Valgus Deformity of the Arthritic Ankle

Specific Problems for Total Ankle Replacement

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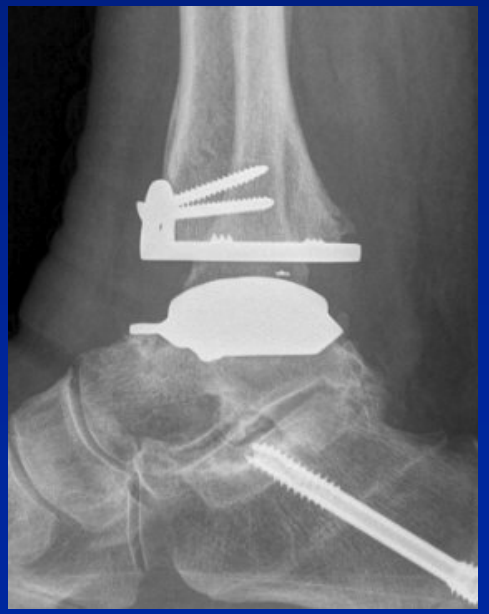
Valgus Deformity

probably YES ?

Is TAR feasible ?

- proper realignment of the ankle
  - → tensioning of ligaments
  - → osteotomy of calcaneus
- appropriate instrinsic stability
  - → implant design
  - → implant positioning

2 years



TAR – Valgus Deformity

Valgus Deformity

probably NOT ?

Is TAR feasible ?

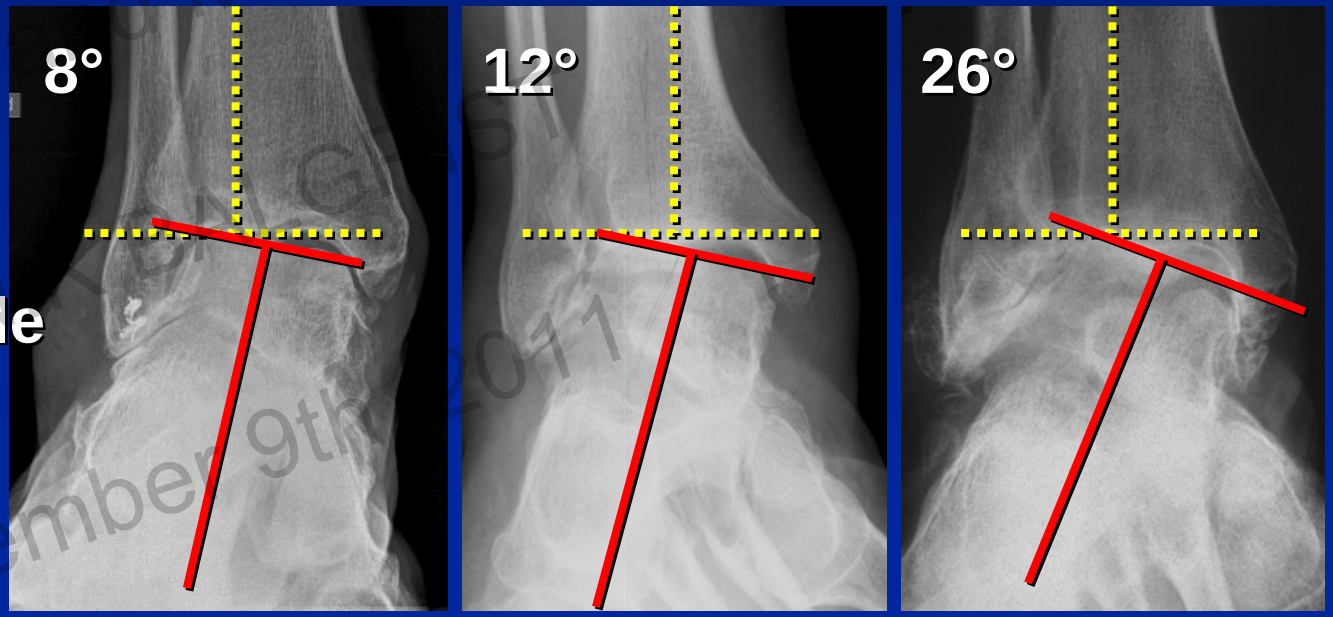
- Valgus malunion after fusion
- Medial ankle instability

Valgus Deformity

be careful !

Limitations

- valgus < 5°
  → possible
- valgus 6 – 10°
  → at risk
- valgus > 11°
  → not possible

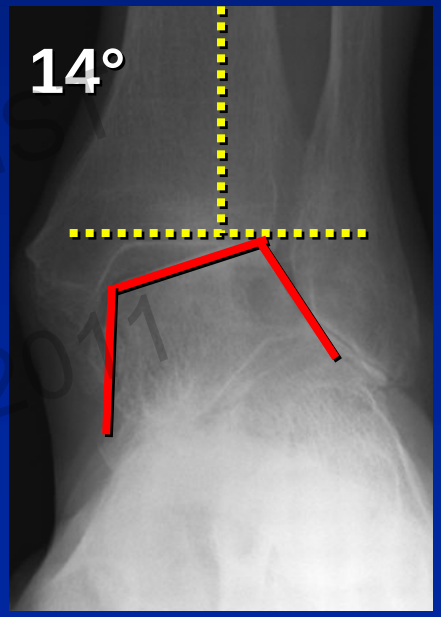


P.A. Wood, 2004

Valgus Deformity can be handled !

Limitations

- valgus < 10°
  → correct with implantation
- valgus 11 – 20°
  → at risk
- valgus > 20°
  → probably not possible



H. Kofoed, 2004

TAR – Valgus Deformity

It is Fact …

n = 829

Talar Malpositioning

- Varus
  → 159 ankles (19%)
- **Valgus**
  → **112 ankles (14%)**

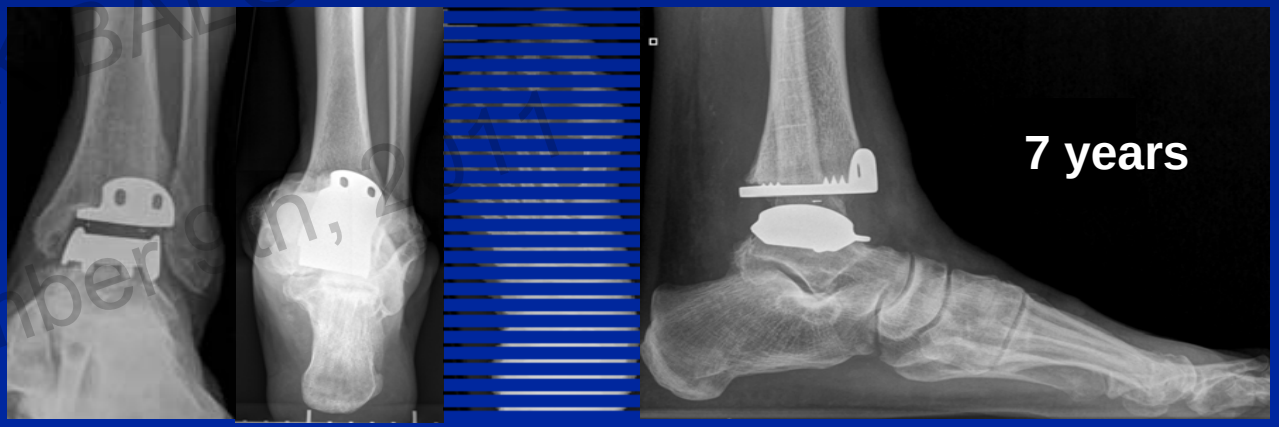
TAR – Valgus Deformity

It is Fact …

n = 829

TAR

- Without any other procedure
  → 222 ankles (65%)



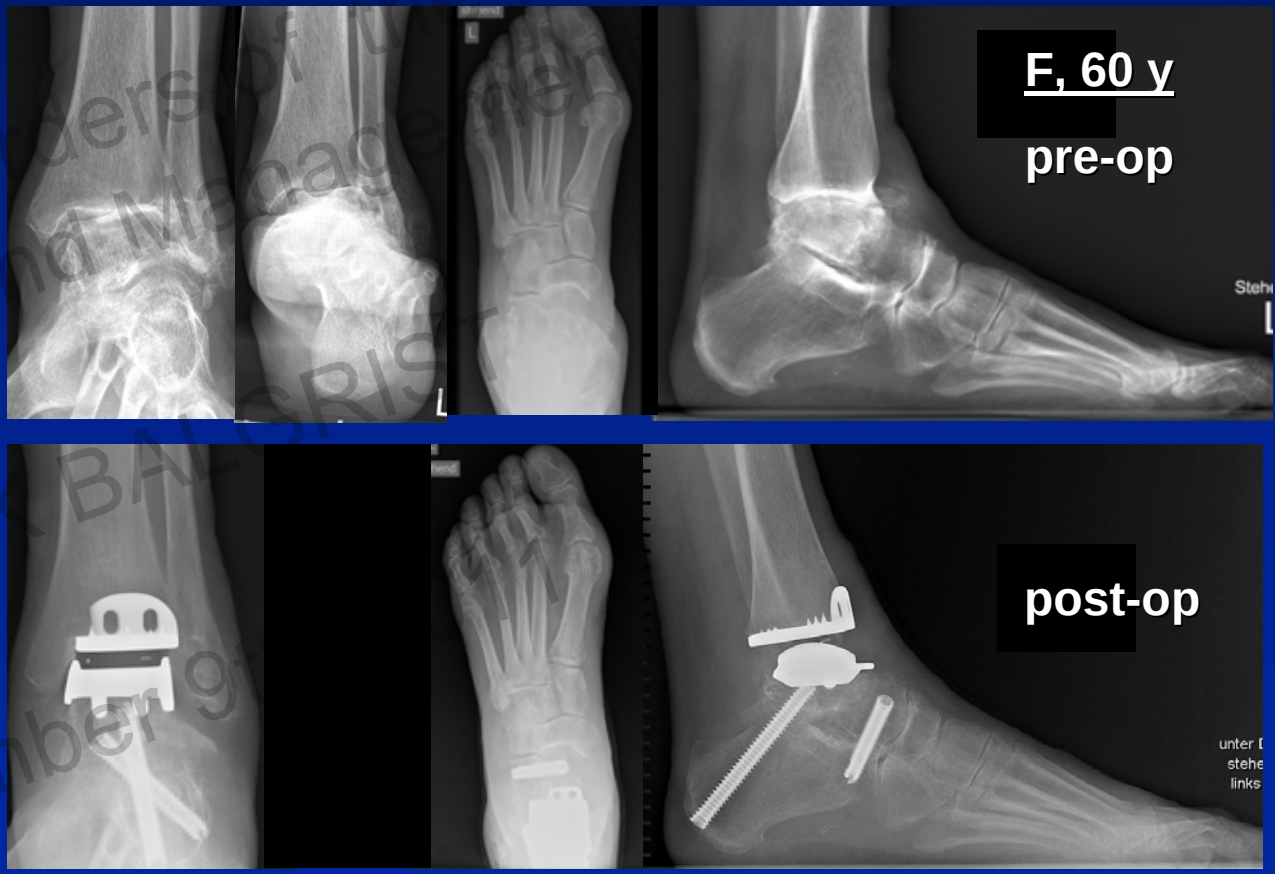
TAR – Valgus Deformity

It is Fact …

n=829

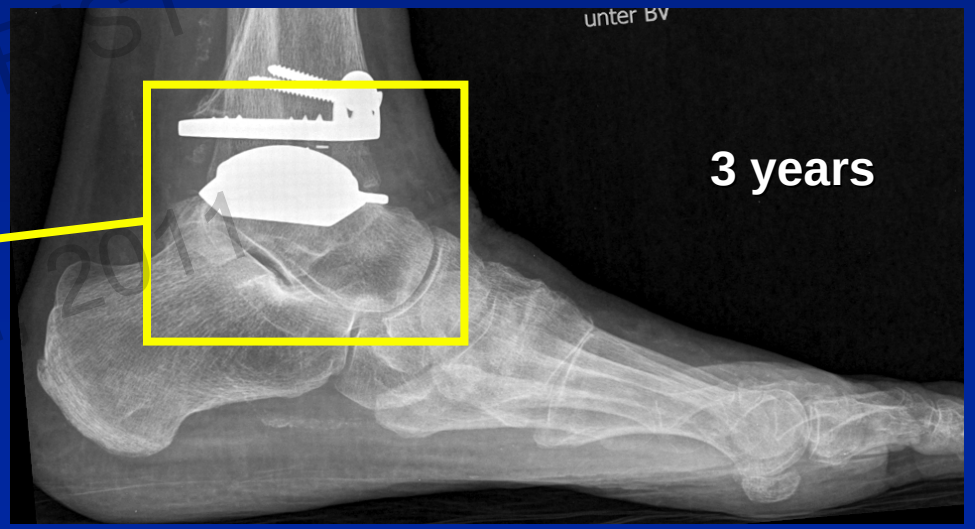
TAR

- Without any other procedure
  → 222 ankles (65%)
- **With other procedures**
  → 118 ankles (35%)



TAR – Valgus Deformity

What are the Issues ?



ty

ssues ?

exorotated

M, 67 y

pre-op

3 years

TAR – Valgus Deformity

My Approach

Step-by-Step Approach

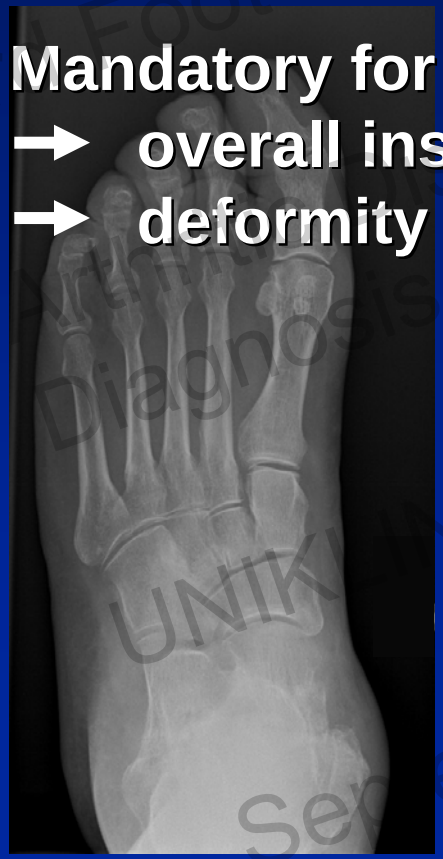
- Identification of the problem
  - → understanding the case
- Determining of treatment modalities
  - → associated surgeries
- Total ankle replacement
  - → continuous intraoperative assessment
  - → addressing all problems

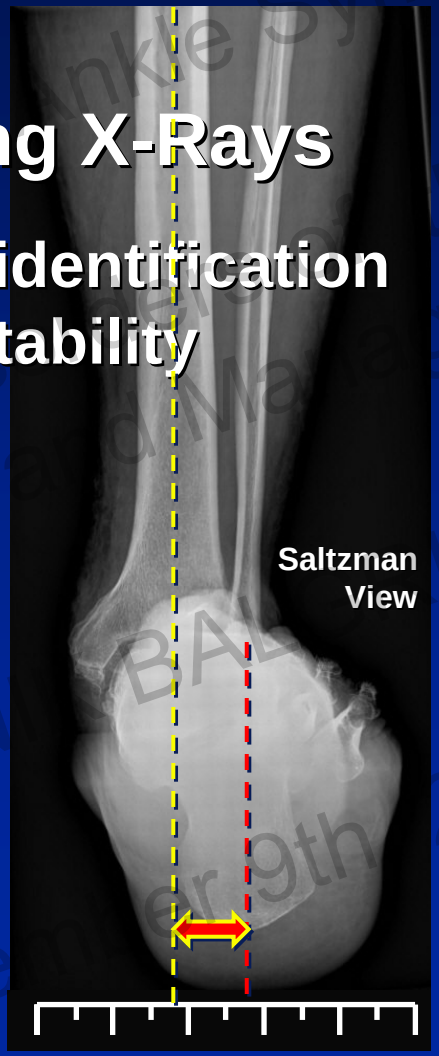
TAR – Valgus Deformity

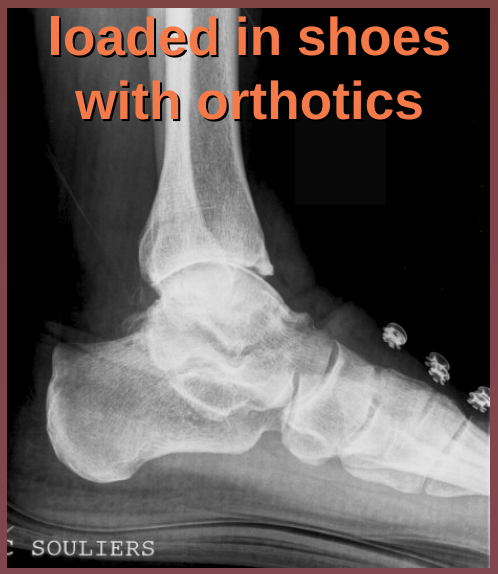
Diagnostics

Weigth-Bearing X-Rays

- Mandatory for identification
  - → overall instability
  - → deformity



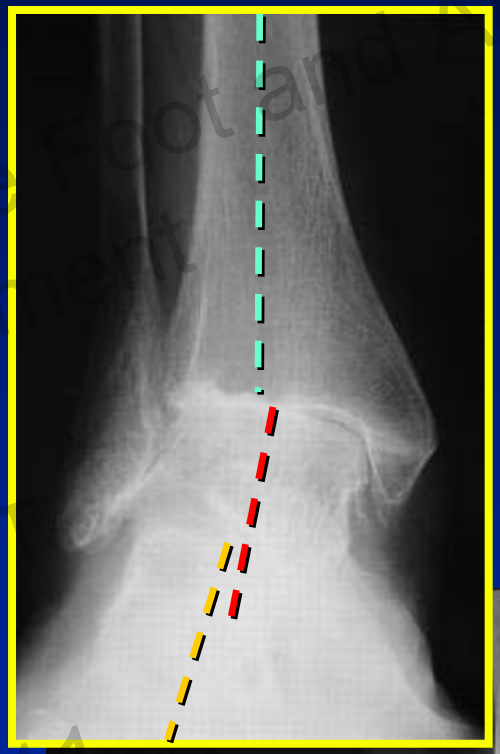




Valgus Deformity

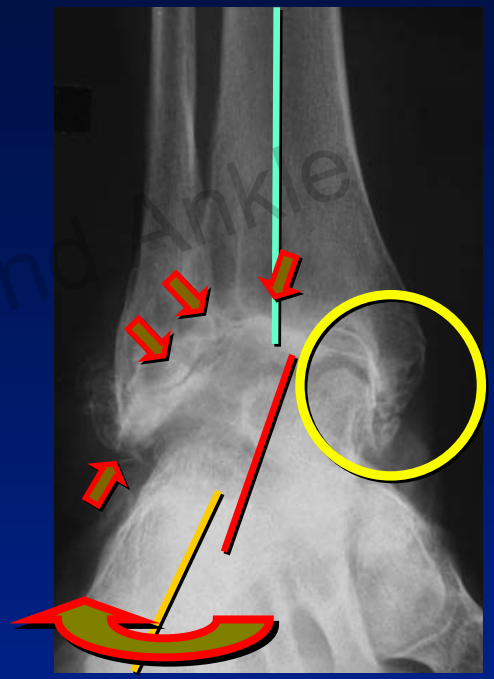
What are the Issues ?

- incompetence of ligaments
  - → medial ankle
  - → Spring ligament complex
- tendon dysfunction
  - → posterior tibial muscle



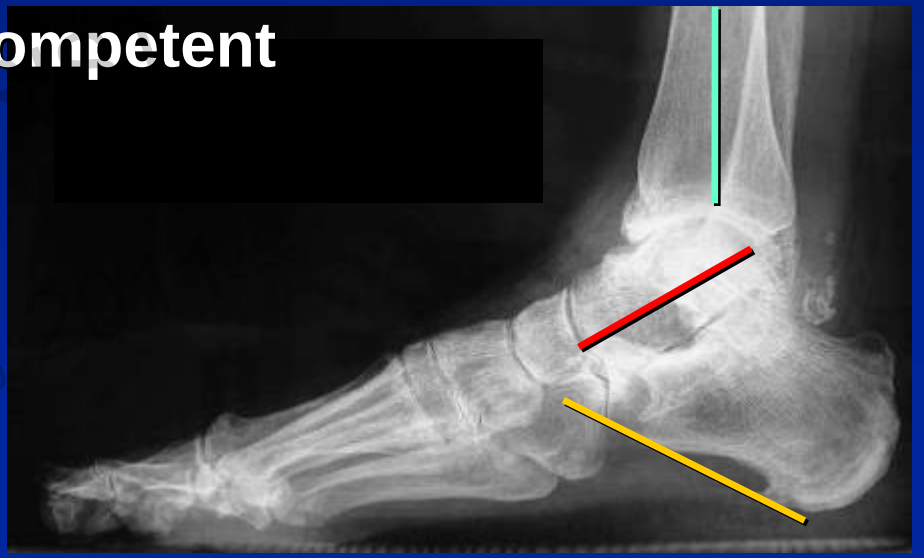
TAR – Valgus Deformity

Case Report



Valgus Ankle

- Collapse of the ankle joint complex
  → impaction of lateral pilon tibiale
- *But:*
  → medial ankle ligament competent
  → *no* break-down of arch!



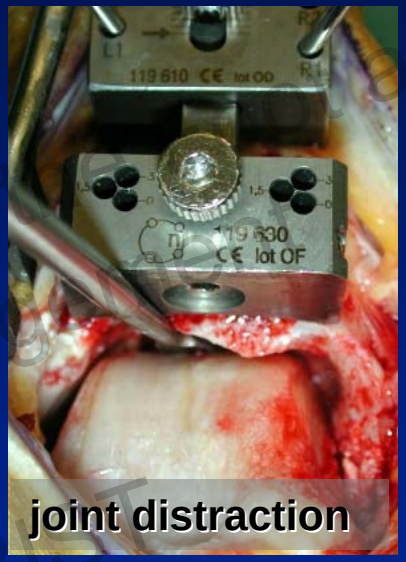
f, 61 y

- multiple ankle sprains
  → conservative treatment
- pain

TAR – Valgus Deformity

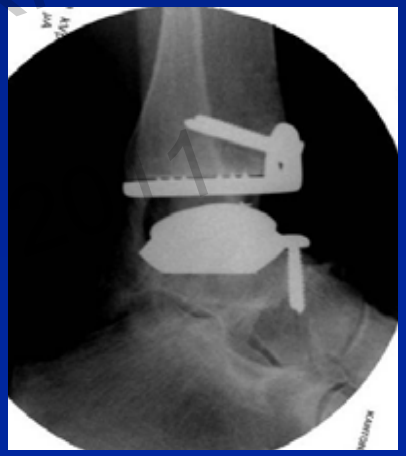
Case Report

joint distraction



joint distraction

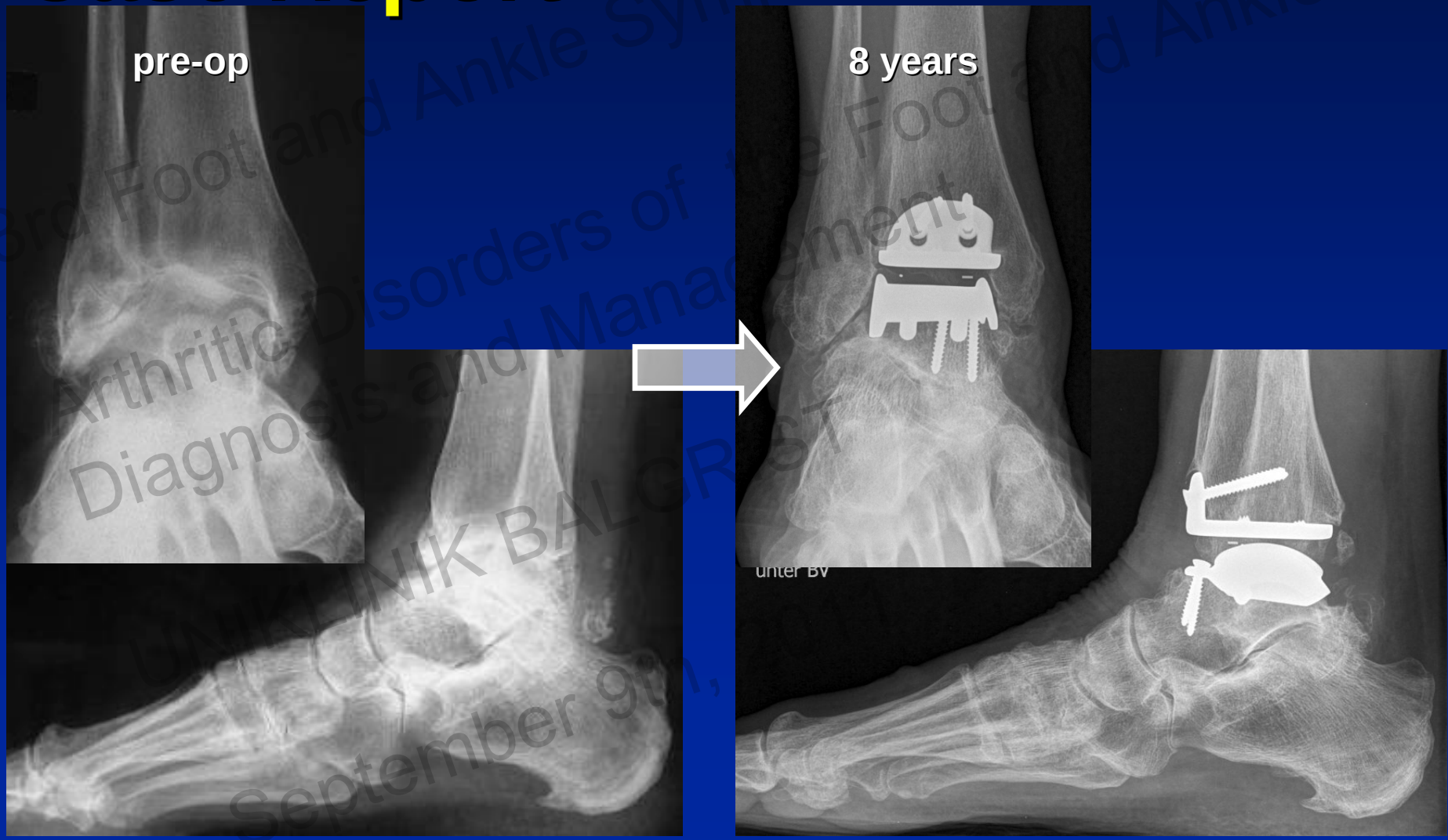
no joint distraction



joint distraction

TAR – Valgus Deformity

Case Report

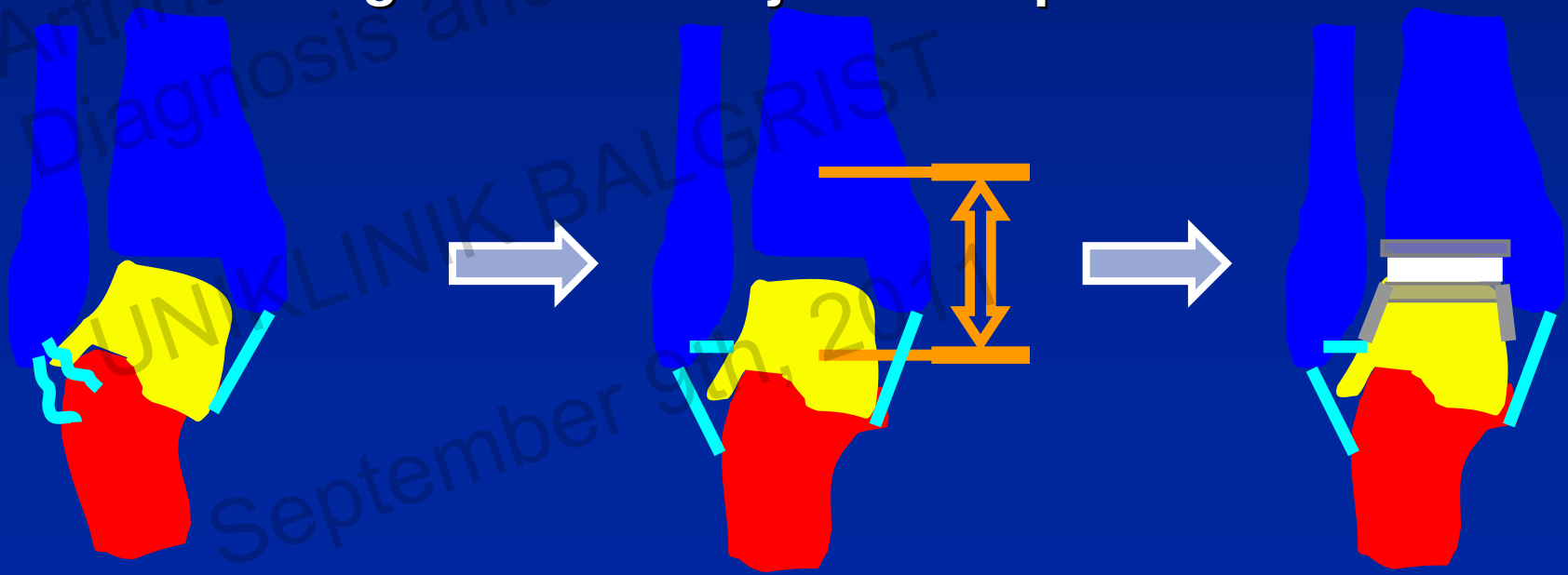


TAR – Valgus Deformity

Hypothesis 1

Possible Explanation

- Increasing height of worn-out ankle
  - → tightening of the ligaments
  - → stabilizing whole ankle joint complex



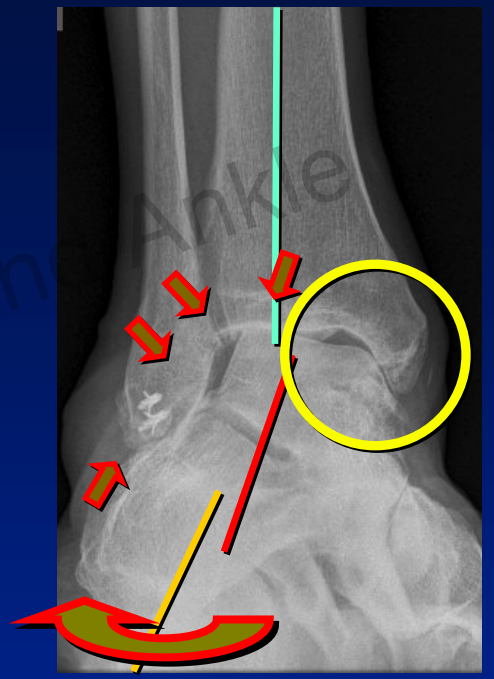
Hypothesis 2

Possible Explanation

- Parallelism at primary and secondary interface
  - → restoring of intrinsic stability
  - → frontal plane stability

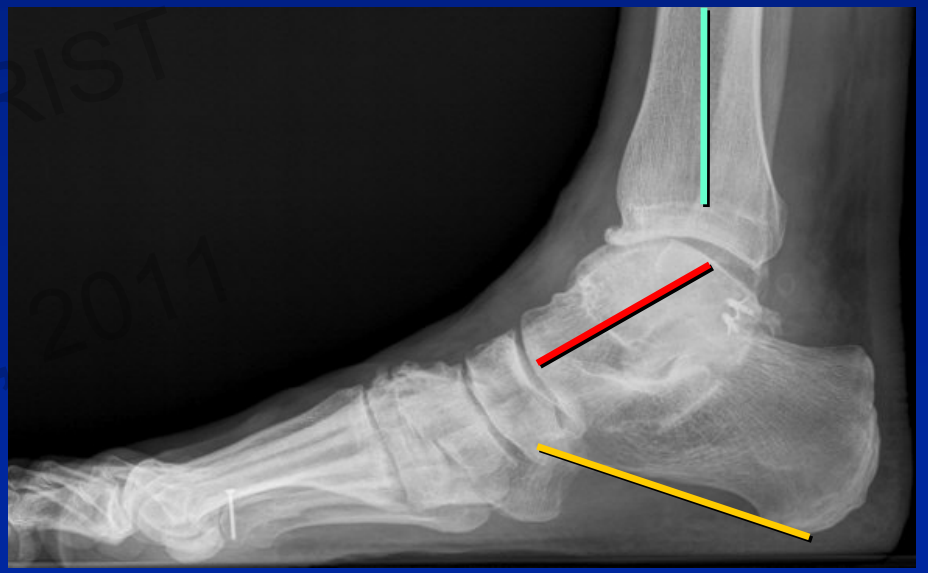
TAR – Valgus Deformity

Case Report



Valgus Ankle

- Collapse of the ankle joint complex
  → gapping of lateral tibiotalar joint
- *E.g:*
  → medial ankle ligament *not* competent
  → *no* break-down of arch!

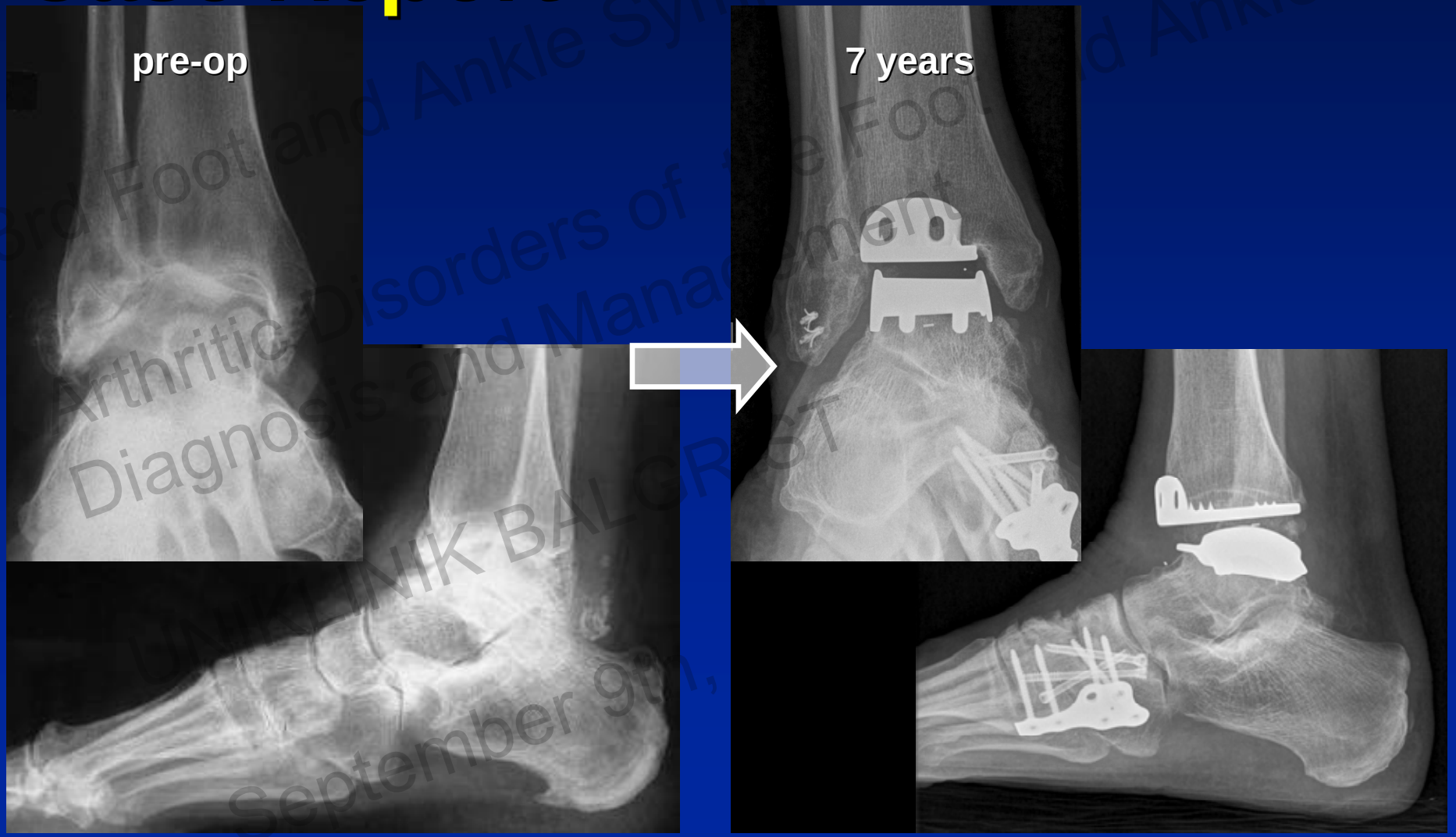


m, 67 y

- multiple ankle sprains
  → ligamentoplasty

TAR – Valgus Deformity

Case Report



TAR – Valgus Deformity

Case Report

What Have I Learned ?

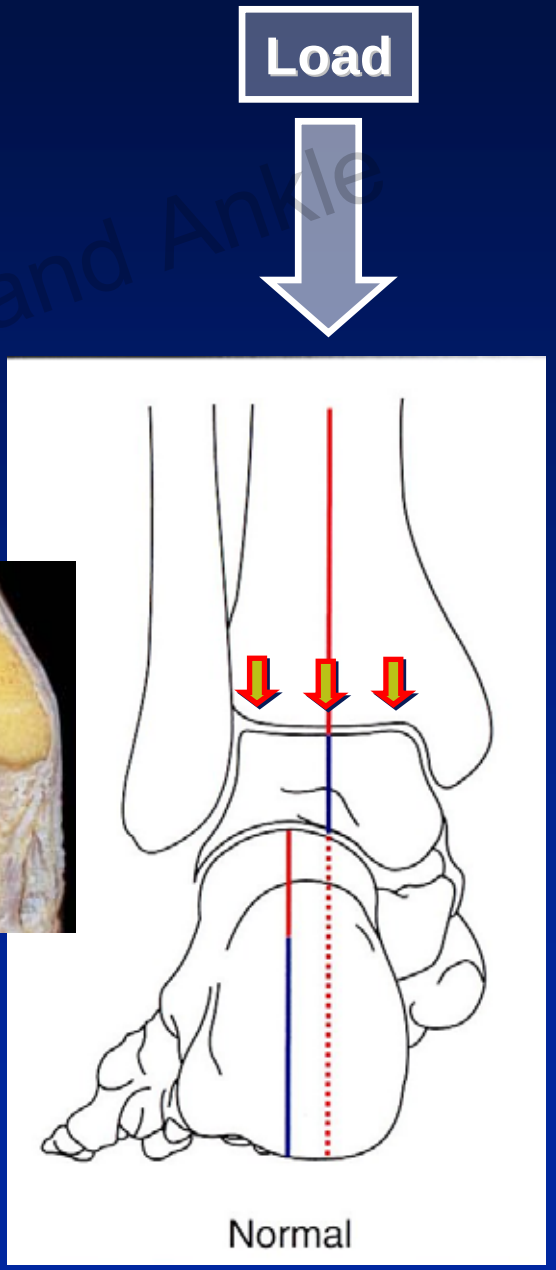
- Despite remaining valgus
  → stable over time
- *BUT:*
  → potential lateral overload
  → asymmetric PE wear

TAR – Valgus Deformity

Biomechanics

What do we Know ?

- Ankle joint
  - → most congruent joint
  - → 100% self-stabilizing



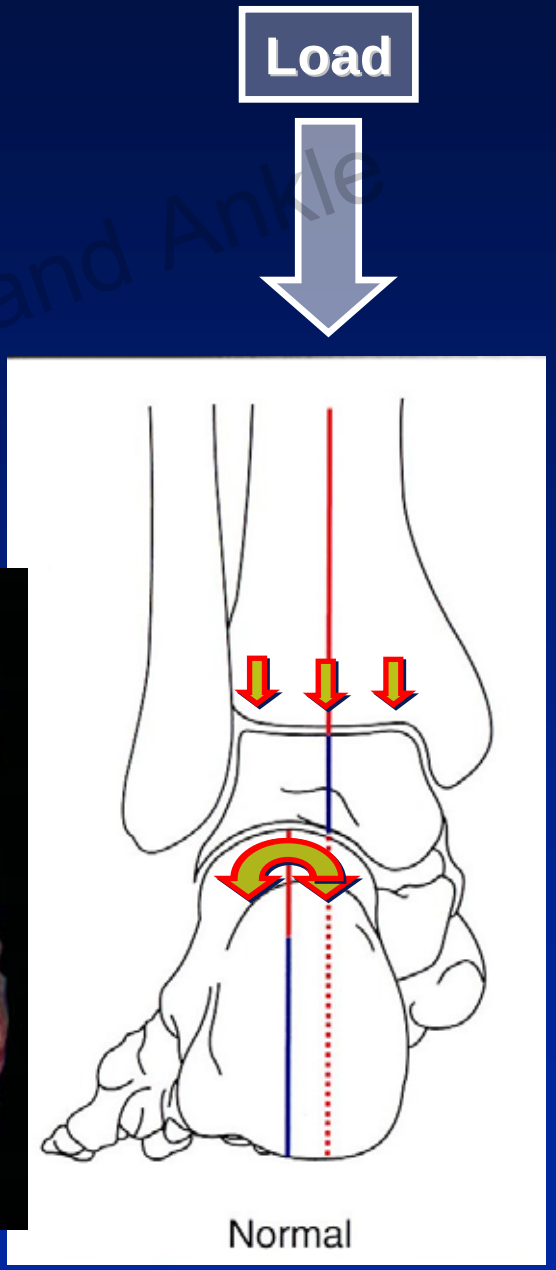
Stormont 1985

TAR – Valgus Deformity

Biomechanics

What do we Know ?

- Ankle joint
  - → most congruent joint
  - → 100% self-stabilizing
- **Posterior subtalar joint**
  - → **congruent**
  - → **round surface**
  - → **not stabilized**

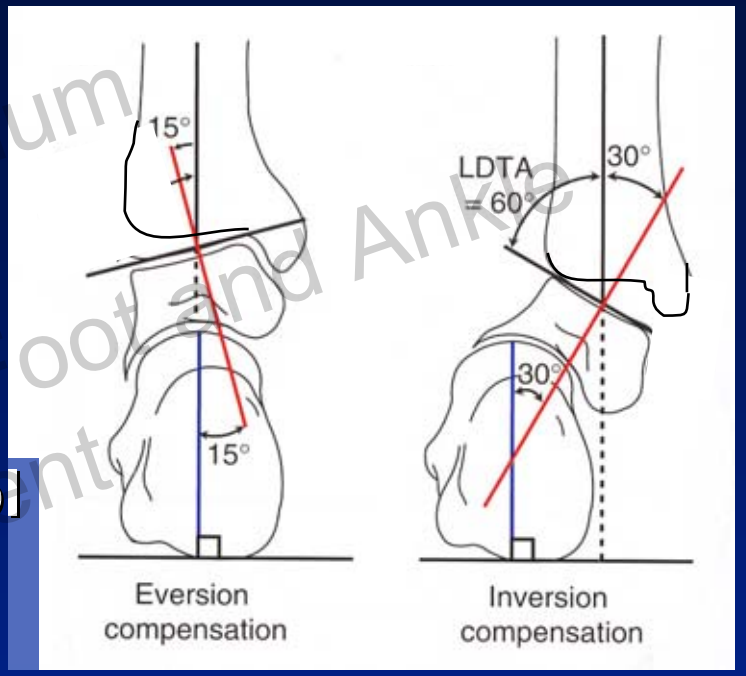


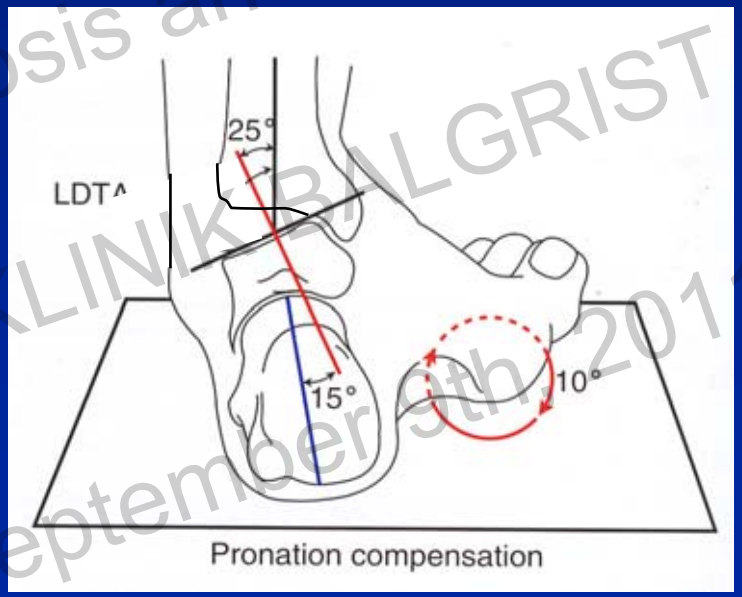
TAR – Valgus Deformity

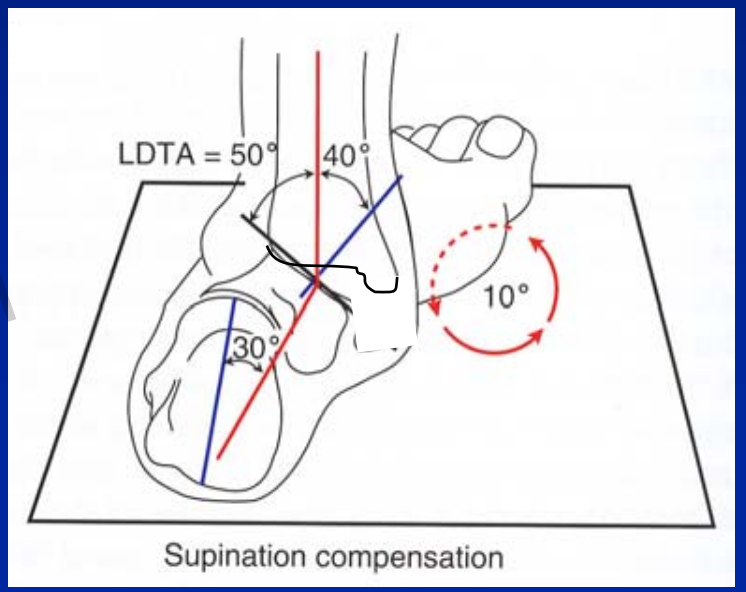
Biomechanics

Implications to the Clinics

- Tibial plafond has lost talar control
  - → talus tilted
  - → subtalar compensates talar tilt







Paley 2005

TAR – Valgus Deformity

Biomechanics

Implications to the Clinics

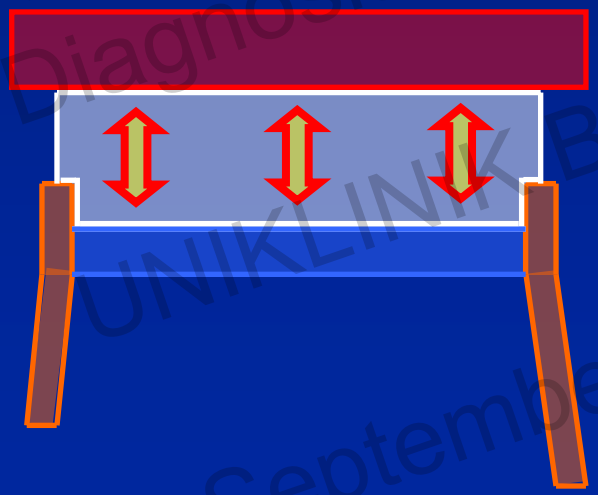
- Ankle prosthesis *must*
  - → re-orientate the talus in the frontal plane
  - → provide talar stability
- Ankle prosthesis *may*
  - → re-orientate calcaneus
  - → provide stability to calcaneus

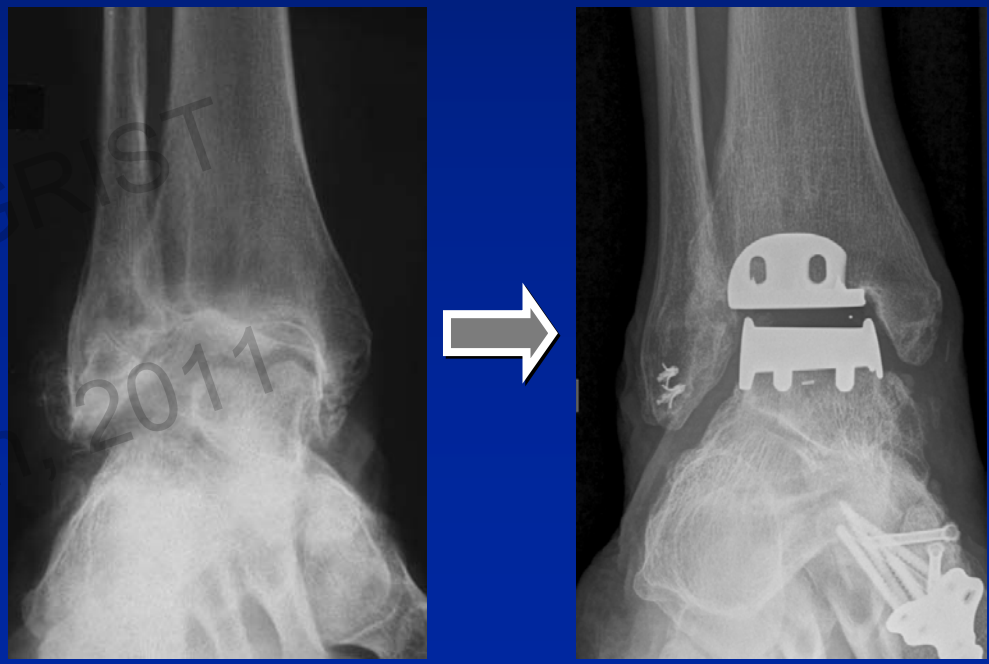
TAR – Valgus Deformity

Biomechanics

Implications to the Clinics

- Speculations
  - → Ankle prosthesis should provide intrinsic stability in the frontal plane





TAR – Valgus Deformity

Clinical Case - Valgus

TAR – Valgus Deformity

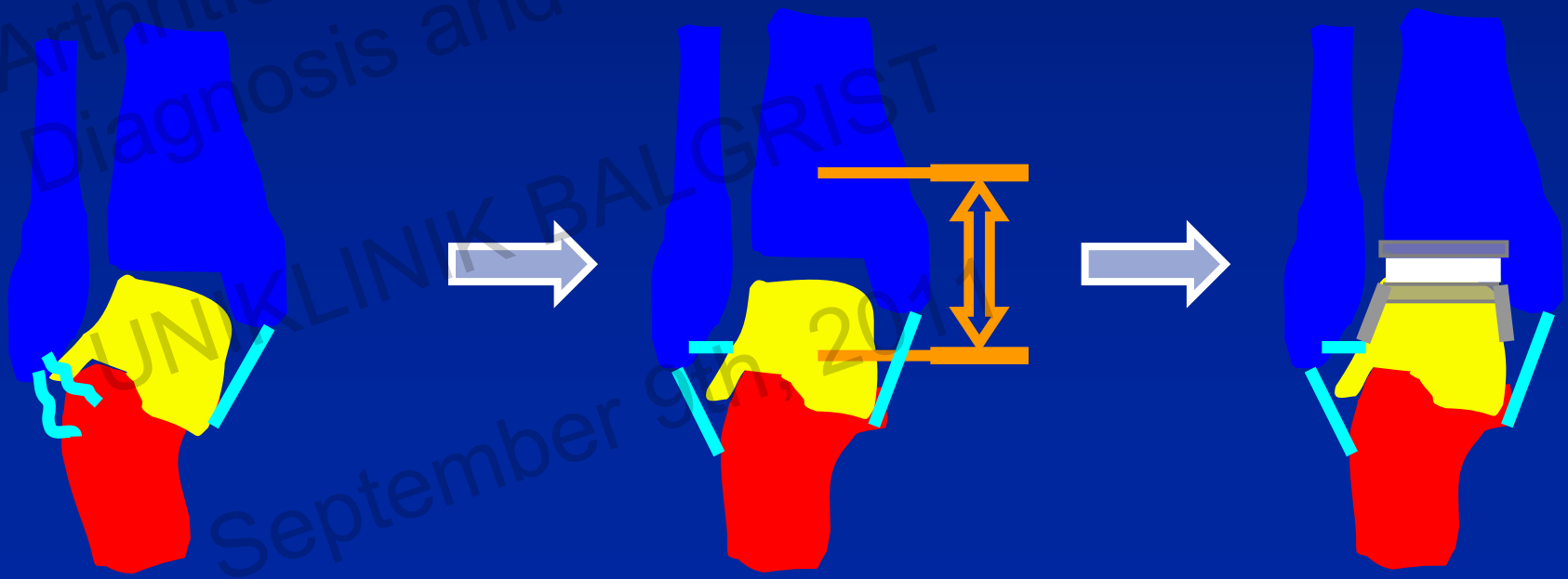
Clinical Case - Valgus

TAR – Valgus Deformity

Conclusions

TAR

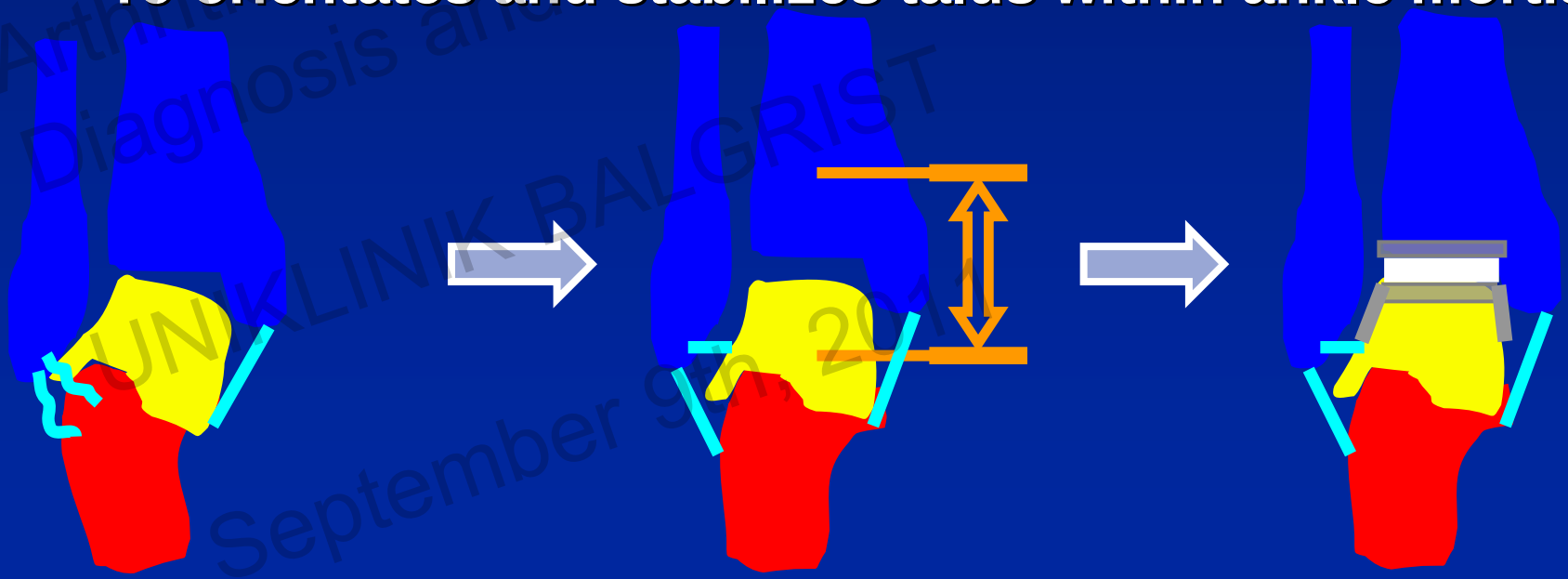
- **May act as a spacer to tension the worn-out ligaments**
  → **stabilizes the whole ankle joint complex**



Conclusions

TAR

- **Has the potential to provide lost intrinsic stability of ankle joint**
  → **re-orientates and stabilizes talus within ankle mortise**

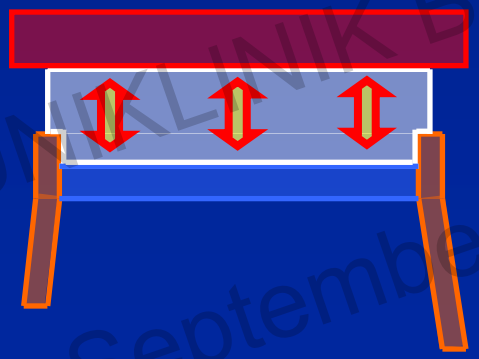


TAR – Valgus Deformity

Conclusions

TAR

- Although not proven, it is my believe
  - → ankle prosthesis must provide intrinsic stability in frontal plane
  - → needs parallelism at primary and secondary interface

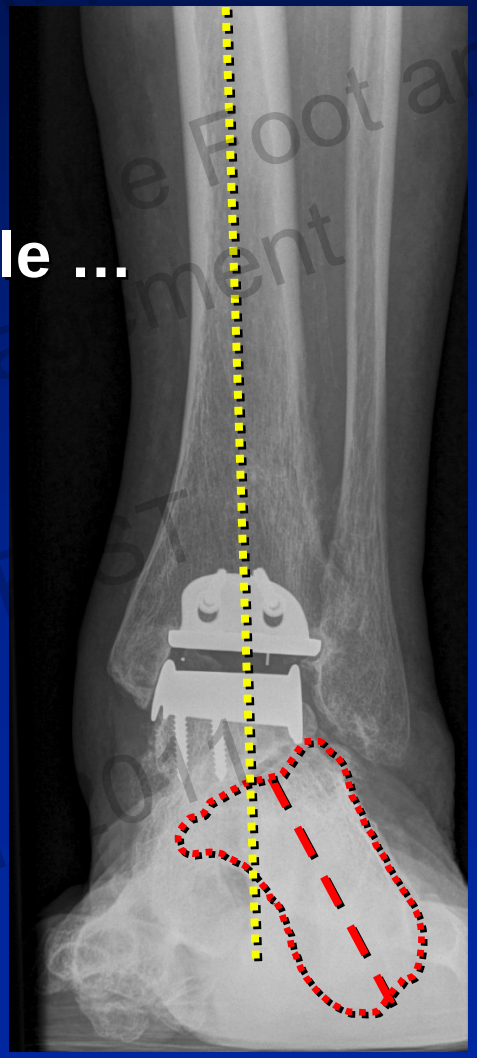


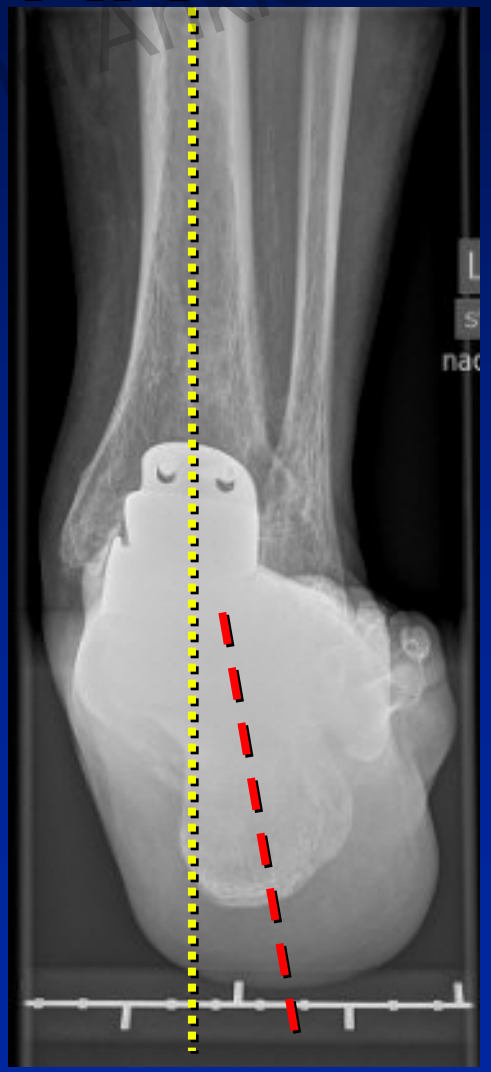
TAR – Valgus Deformity

The Valgus Ankle after TAR

Be Aware of it !

- **Valgus will destroy the ankle …**





The Problem (Case Report)

Valgus Osteoarthritis

- Valgus malpositioning of talus
  - → OA lateral tibiotalar joint
- Misalignment lower extremity
  - → genu varum
  - → heel valgus

m, 63 y

- Posttraumatic OA
- Lateral ankle pain
- Limited ROM

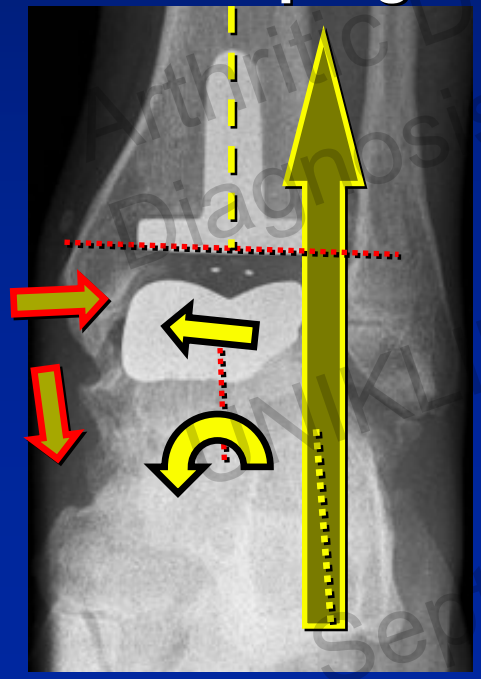
non weight-bearing !

TAR – Valgus Deformity

The Problem

Painful from the Beginning

- **Medial shift of talus**
  → **impingement**



non weight-bearing !

TAR – Valgus Deformity

The Problem

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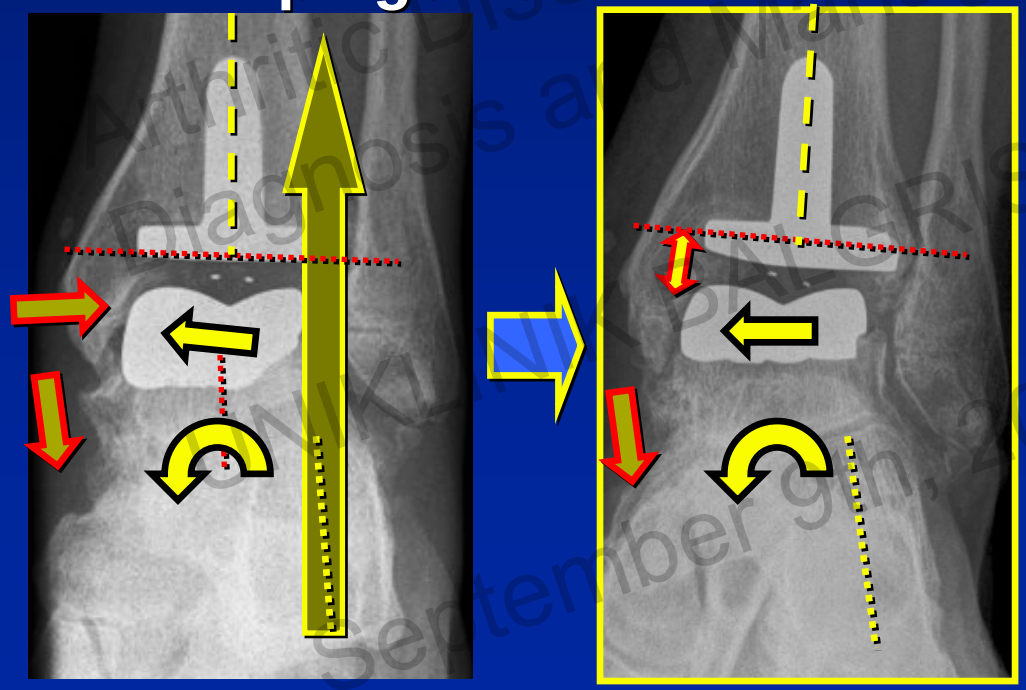
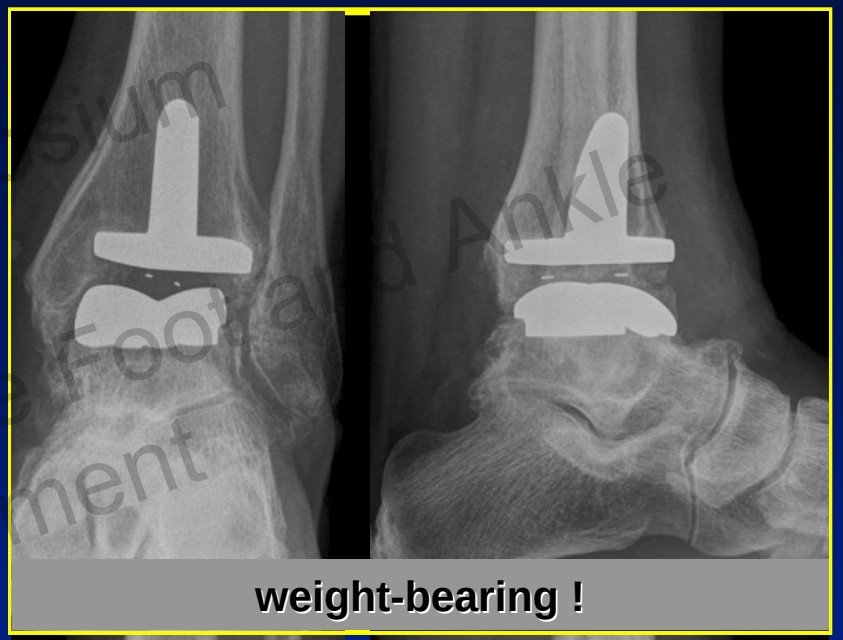
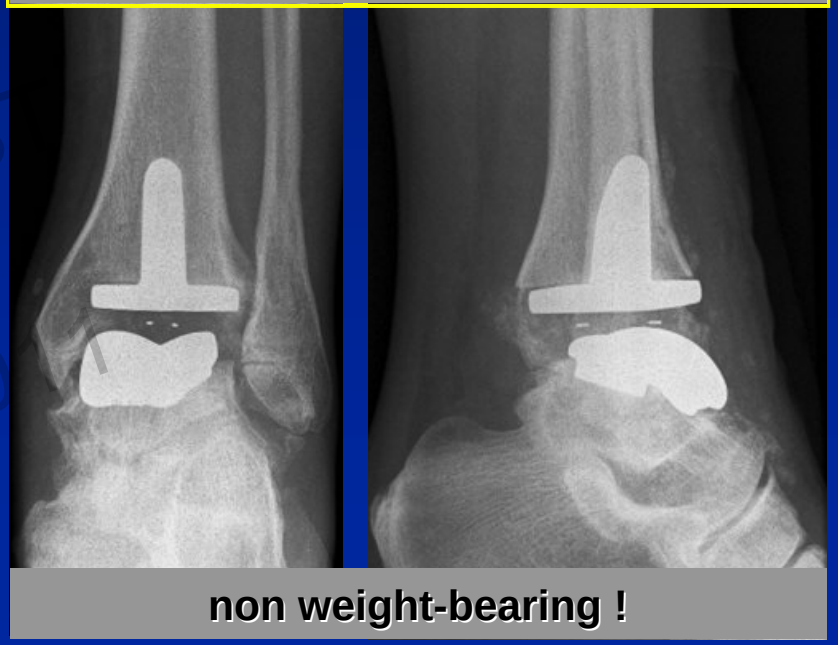




weight-bearing !



non weight-bearing !

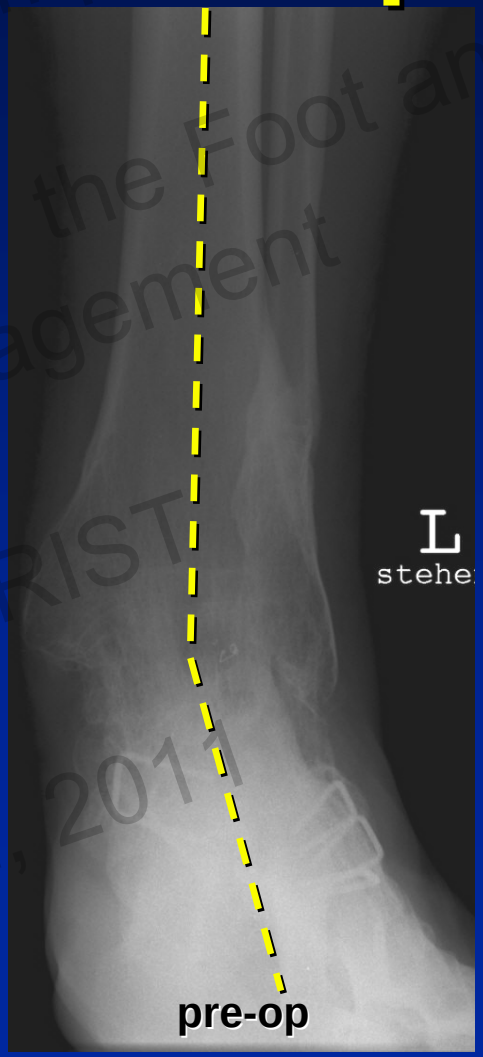
The Problem (Case Report)

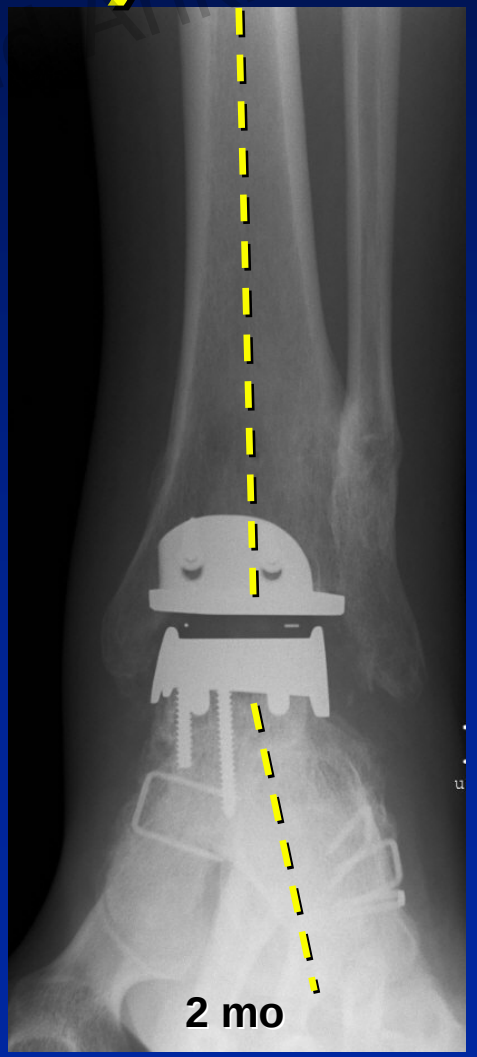
Valgus-Misalignment

- Medial shift of talus
  → medial pain syndrome

M, 51 y

- Posttraumatic ankle pain
  → ankle fusion 6 y
  → subtalar and cc-fusion 4 y
  → overall 19 surgeries
- Painful pantalar arthrodesis
  → TAR 16 mo



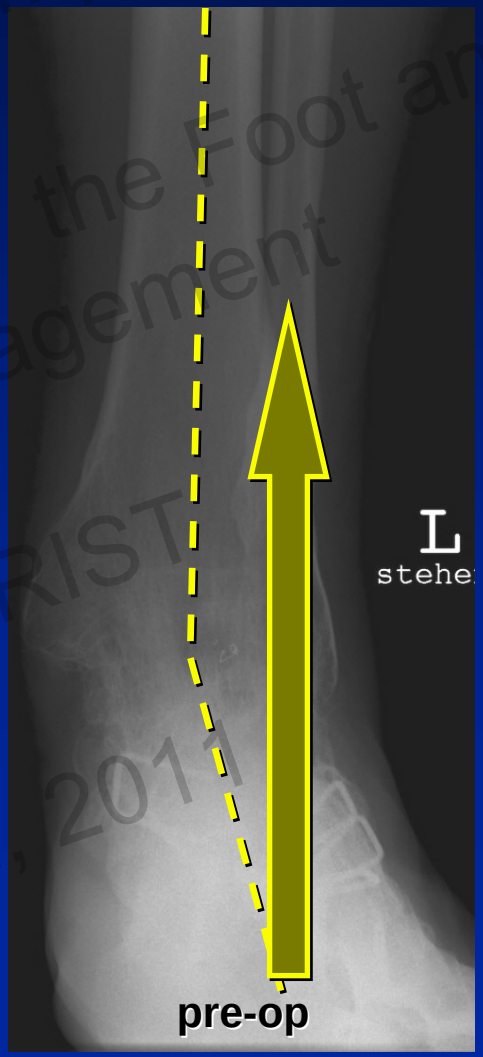


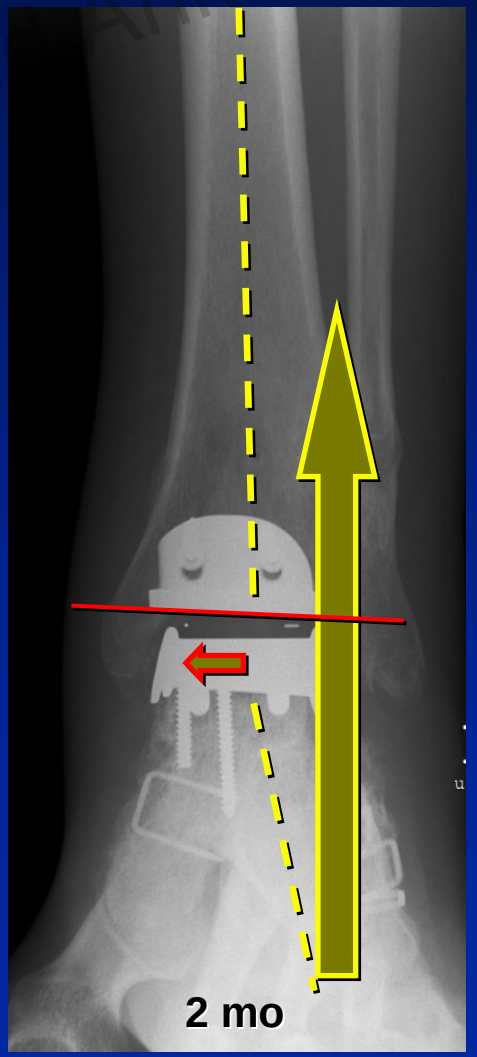
TAR – Valgus Deformity

The Problem

Valgus-Misalignment

- **Medial shift of talus**
  → **medial pain syndrome**
- **Tibiotalar varus**
  → **medial shift of talus**
- **Pronation-abduction deformity**
  → **edge load**





TAR – Valgus Deformity

The Problem

Valgus-Misalignment

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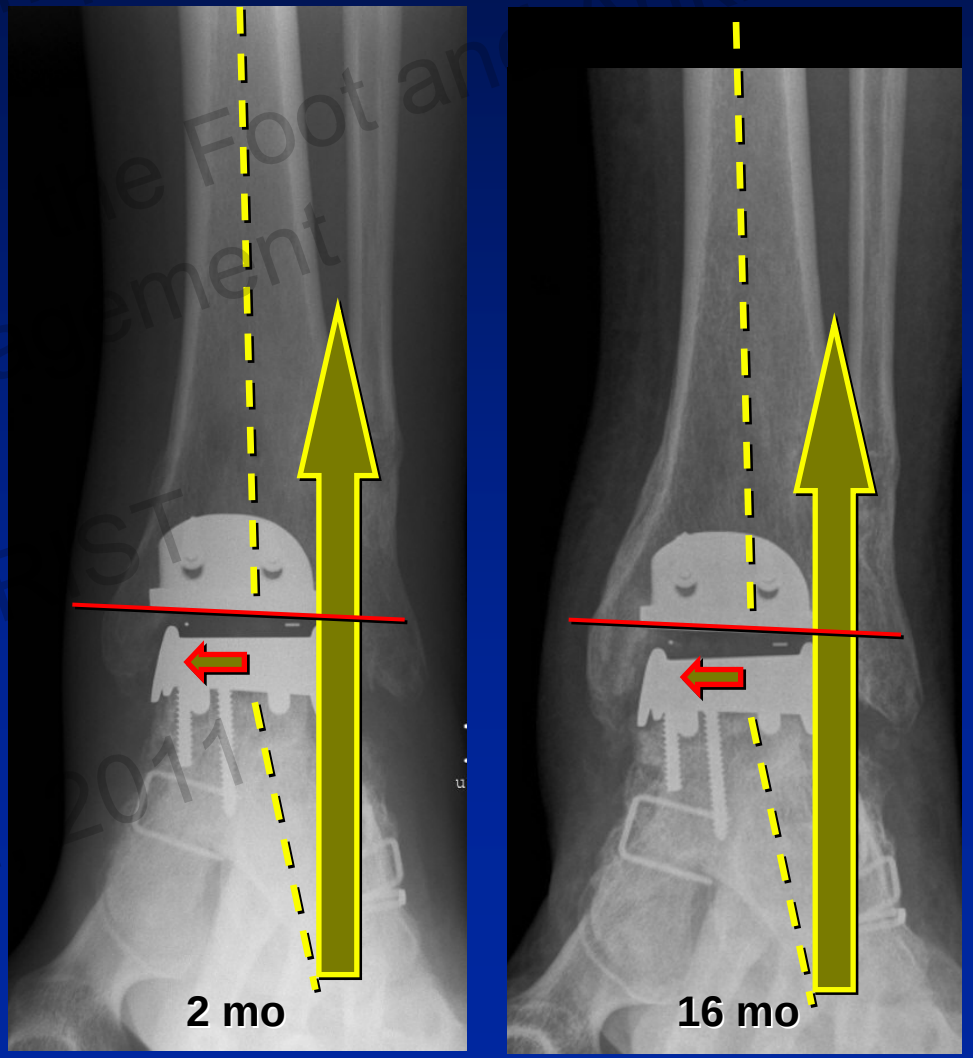


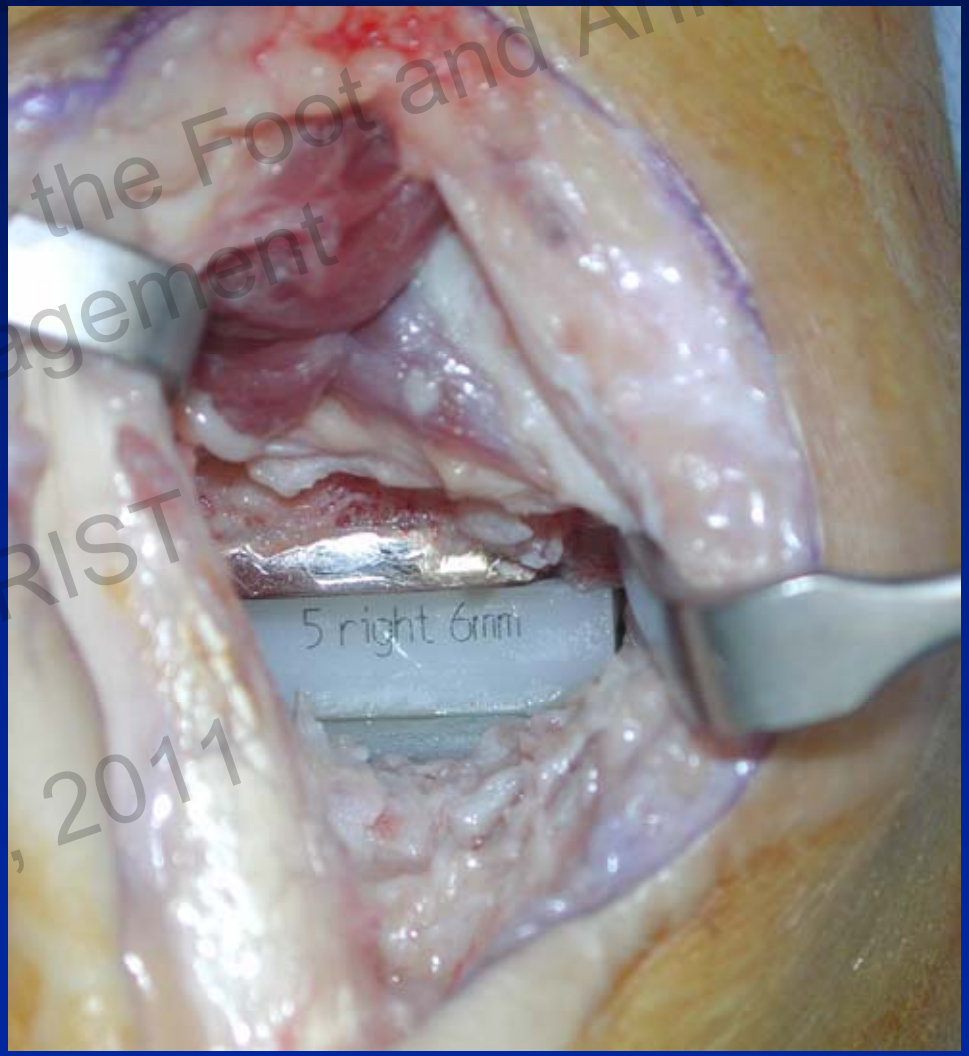
TAR – Valgus Deformity

Surgical Corrections

Joint Debridement

- **Change of inlay**

  → **damages**

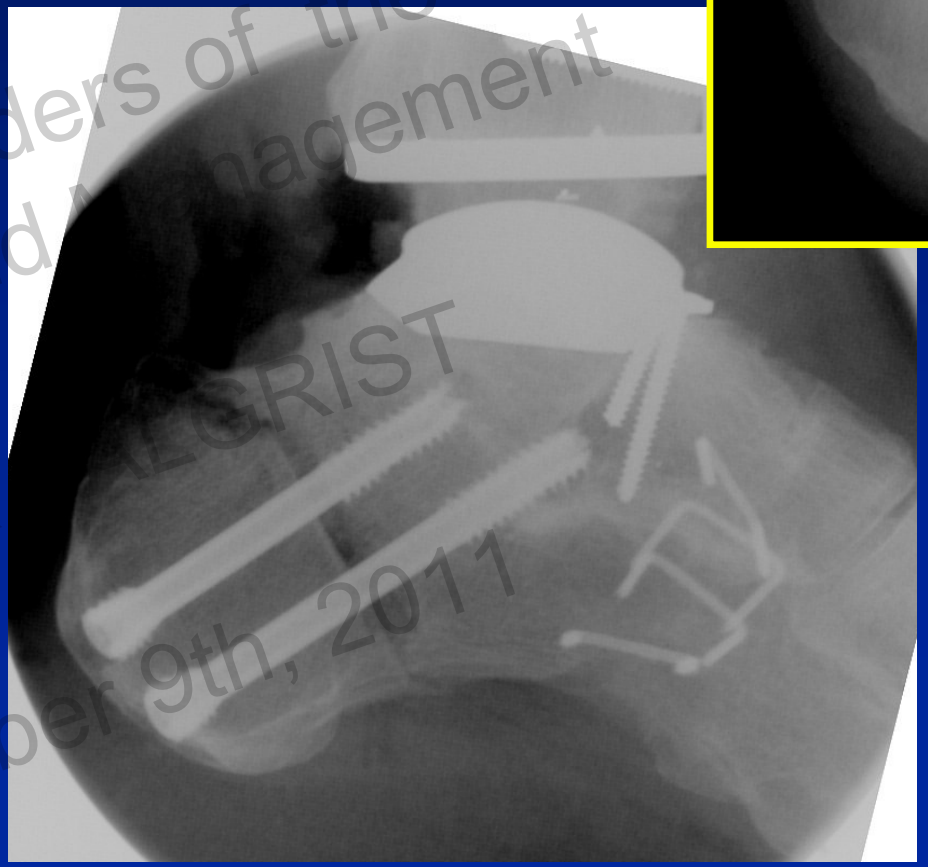


TAR – Valgus Deformity

Surgical Corrections

Joint Debridement

- Change of inlay
  → damages
- **Calcaneal**
  → **medial sliding**



TAR – Valgus Deformity

Post-Operative Findings

***After* Osteotomies**

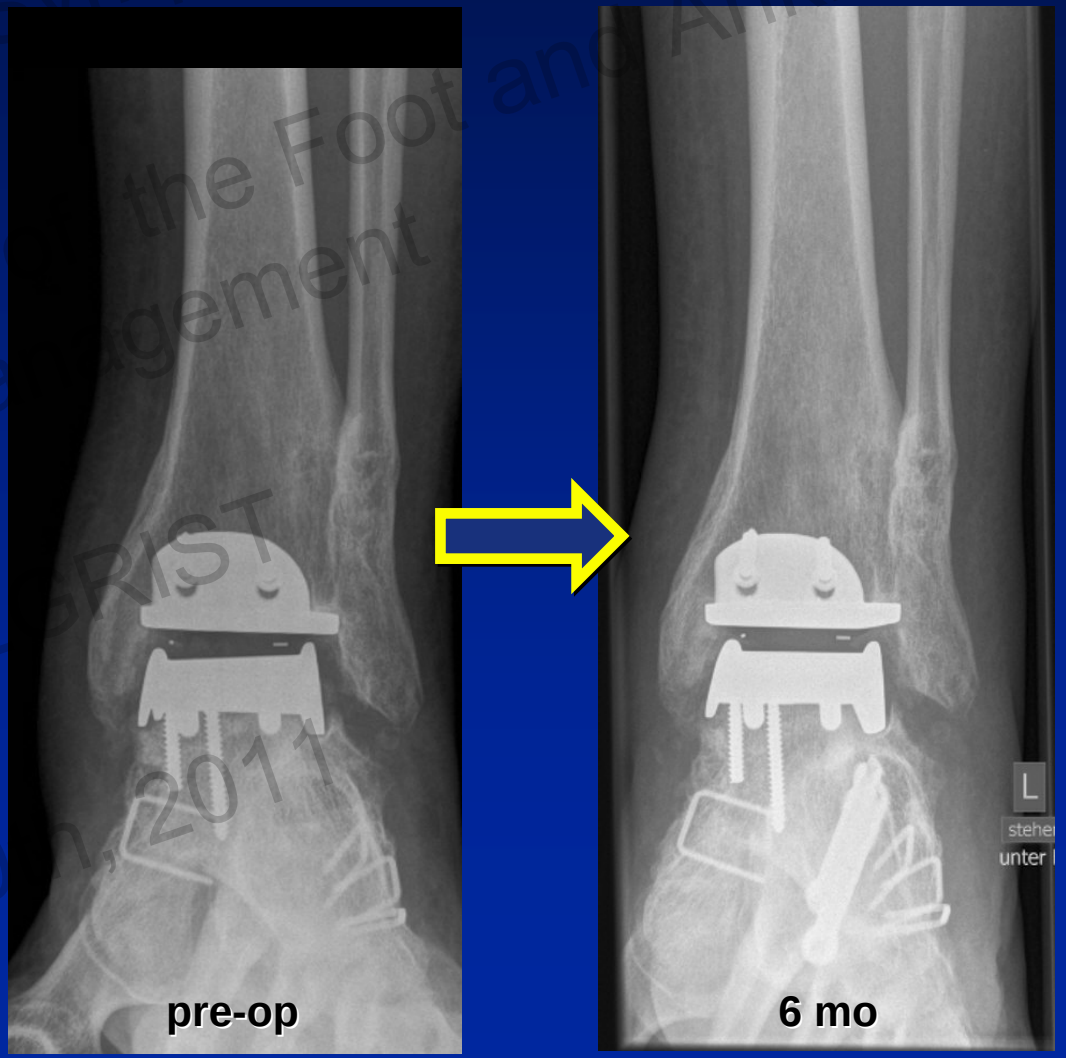
- **Talar component**
  → **centralized**
- **Well-balanced ankle**
  → **frontal plane**
  ***but:* still some external rotation**
- **Patient**
  → **immediately better feeling**

TAR – Valgus Deformity

Final Result

Effect of Osteotomies

- Decompresses medial ankle joint
  - → regular position of talar component
- Decreases stress
  - → bony tissues
- Patient
  - → pain relief
  - → better feeling



TAR – Valgus Deformity

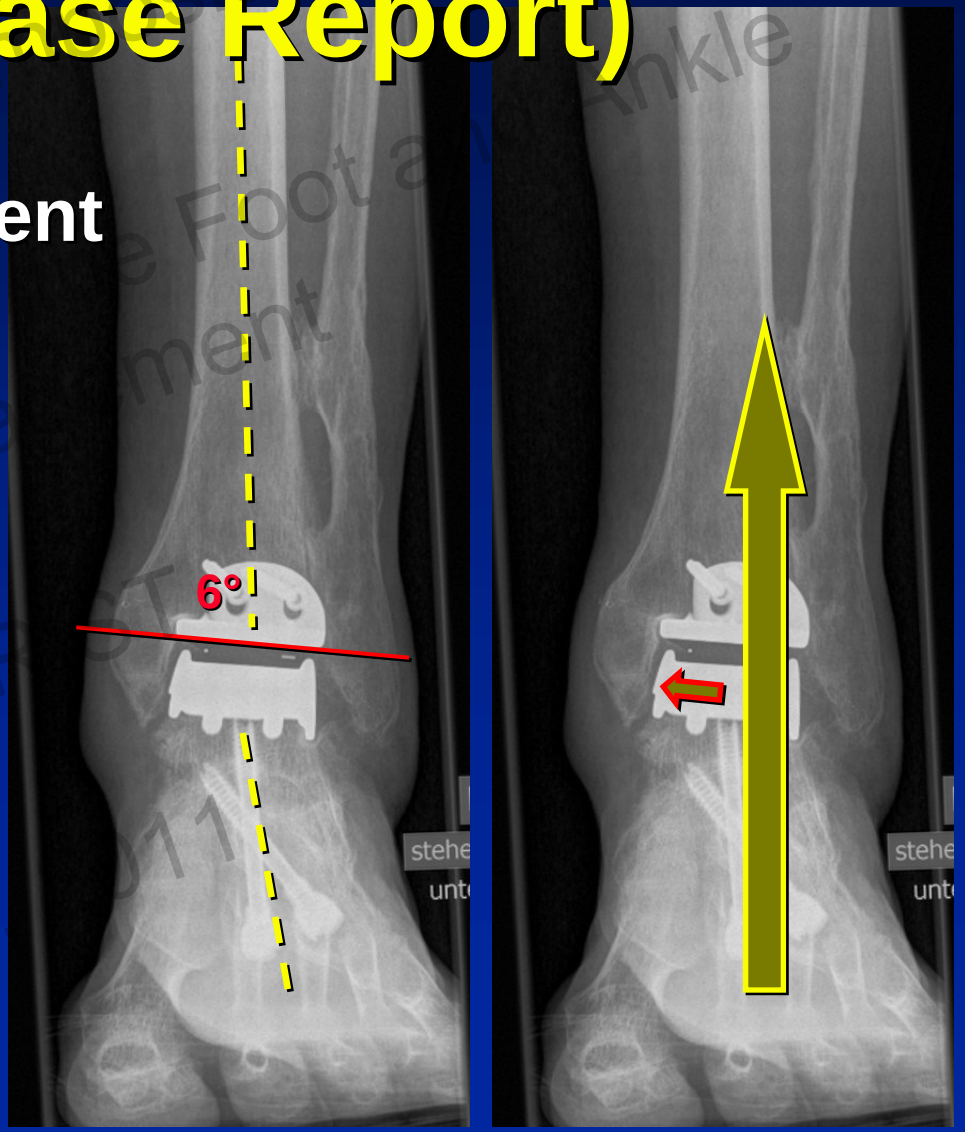
The Problem (Case Report)

Varus-Valgus-Misalignment

- Medial shift of talus
  → medial pain syndrome

<u>f, 73 y</u>

- Posttraumatic OA
  → TAR 26 months
- Pain
  → medial malleolus
- Limited load tolerance
  → walking distance < 1 h

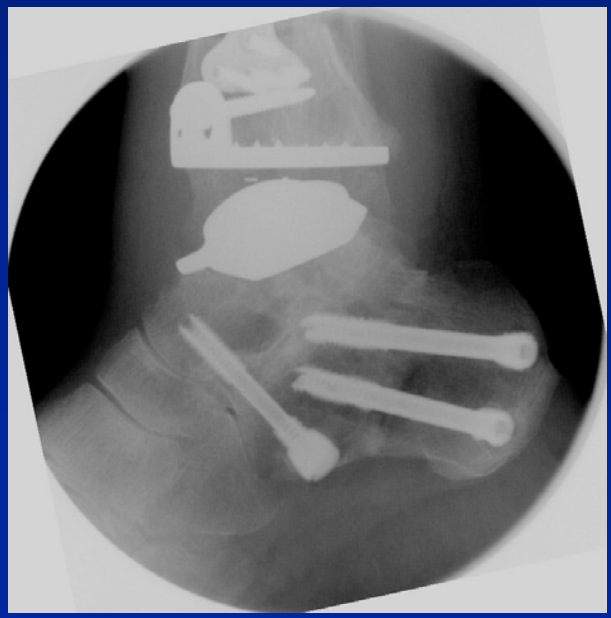


TAR – Valgus Deformity

Surgical Corrections

Osteotomies

- **Supramalleolar**
  - → **medial closing**
- **Calcaneal**
  - → **medial sliding**

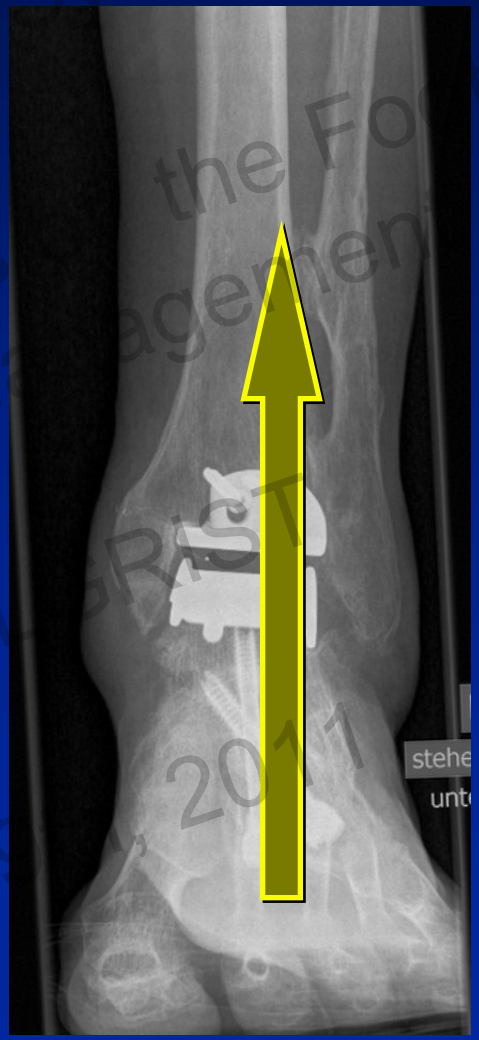


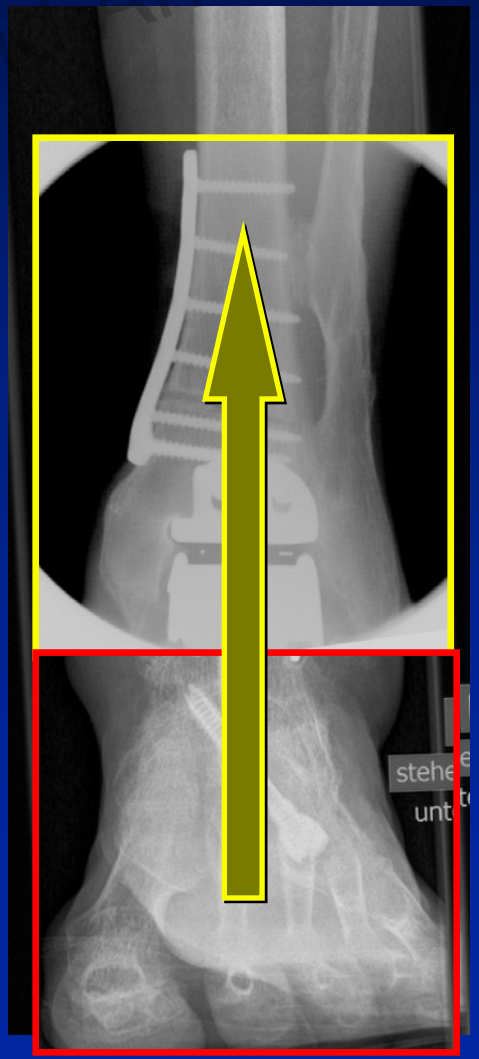
TAR – Valgus Deformity

Post-Operative Findings

***After* Osteotomies**

- **Talar component**
  - → **centralized**
- **Well-balanced ankle**
  - → **sagittal plane**
  - → **frontal plane**
- **Patient**
  - → **immediately better feeling**



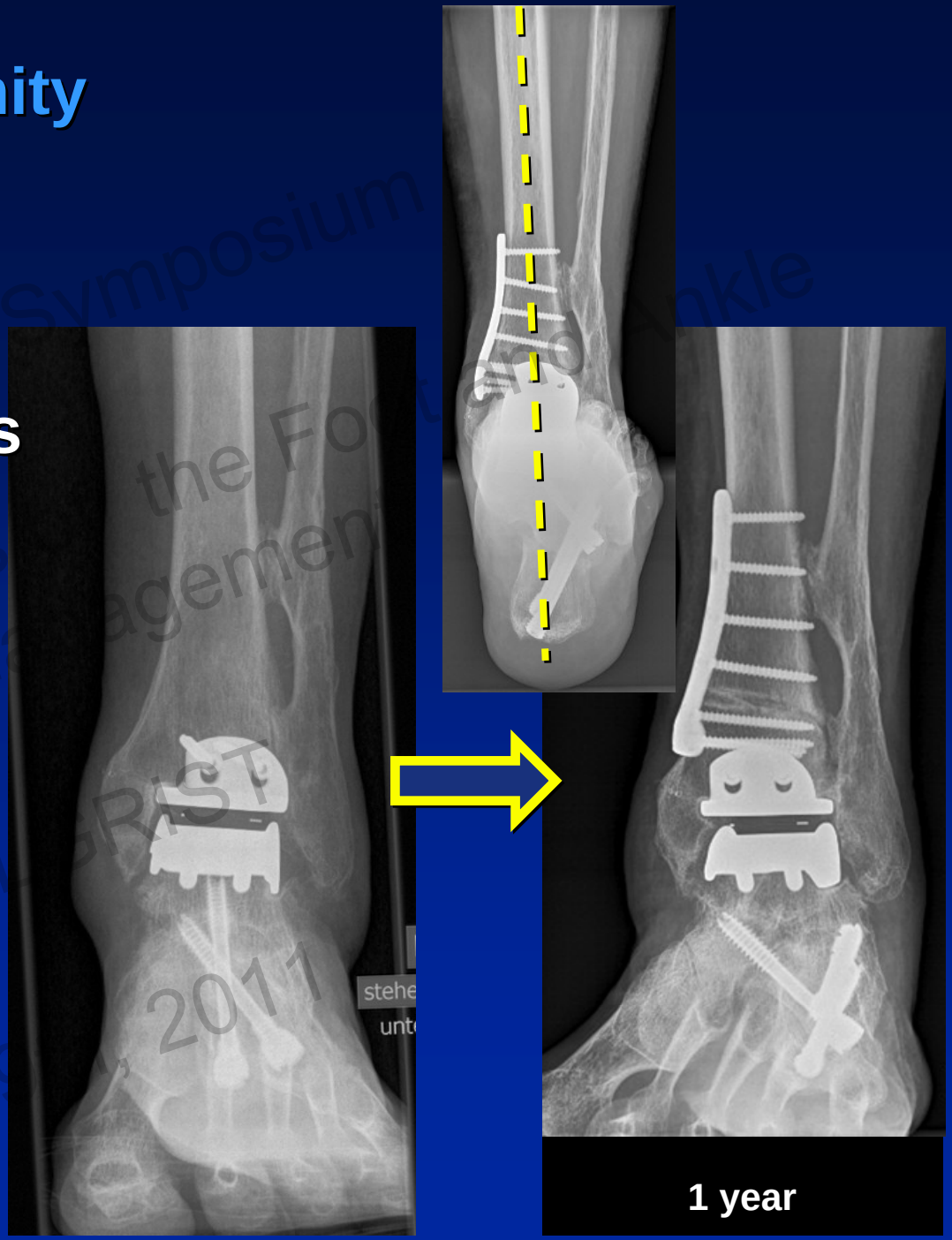


TAR – Valgus Deformity

Final Result

Effect of Osteotomies

- Decompresses medial ankle joint
  - → regular position of talar component
- Decreases stress
  - → bony tissues
- Patient
  - → pain relief
  - → better feeling



TAR – Valgus Deformity

Conclusions

Valgus Deformity

- Crucial
  - → fully correct it
- Tools
  - → arthrodeses
  - → osteotomies
  - → ? ligamentoplasty

TAR – Valgus Deformity

Conclusions

What now, Doc ?

Never tolerate any Valgus left !

- **You will be punished**
  - → **the patient will be back …**