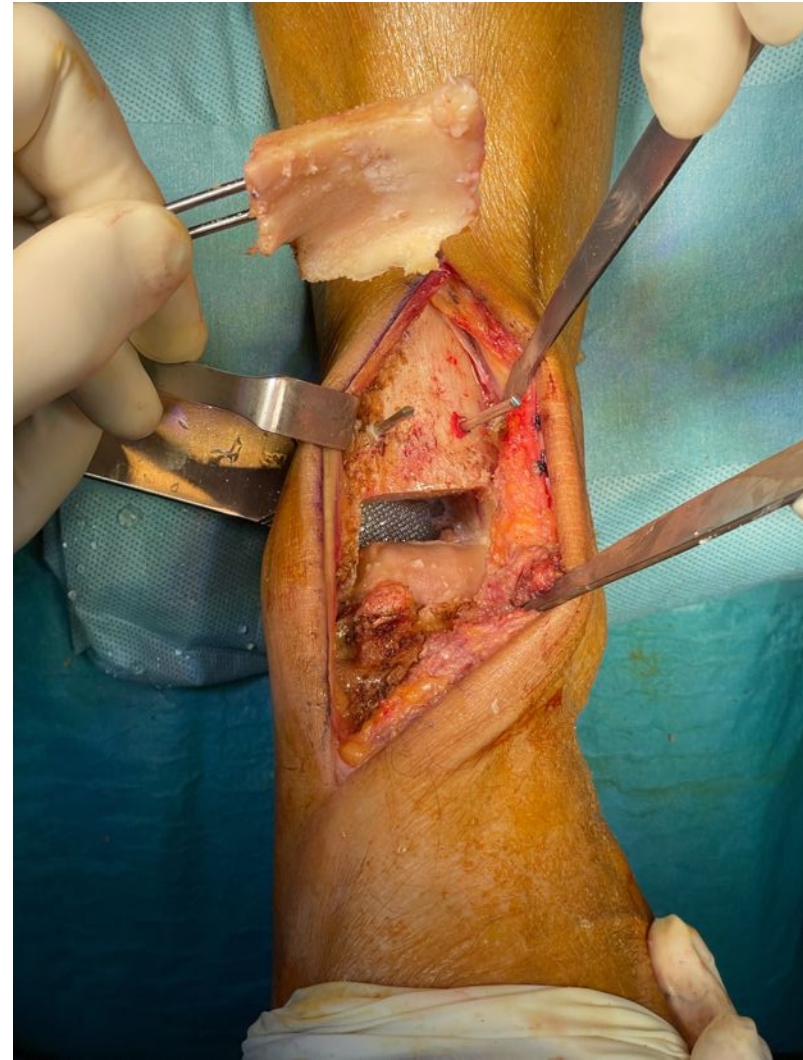
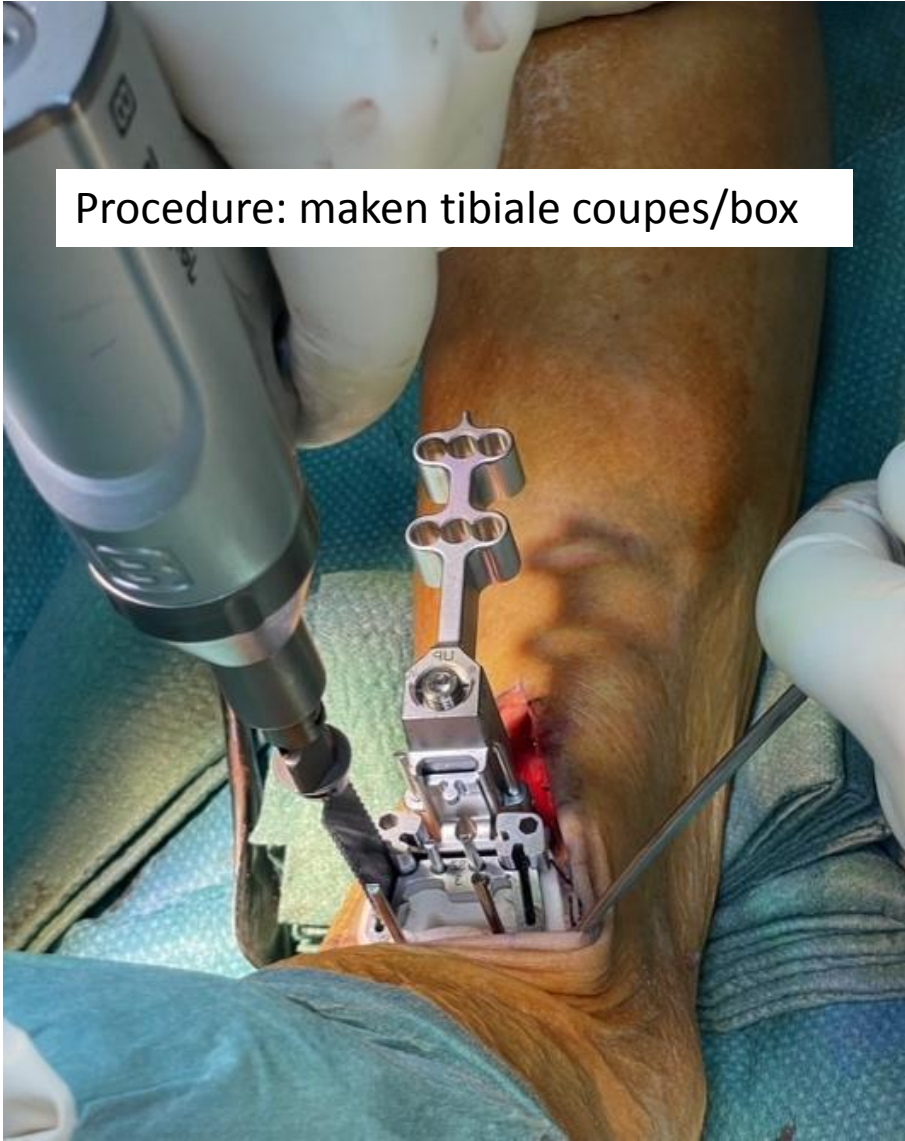
CASE73970 - Surgeon: Patrick Deprez
PDP19121967AFC - Left - Surgery: 06-Feb-2023
Tibia: INFINITY™ Size 4 Long
Talus: INFINITY™ Size 4



Tibia Implant Alignment
 • Tibia Mechanical Axis (Cyan line)
 • Tibia Anatomic axis (Red line)

Tibia Implant Alignment
 • Coronal Plane: Mechanical (long)
 • Sagittal Plane: Mechanical (long)
 Medial/Lateral placement is set:

Procedure: maken tibiale coupes/box

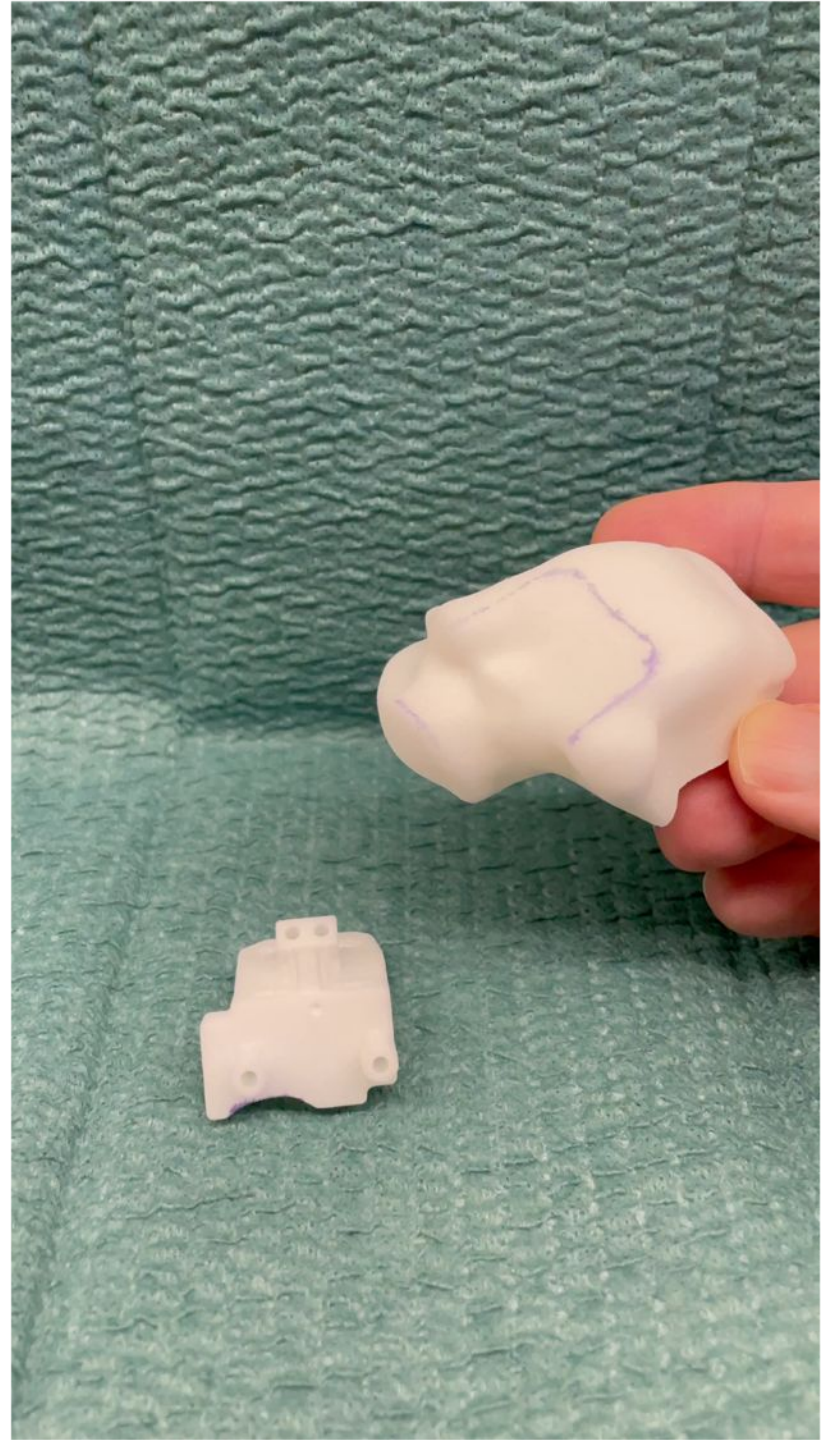
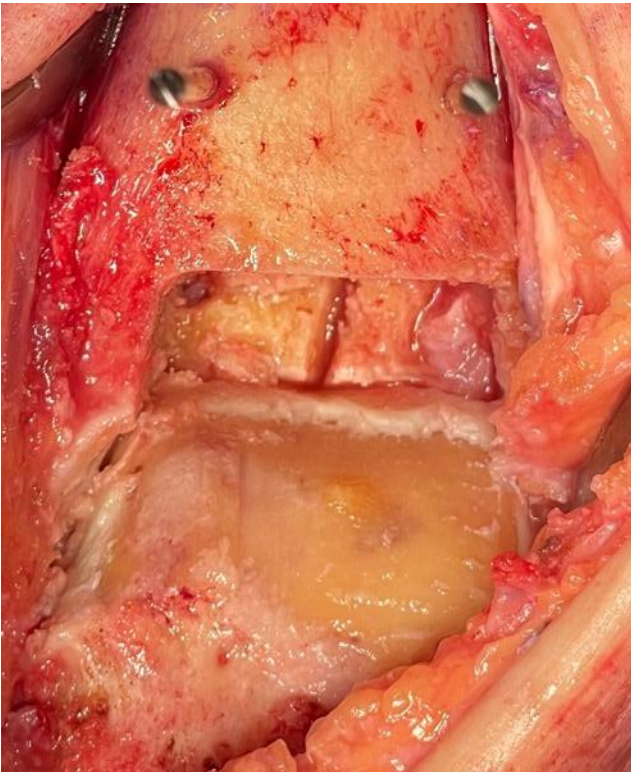


Procedure:

Check positie talusguide op botmodel

Vergelijk positie guide op botmodel en bot zelf

=Visuele en tactiele controle



Intraoperatief= preoperatieve planning?



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Summary

Tibial Alignment Method

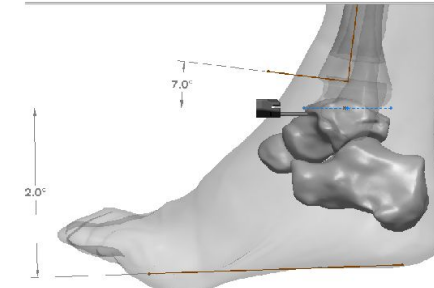
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- Match medial gutter corner.
- The cuts on the medial malleolus and fibula are minimized.
- Upsize for AP tibial coverage.
- Anterior/Posterior implant placement: Anterior edge

Talar Alignment Method

- Talus implant flexion is set to: Follow the curvature of the talar dome.
- Talus implant is selected to maximize bone coverage while minimizing implant overhang.
- Anterior direction is set by Gutter bisection.
- Resection depth: 0 mm less than the thickness of the talar implant.

PROPHECY™ Engineering Comments

- Per Dr. Deprez's request the following changes have been applied. The talus implant is changed to size 4 Long



Sagittal view of pre-op talus showing:

- Talus resection vs. tibia resection.
- Talus resection vs. bottom of foot line.

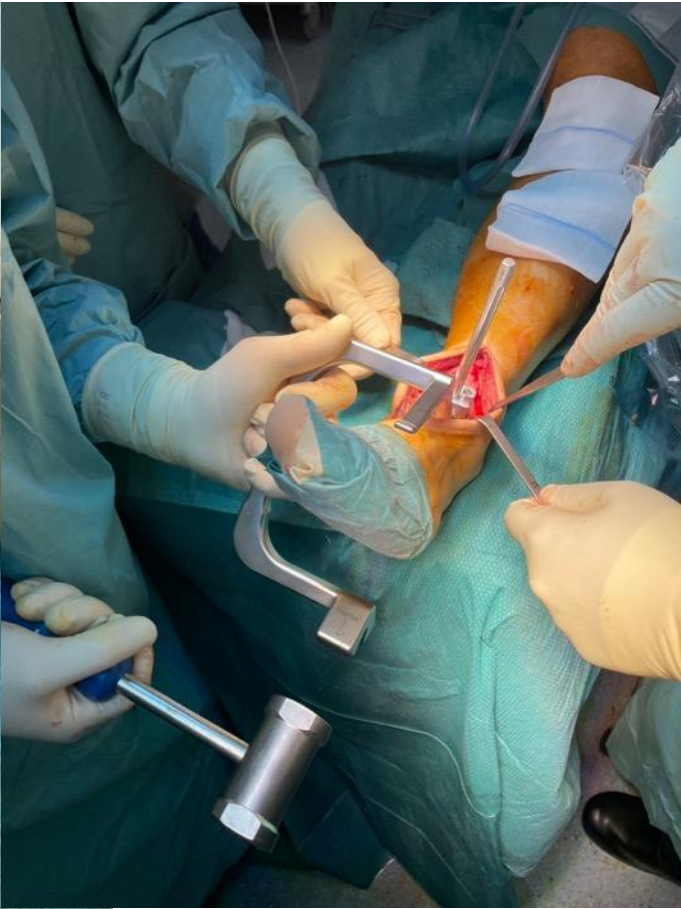
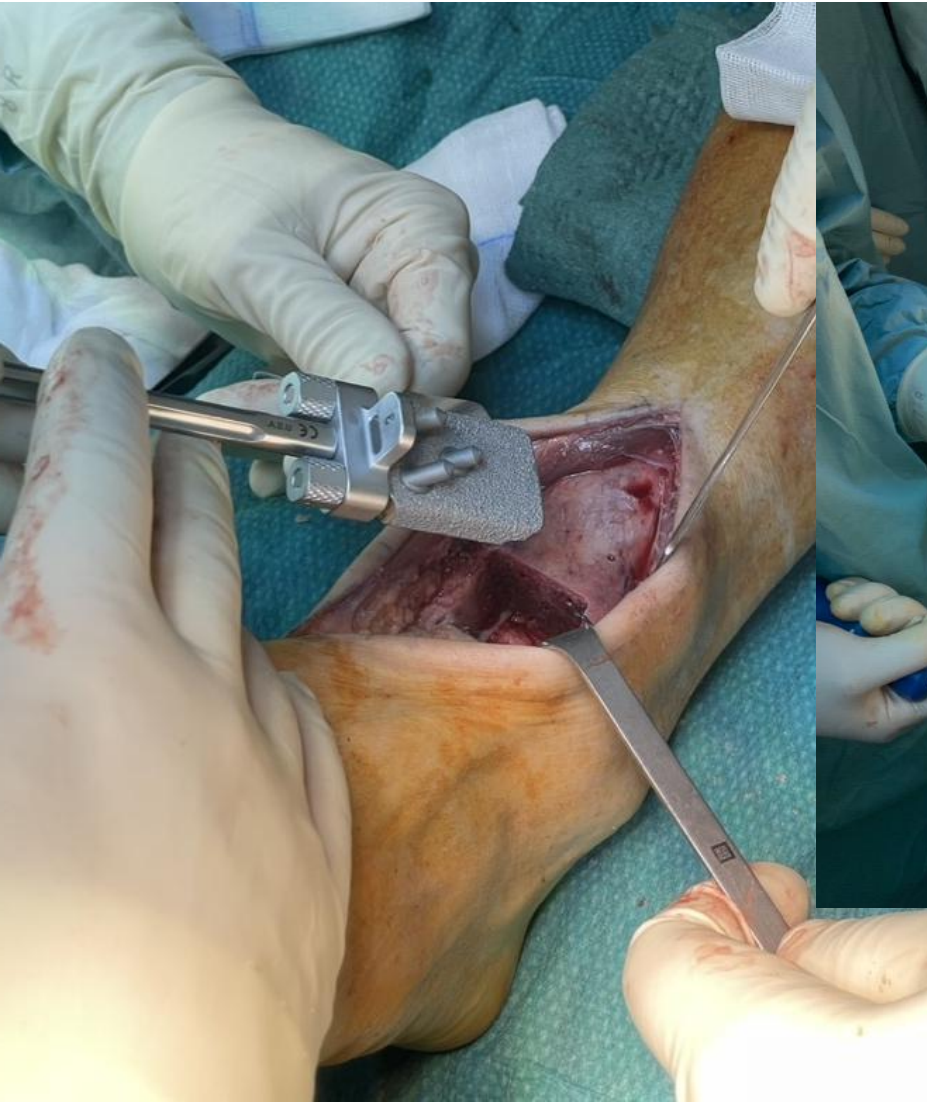
Procedure: maken talaire coupe

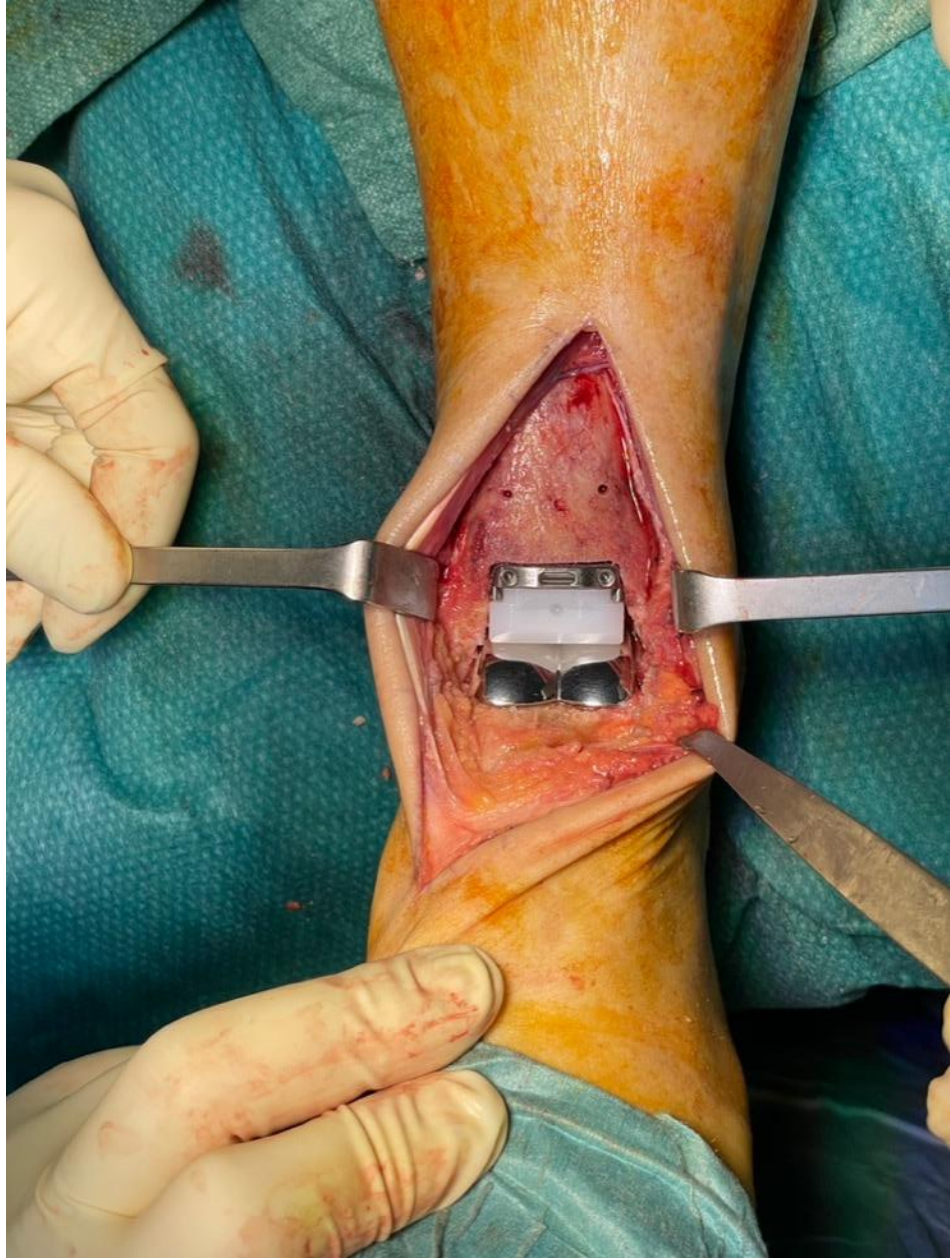




Proefprothese

Procedure: plaatsen definitieve prothese





Dag 1 postop:



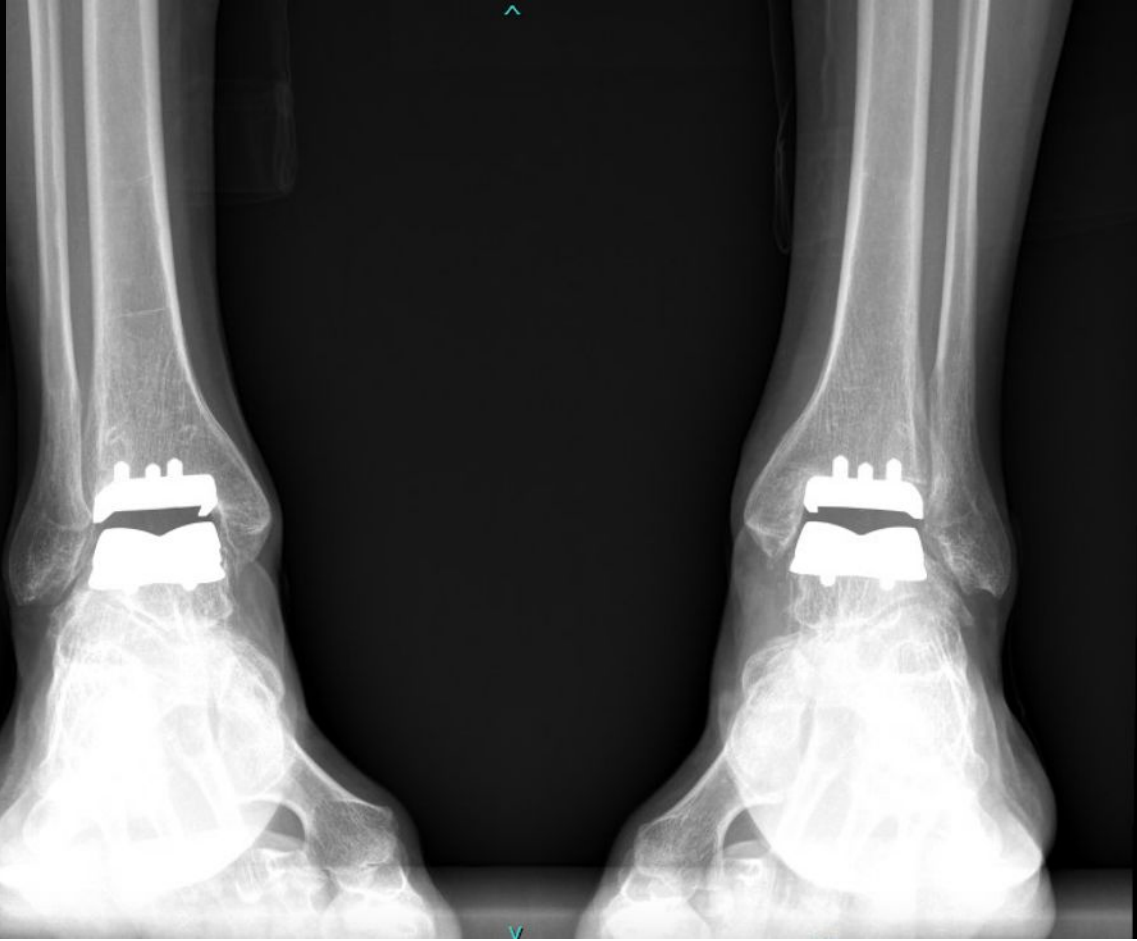
Postoperatief:
2 weken NWB onderbeengips
+ 4 w walkerboot



6 weken postop



10 maand na linker enkelprothese
24 maand na rechter enkelprothese



Patient-Reported Outcomes in Total Ankle Arthroplasty

Patient Specific Versus Standard Instrumentation

James Yau ,
Benjamin Emmerson, MBBS, MRCS,
Rajesh Kakwani, MBBS, MS, DNB, MRCS,
MCh, DipSportsMed,
Aradhyula N. Murty, MBBS, MS, and
David N. Townshend, MBBS

Foot & Ankle Specialist

OnlineFirst, June 23, 2023

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<https://doi.org/10.1177/19386400231179124>

In conclusion, we believe that this study supports the use of PSI to **decrease operative time**, **reduce intraoperative fluoroscopy**, and achieve **better postoperative alignment**. Patient-specific instrumentation provides an **acceptable prediction of implant sizes**. A significant difference in favor of PSI was only identified in the **walking/standing** domain of the MOXFQ. Longer term studies are required to demonstrate the effect on overall PROMs and implant survivorship.

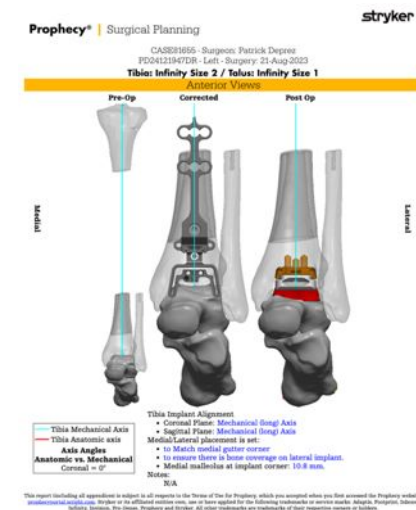
Enkelprothese met Psi<>zonder Psi (FU>1j):

- **Snellere** operatieve procedure
- Minder **röntgenstraalbelasting** voor OK-staff
- Beter postoperatief **alignement** > survival?
- MOXFQ-score: - pijn: =
 - **wandelen en staan**: significant beter
 - sociale interactie: =
- Verder opvolging en studies nodig

Toekomst:
Psi standaard bij
elke enkelprothese?

Conclusie:

- Niet iedereen kandidaat voor enkelprothese maar de indicaties nemen toe gezien betere prothesen, technieken en resultaten ivm fusie.
- Prothese is een waardig alternatief voor enkelfusie
- Prothese functioneel beter en pijnscores =fusie/prothese
- Patiënt specifieke instrumentatie geeft meer en betere controle op alignment, sneller procedure en minder röntgenstraalbelasting.



Dank U

