Basic principles of joint preserving surgery of the ankle

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KANTONSSPITAL LIESTAL
GEMEINSAM FÜR DIE GESUNDHEIT

Introduction

Stage adapted treatment of OA

1. Arthroscopy (+Debridement)
2. Arthrotomy + Debridement
3. Distraction
4. Osteochondral Ankle Joint Resurfacing
5. Corrective osteotomies
6. Joint replacement
7. Arthrodesis

Joint preserving

Non-preserving

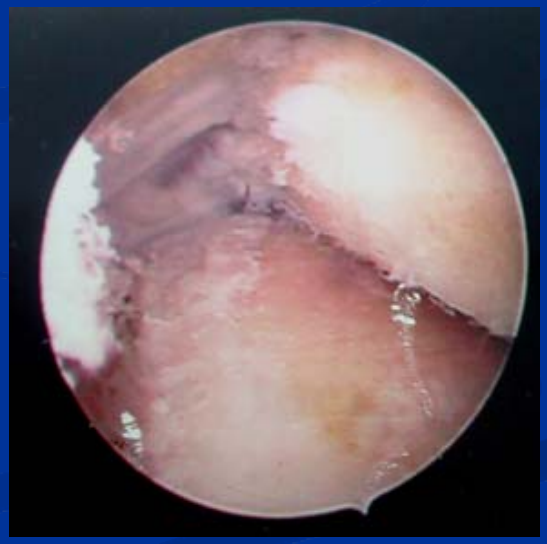
Debridement

Arthroscopy / Arthrotomy + Debridement

Satisfactory results in

early stages

osteochondral lesions < 1- 1.5cm



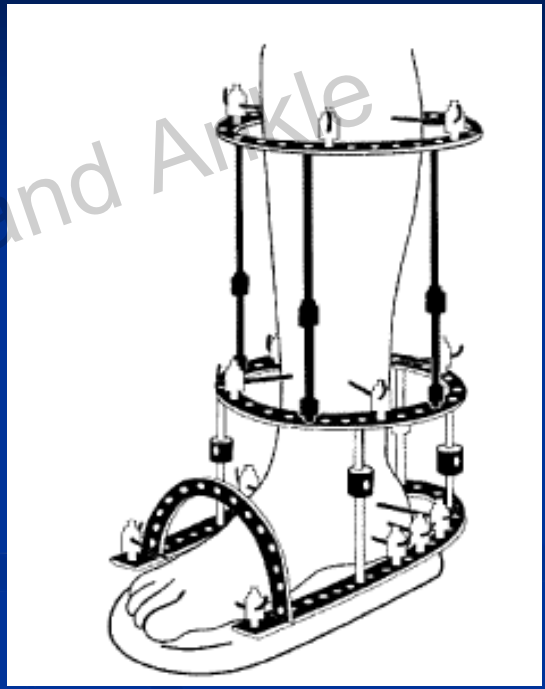
Chuckpaiwong B, Arthroscopy 2008
Cheng JC et al, Clin Orthop 1998
Amednola A et al, Arthroscopy 1996

Distraction (Arthrodiastasis)

Arthroscopy / Arthrotomy+Debridement

Distraction

3 mo external fixator



Marijnissen AC et al

Tellisi N, Foot Ankle Int. 2009
Acevedo JI, Foot Ankle Clin 4:409-30, 1999
Ploegmakers JJ et al, Osteoarthritis Cartilage 13:582-588, 2005
van Valburg AA, J Bone Joint Surg Br 77:720-725, 1995

Distraction

Arthroscopy / Arthrotomy+Debridement

Distraction

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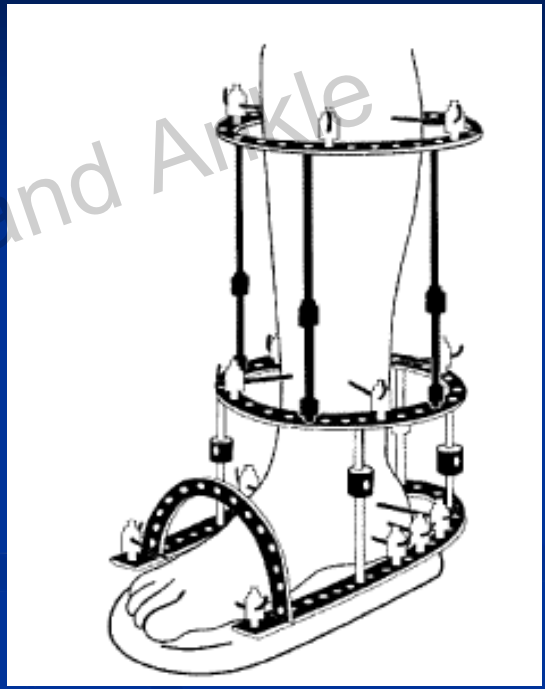


Marijnissen AC et al

Own Data

2001-2006: 5 Patients, Fixator removal after 10 (7-12) weeks

Only one of the patients reported on a functional improvement after 1 year

Osteochondral Resurfacing

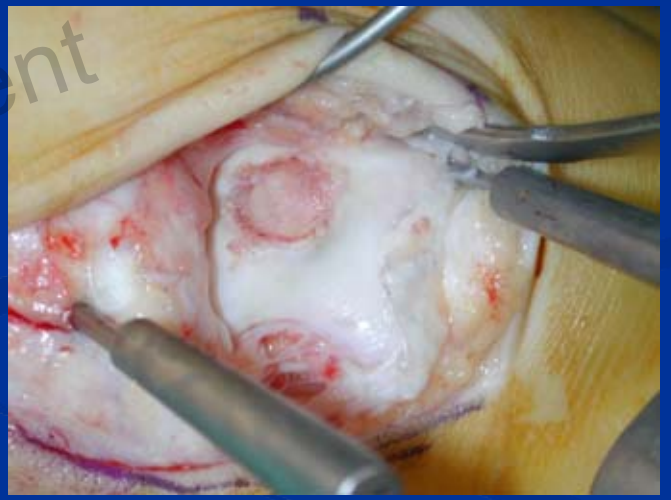
Arthroscopy / Arthrotomy+Debridement

Distraction

Osteochondral Ankle Joint Resurfacing

Autograft

OATS, Mosaicplasty (mainly OCD)



Hangody L:.Foot Ankle Clin 8(2):259-273, 2003.
Hangody L. Foot Ankle Int 18:628-634, 1997.
Sammarco GJ. Foot Ankle Int 23(8):693-698, 2002.

Osteochondral Resurfacing

Arthroscopy / Arthrotomy+Debridement

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Osteochondral Ankle Joint Resurfacing

Autograft

OATS, Mosaicplasty (mainly OCD)

Vascularized Autograft

M, 54, extended lesion medial talus

Osteochondral Resurfacing

Arthroscopy / Arthrotomy+Debridement

Distraction

Osteochondral Ankle Joint Resurfacing

Autograft

OATS, Mosaicplasty

Vascularized Autograft

M, 54, extended lesion medial talus

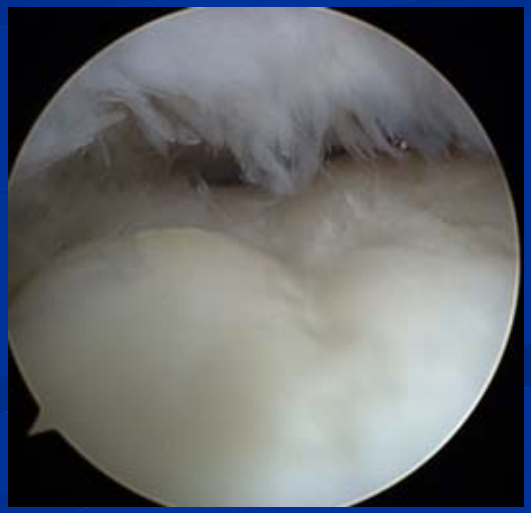
Osteochondral Resurfacing

Arthroscopy / Arthrotomy+Debridement

Distraction

Osteochondral Ankle Joint Resurfacing

- Autograft
  - OATS, Mosaicplasty
  - Vascularized Autograft
  - 2001-2007, n=12
  - 2 failure (conversion to TAR)
  - 10 complete incorporation



1 y post-OP follow up

Pierer et al, submitted

Osteochondral Resurfacing

- Arthroscopy / Arthrotomy+Debridement
- Distraction
- **Osteochondral Ankle Joint Resurfacing**
  - Autograft
    - OATS, Mosaicplasty
    - Vascularized Autograft
  - **Allograft**
    - **Limited experience**

Courtesy of Ned Amendola

Adams SB, JBJS Am 2011

Raikin SM, JBJS Am 2009

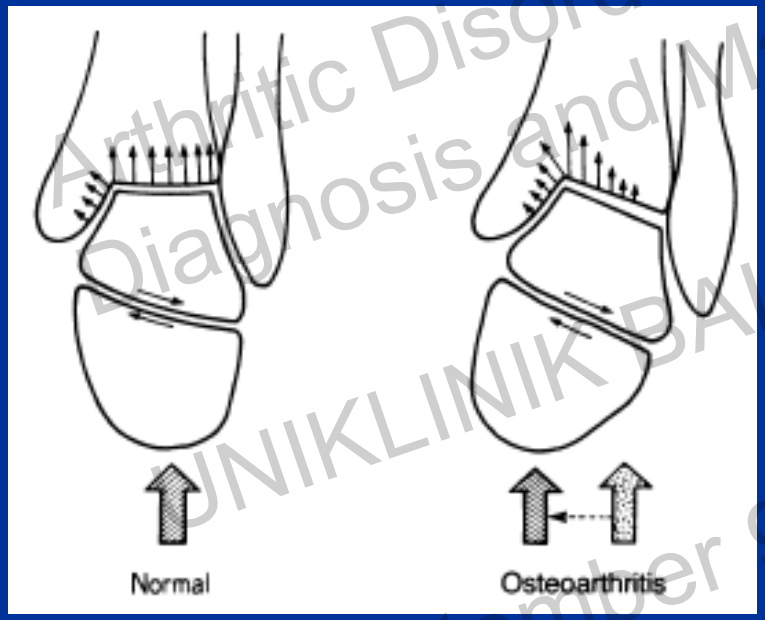
Tontz WL et al, Foot Ankle Clin 8(2):361-73, xi, 2003

63% of the patients with arthritis of the ankle joint have a malalignment

Valderrabano CORR 2009

What is the problem

1. Asymmetric joint load



Takakura et al, JBJS 95

What is the problem

1. **Asymmetric joint load**
2. **Force vector of the triceps surae**

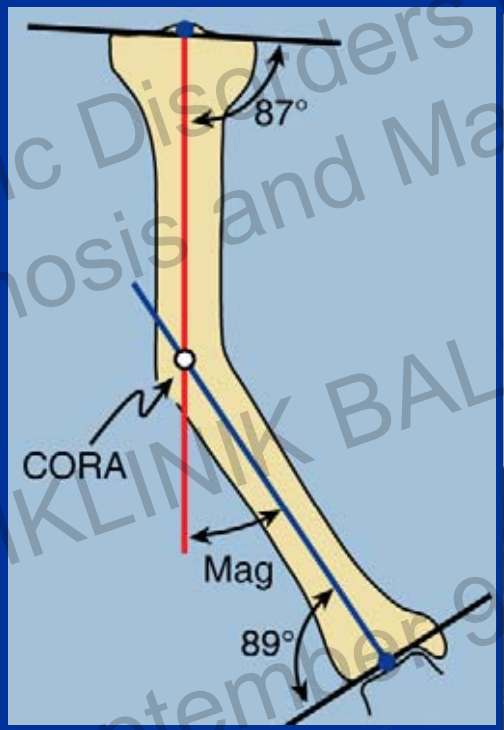
Aim of OT

- **Realignment of the hindfoot**
- **Normalization of the force vector of the triceps surae**

Nature of the deformity

Localisation

CORA (Centre of rotation of angulation)



Paley

Nature of the deformity

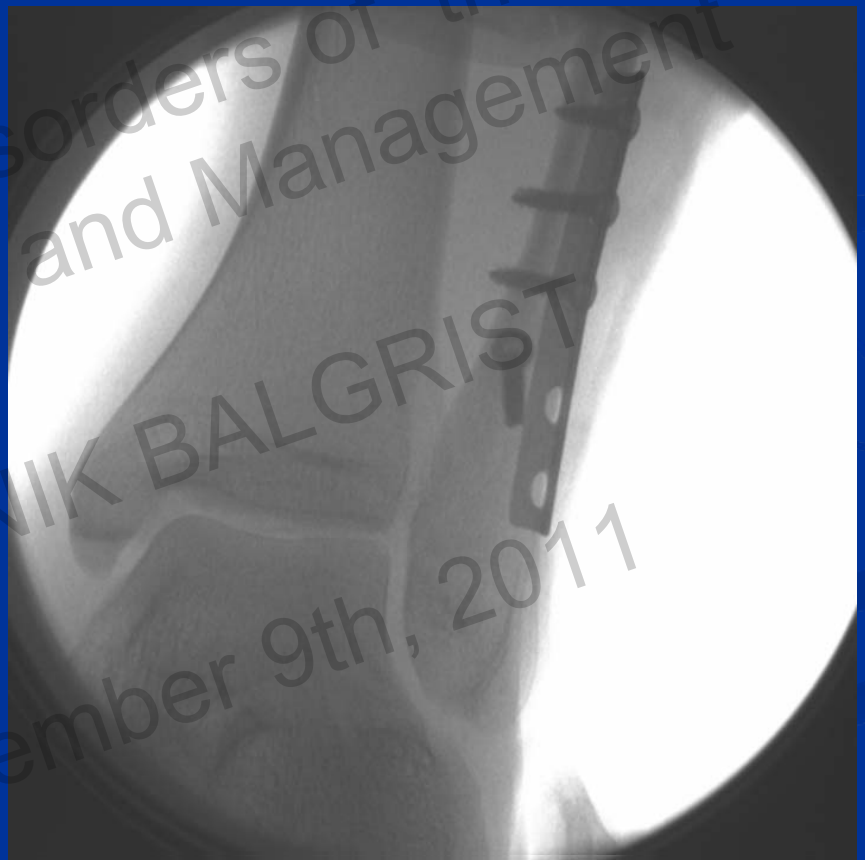
Instability pattern

single plane ⟺ ‘balance board instability’

Nature of the deformity

Instability pattern

single plane ⟷ ‘balance board instability’



Nature of the deformity

Instability pattern

single plane ⟷ ‘balance board instability’

Biomechanical background

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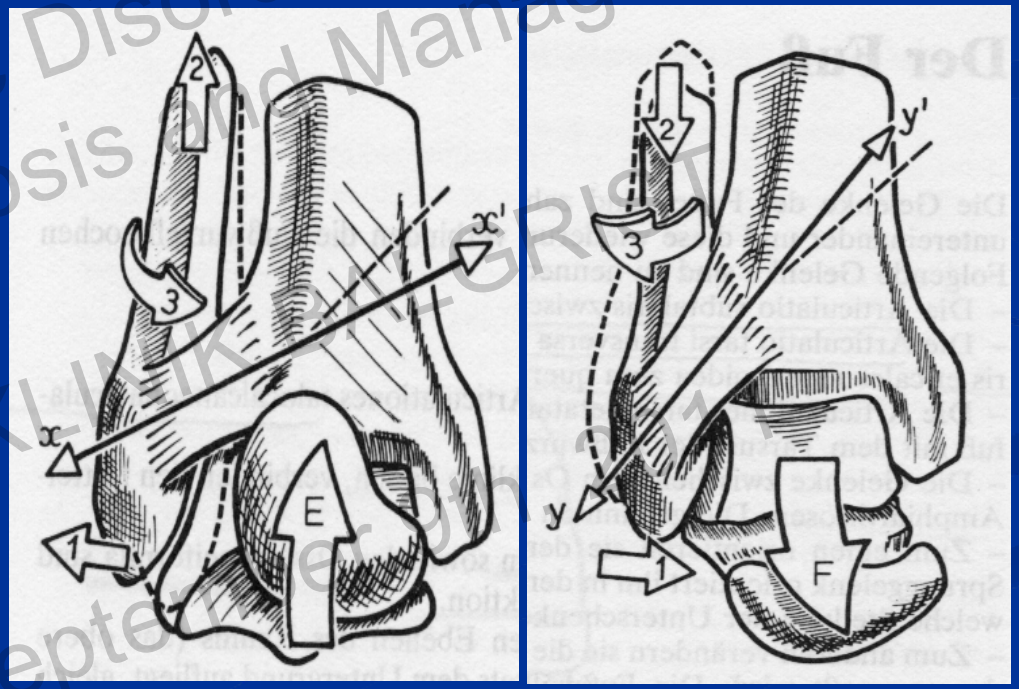
Biomechanical background

Anatomy

Highly congruent joint

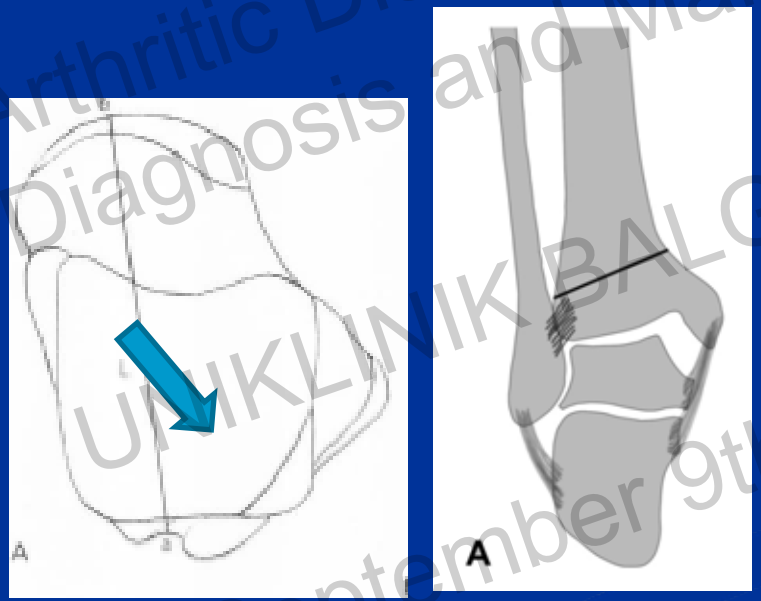
Close joint contact



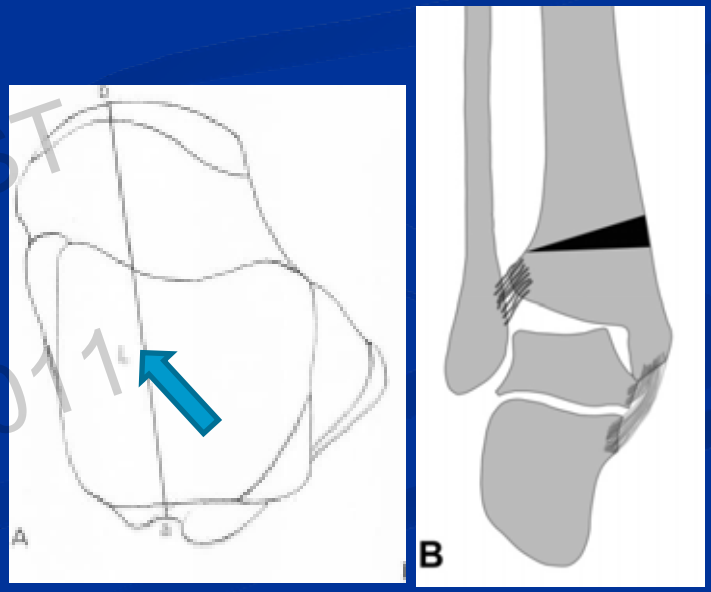
Biomechanical background

isolated changes of the angle of the distal tibia
→ paradox shift of the load transfer

Varus: posterolateral shift



Valgus: anteromedial shift



Biomechanical background

SMOT only comparable to HTO as long as joint congruency / ligament balancing is maintained

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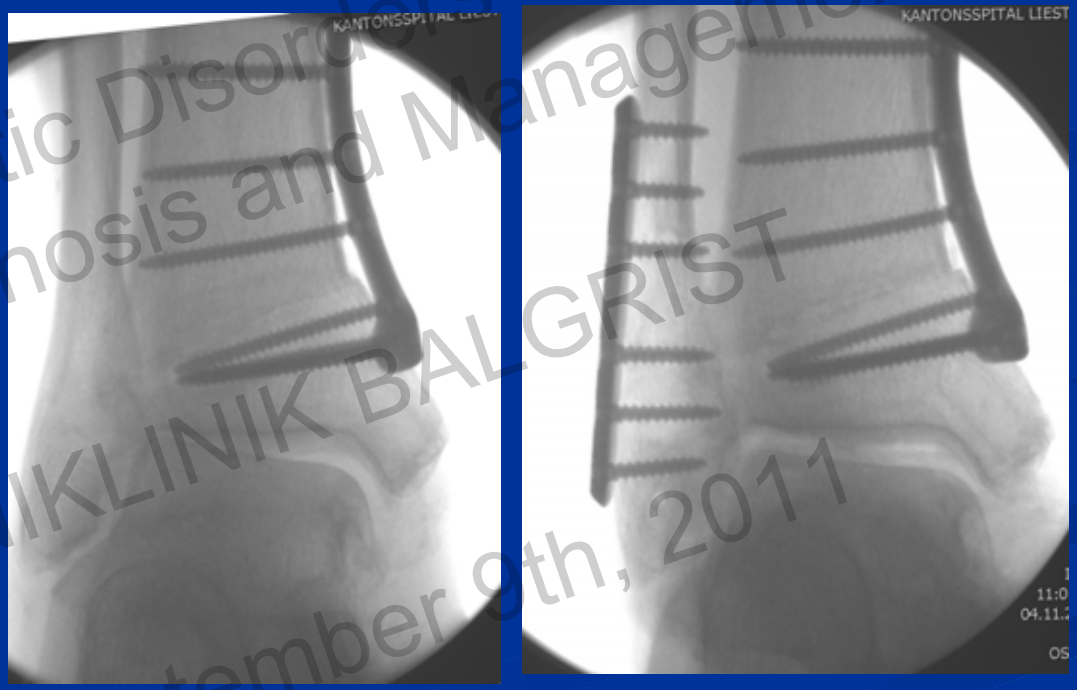
Biomechanical background

Failed SMOT due to joint incongruency

Biomechanical background

Isolated change of the distal tibial articular surface angle failed to restore talar positioning

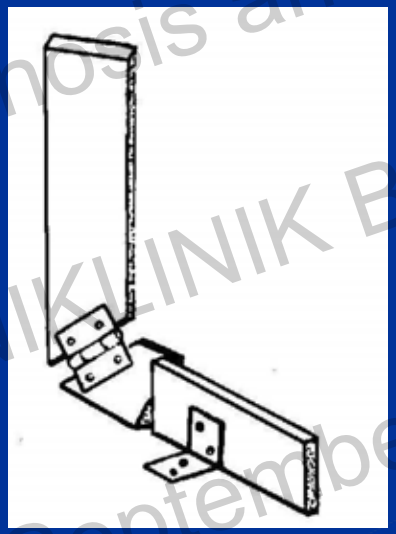


Biomechanical background

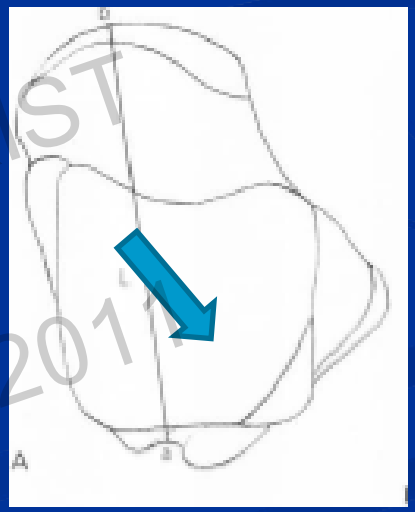
Changes of load distribution in coronal plane deformity

Shift of the load transfer occurs in two directions:

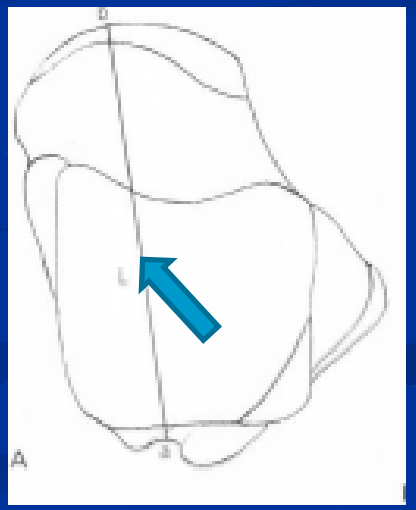
- **medio-laterally**
- **antero-posteriorly**



Varus

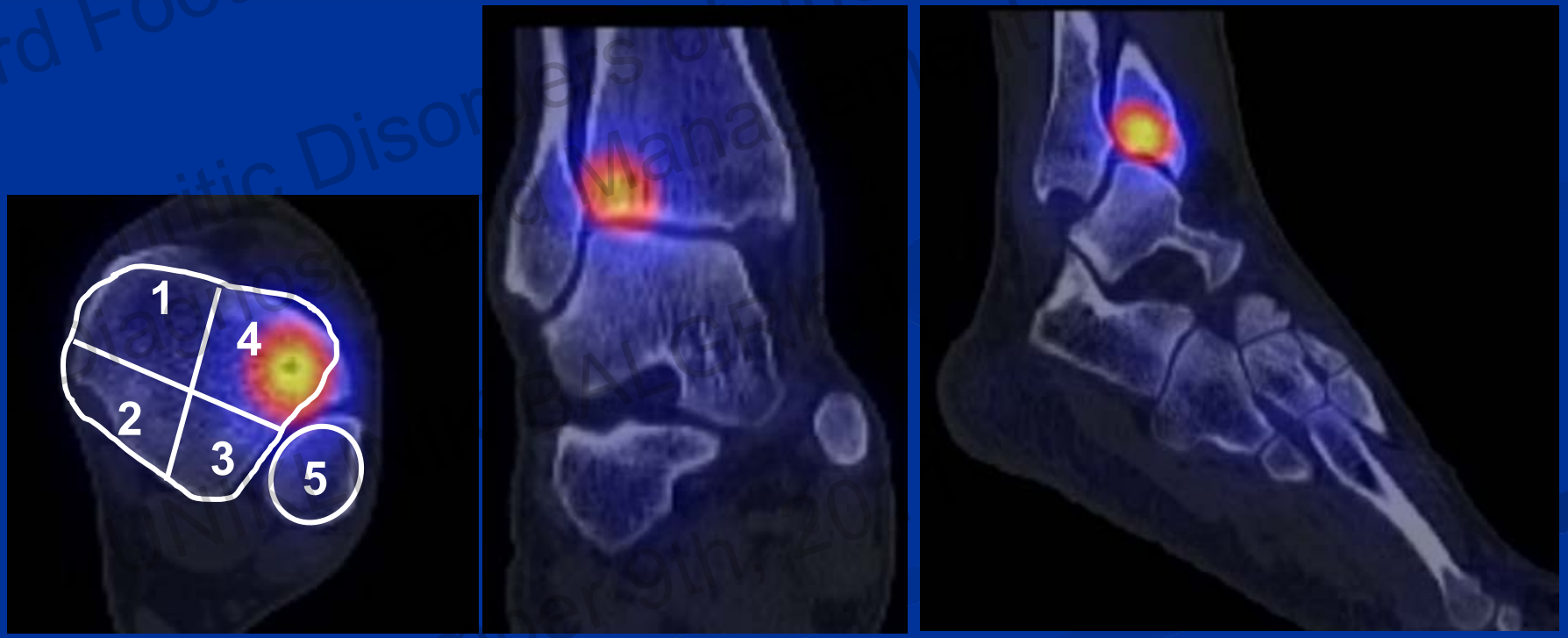


Valgus



Biomechanical background

Usefulness of the SPECT-Ct scan to preoperatively assess the area to be unloaded



JOR 2009

Technique SMOT

In valgus deformity: medial closing wedge

Pre-OP

6 mo post OP

3 y post OP

Regeneration!

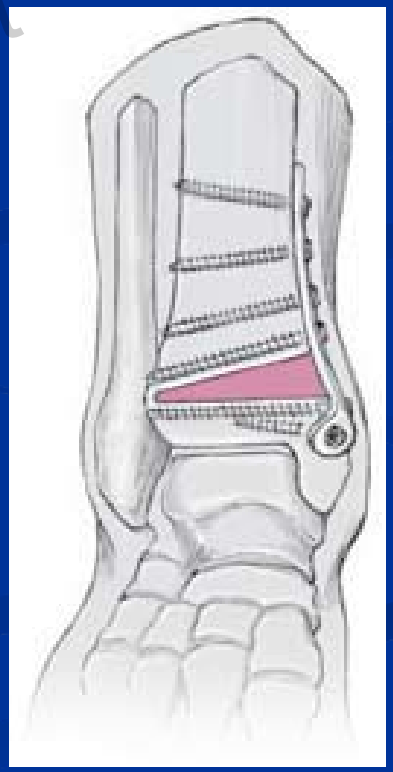
Technique

Varus Deformity

Medial opening wedge OT

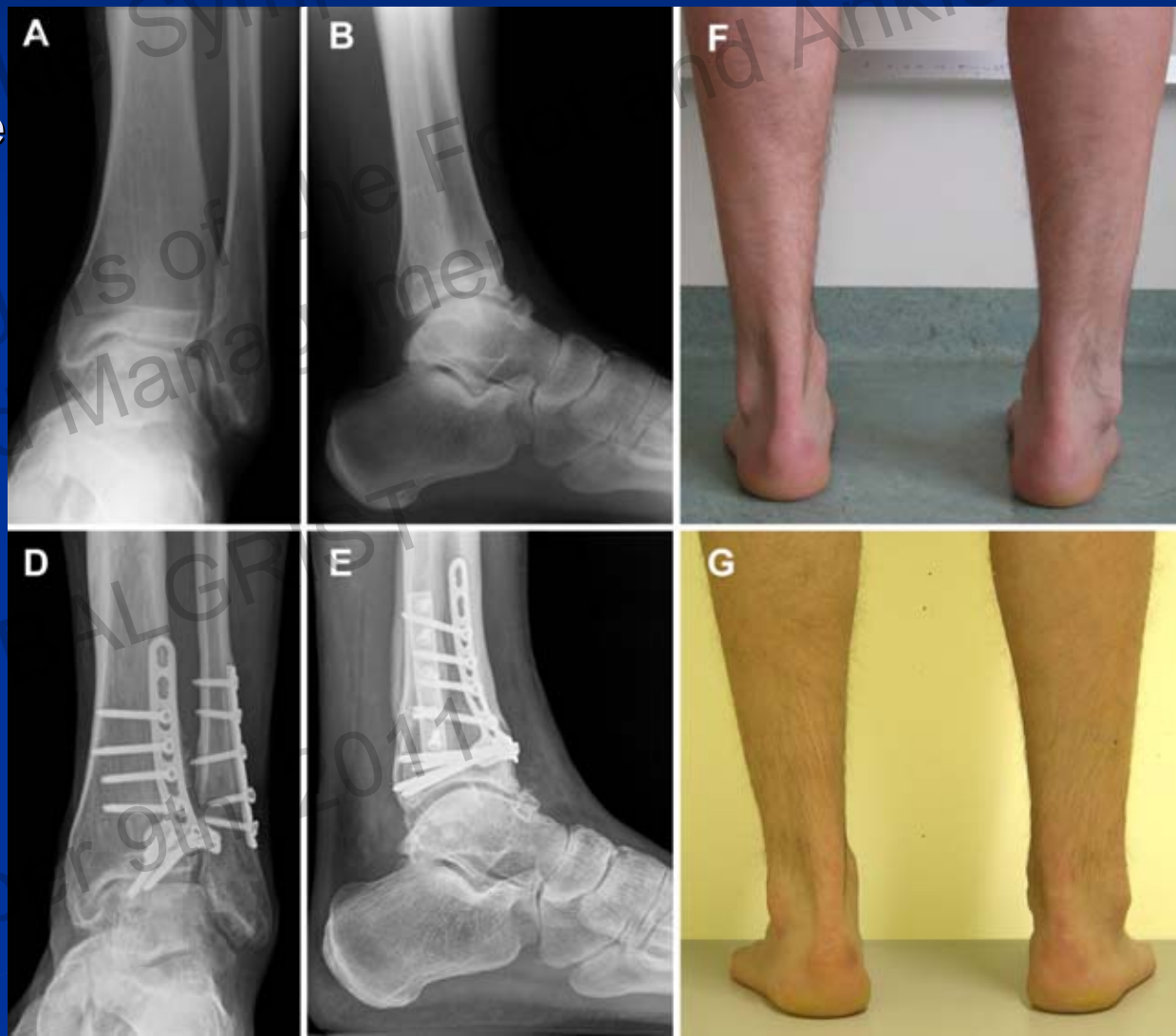
Pre-OP

12 mo post OP



Technique

- **Varus Deformity**
- **Lateral closing wedge**



Technique

- **Varus Deformity**
  - **Medial opening wedge**
  - **Fibula OT**

Technique

Anterior extrusion

Anterior opening wedge OT

Pre-OP

12 mo post OP

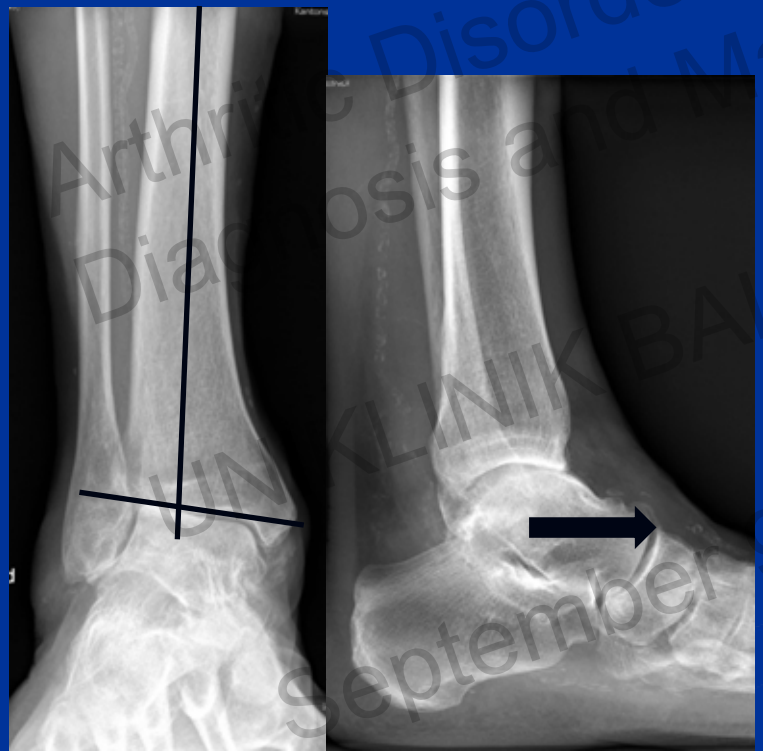
Surgical technique

1. **SMOT Tibia, Aim: overcorrection of 3-5 deg**

Surgical technique

1. SMOT Tibia, Aim: overcorrection of 3-5 deg

   Biplanar OT, if anterior extrusion



Surgical technique

1. SMOT Tibia, Aim: overcorrection of 3-5 deg

   Biplanar OT, if anterior extrusion

Surgical technique

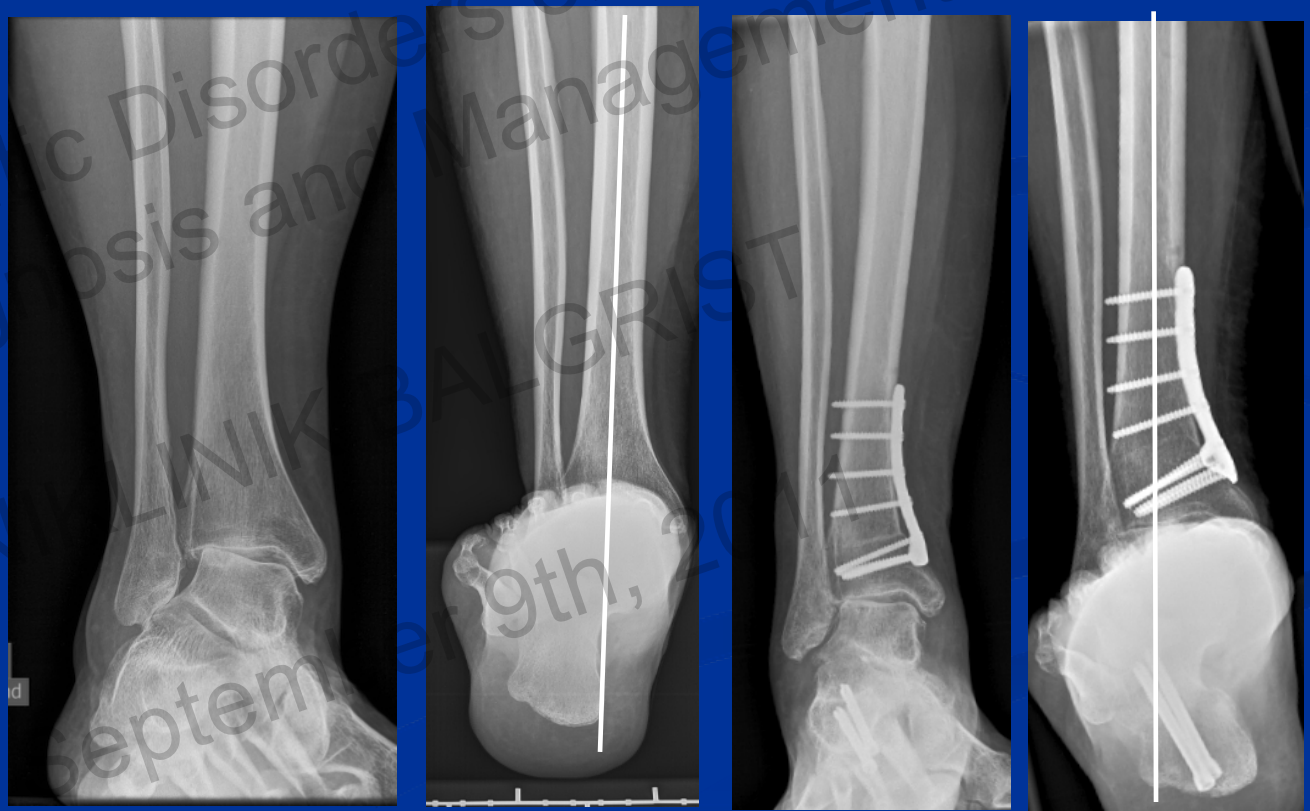
2. Fibular OT

Surgical technique

3. Calcaneus OT: if remaining deformity

Surgical technique

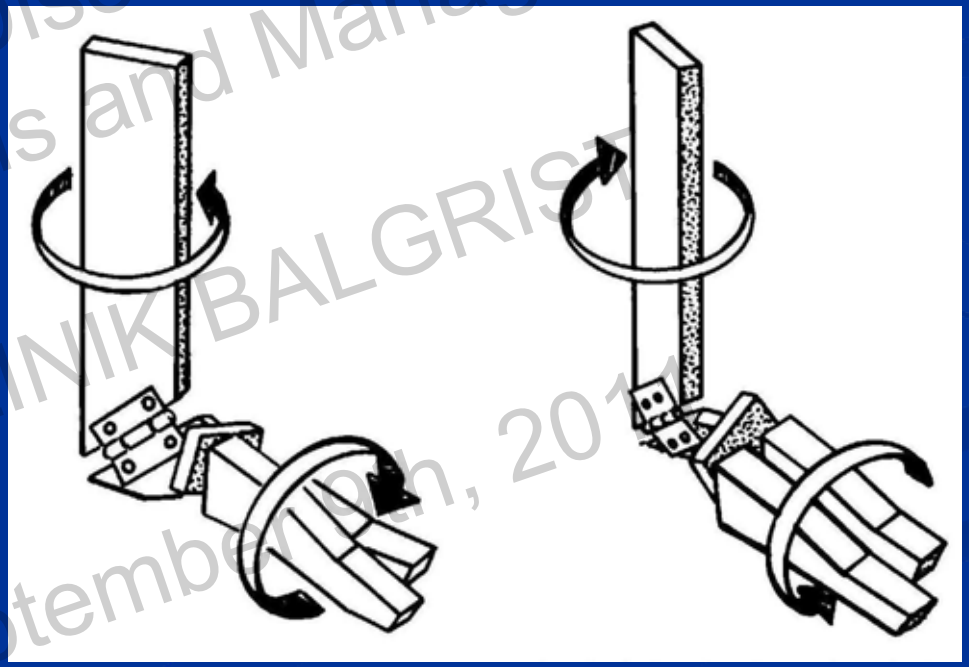
3. Ligament reconstruction



Surgical technique

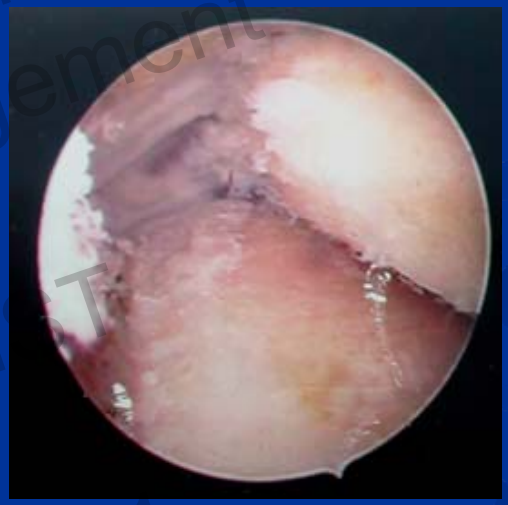
4. **Midfoot OT / AD in flatfoot deformity**

   Midfoot OT in (cavo-) varus feet



Conclusion

- **Debridement / Microfracturing helpful in early stages**



Conclusion

- **Debridement / Microfracturing helpful in early stages**
- **Osteochondral resurfacing for extended lesions**
  - **Only preliminary reports available**

Conclusion

- **Debridement / Microfracturing helpful in early stages**
- **Osteochondral resurfacing for extended lesions**
- **Alignment surgery for asymmetric OA**
  - **May slow down the degenerative process**
  - **2 Step approach: secondary TAR / Fusion**
  - **Corrected alignment: needed for TAR or fusion**

Pre-OP

6 mo post OP

3 y post OP

Thank you!

Basel