

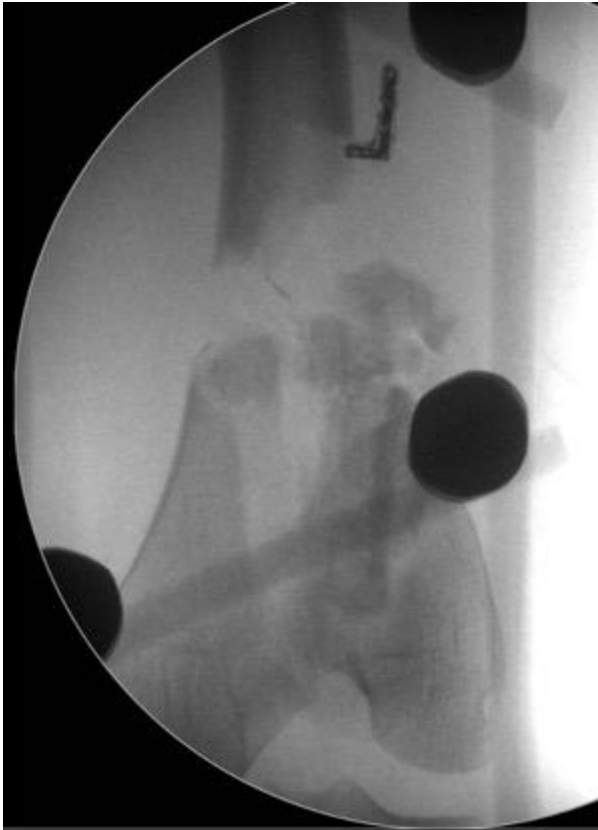


Malunion

Søren Kold

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- 19 years old female
- Gustilo IIIB segmental femoral fracture with distal bone loss.
- Treatment strategy





Indications for surgery of malunions are less clear than for non-unions

DO NO HARM

Stories of Life, Death,
and Brain Surgery



Henry Marsh, neurosurgeon



- 3 months to learn a surgical procedure
- 3 years to learn when to operate
- 30 years to learn when NOT to operate

Indications for surgery:

– Pain:

- pain after trauma is often complex

– Functional deficit:

- joint instability / joint incongruency
- rotational deformities
- Shortening
- Muscular
- Ligaments

Considerations

- Symptoms
- Age
- Activity level
- General medical condition (diabetes, smoking, nutrition)
- Compliance
- Prior vascular or nerve injuries (acute versus gradual correction)
- Soft-tissue contractures
 - Equinus foot (Achilles tendon lengthening)
 - Knee contractures (Quadricepsplasty)
 - Subtalar stiffness (Subtalar arthrodesis)

No absolute values of the angular magnitude of deformity exist that indicate surgery

- > 5 degrees in coronal plane
- > 10 degrees in sagittal plane
- > 10 degrees rotation
- > 2 cm shortening

Important considerations

- Associated translation (additive or compensatory)
- Level of deformity (near knee-joint has greatest impact on mechanical axis deviation)

Osteoarthritis and mechanical axis alignment ?



**FACTORS PREDICTING THE DEVELOPMENT OF EARLY
OSTEOARTHRITIS FOLLOWING LATERAL TIBIAL PLATEAU
FRACTURES: MID-TERM CLINICAL AND RADIOGRAPHIC
OUTCOMES OF 73 OPERATIVELY TREATED PATIENTS**

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- 73 tibial lateral plateau fractures (ORIF) followed for a mean of 54 months
- More advanced osteoarthritis when
 - Valgus malalignment > 5 degrees
 - Articular depression > 2 mm
 - (The role of initial dislocation and cartilage damage is unknown)

Intra-articular malunion: surgical options

- Joint preserving surgery (intra-articular osteotomies, juxta-articular osteotomies)
- **Arthroplasty**
- Arthrodesis



Juxta-articular malunion

16 years old male

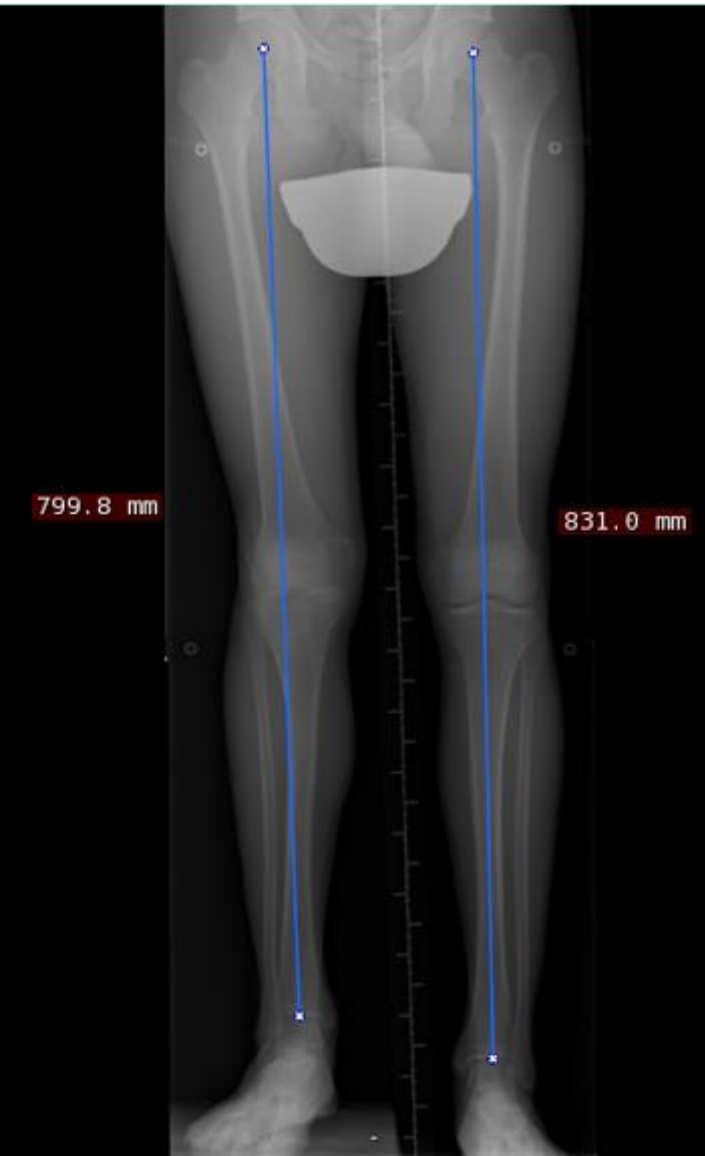
Right knee trauma at age 9

Right knee pain

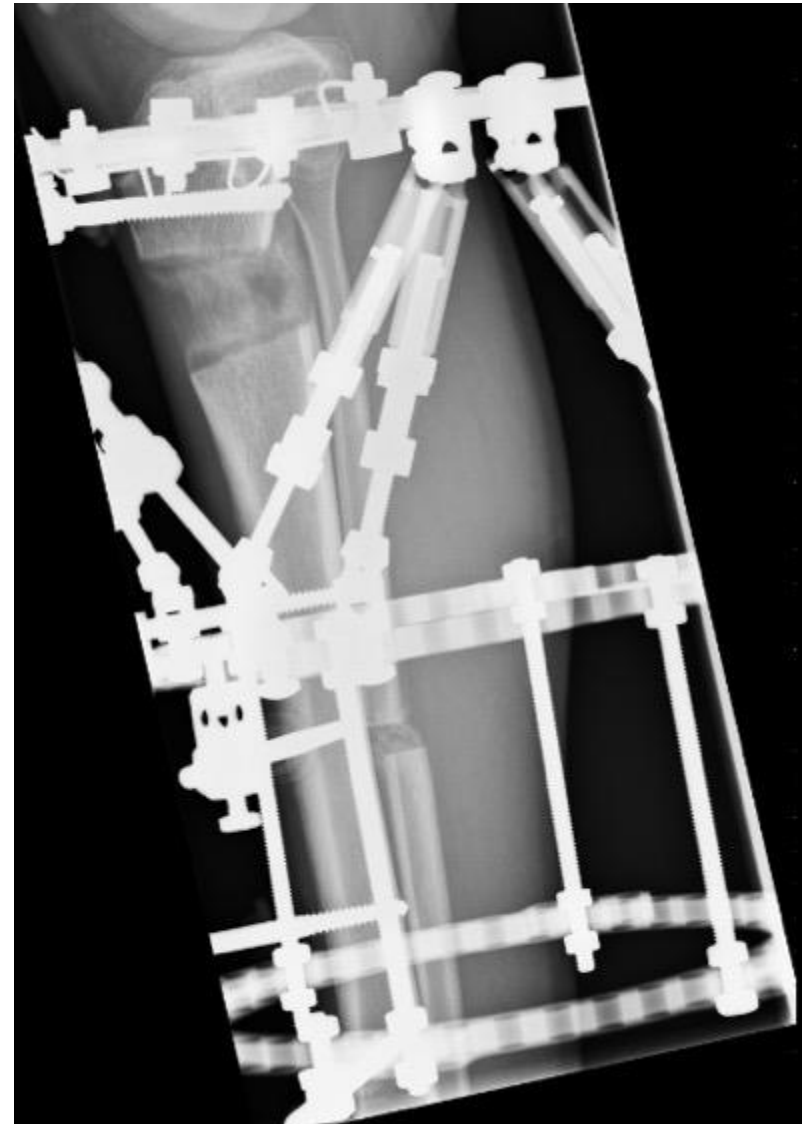
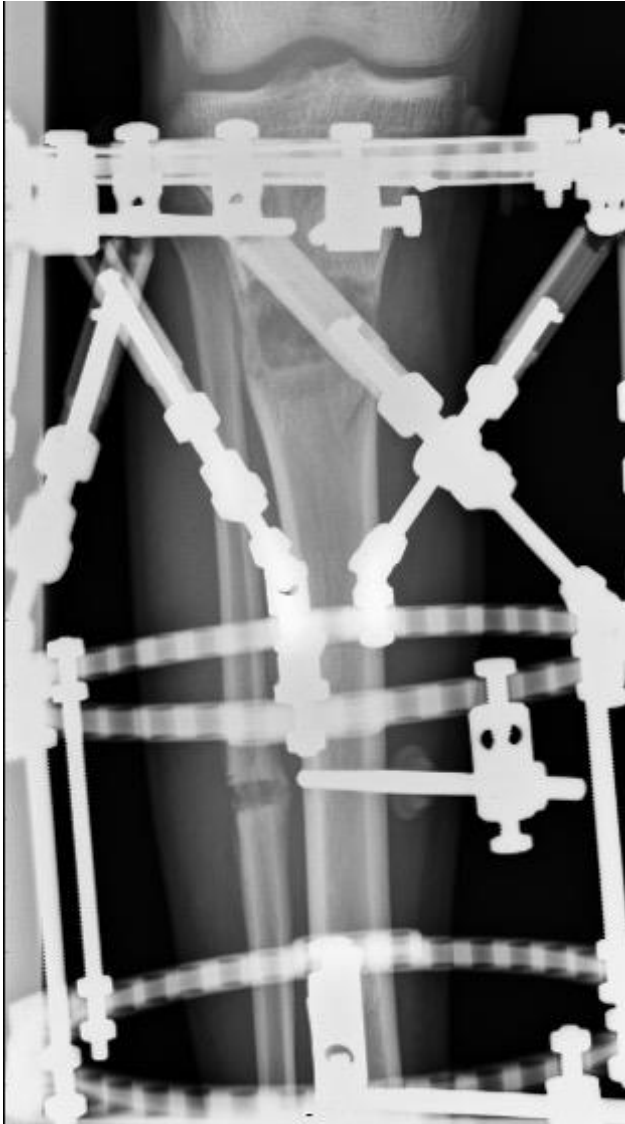
LLD: 3 cm

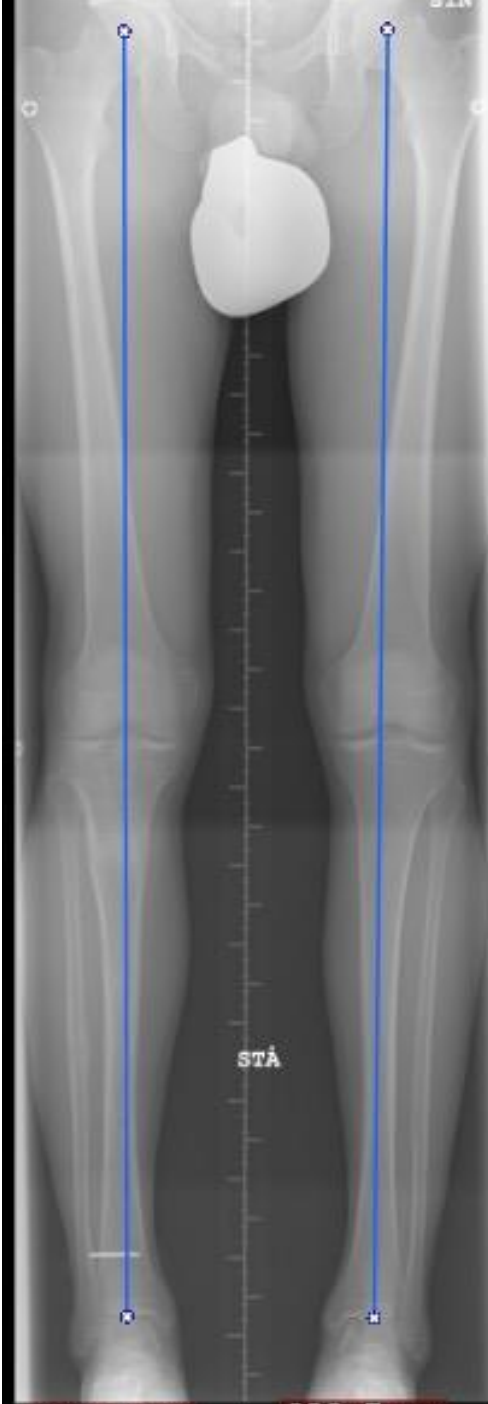
Valgus

Genu recurvatum (PPTA: 110 degrees)



Gradual correction of deformities in all planes



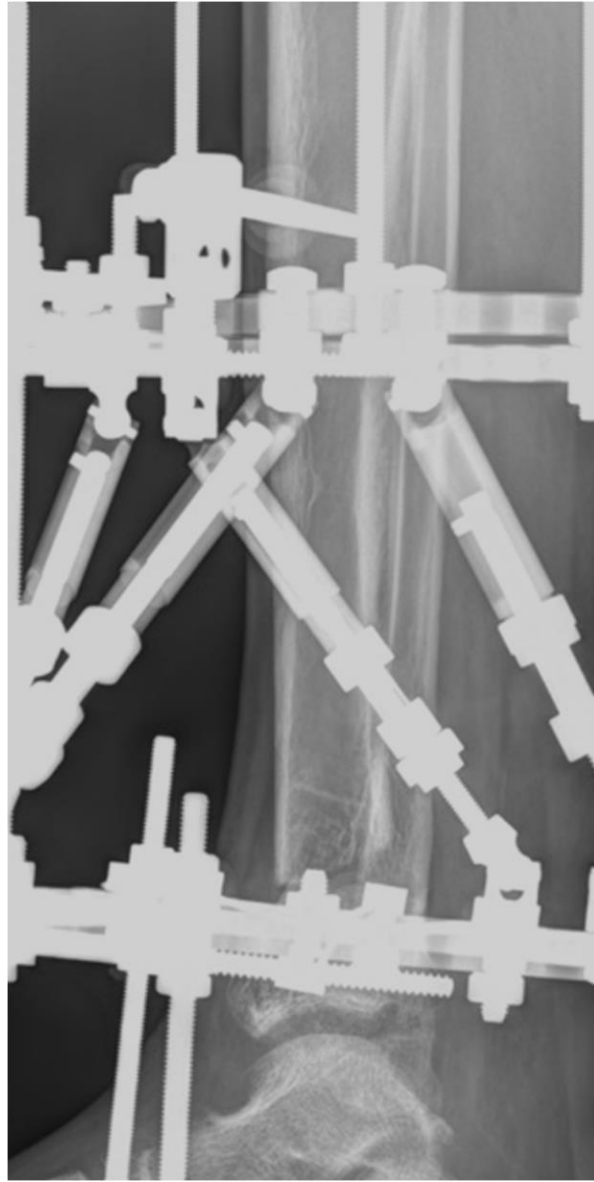
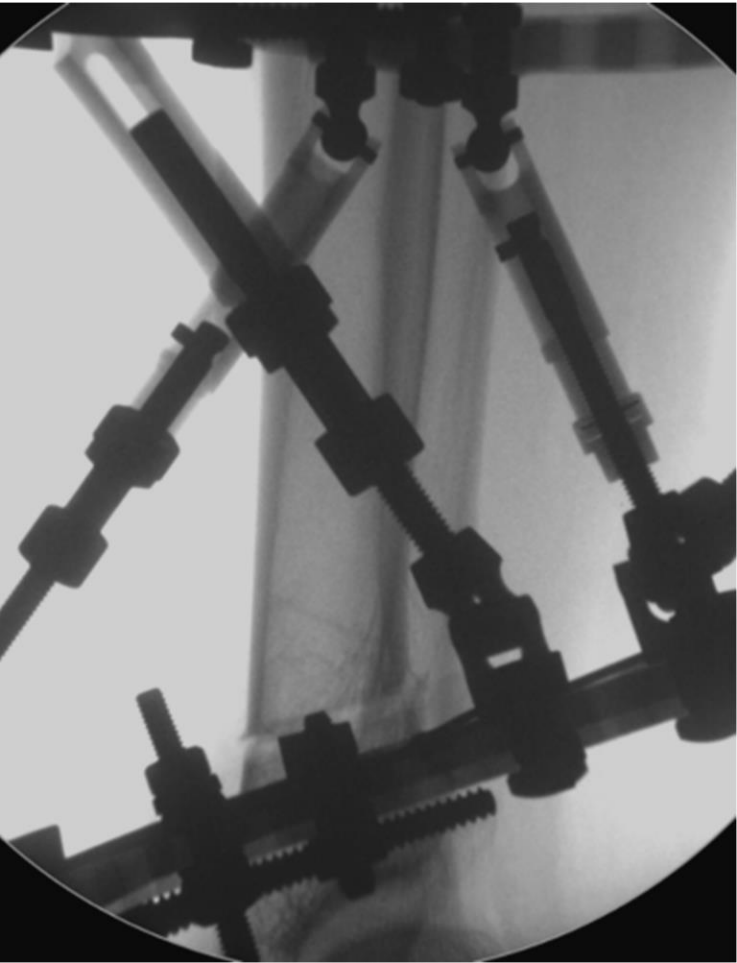


2-step procedure

- Procurvatum distal tibia (ADTA: 125 degrees)

- 4 cm shortening







Technical note

1-stage total knee arthroplasty and proximal tibial non-union correction using 3-D planning and custom-made cutting guide

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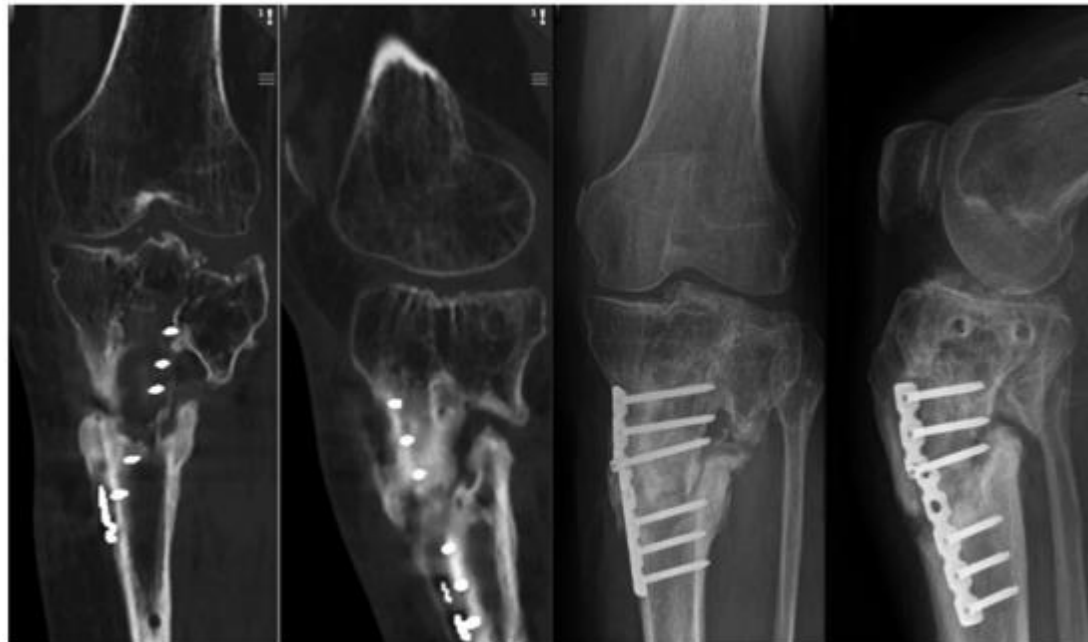


Figure 1. Preoperative CT and radiographs showing posttraumatic lateral tibial joint incongruence and non-union.

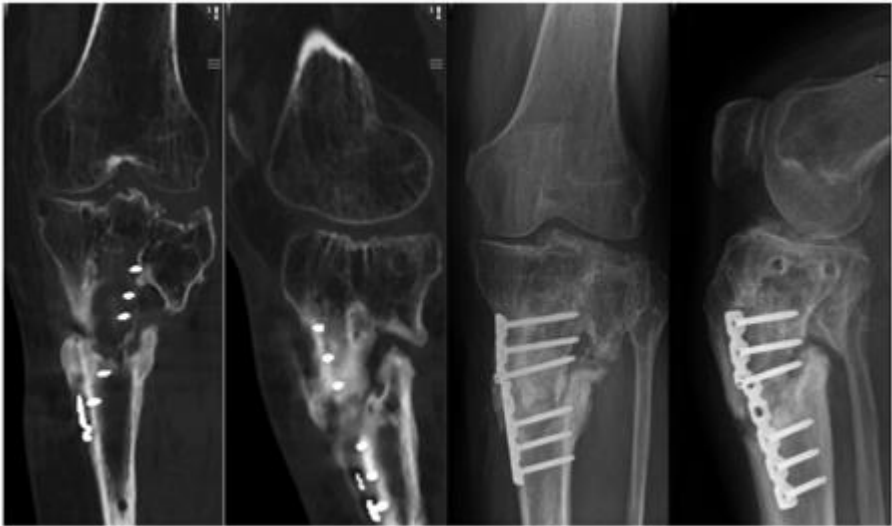


Figure 1. Preoperative CT and radiographs showing posttraumatic lateral tibial joint incongruence and non-union.

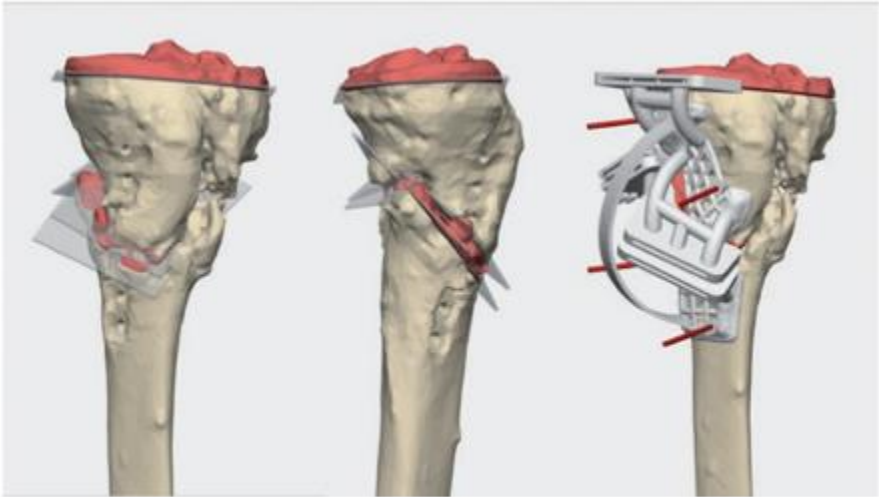


Figure 2. Surgical planning: red areas are planned resections, including resection of non-union site. Left: coronal view. Mid: sagittal view illustrating biplanar cuts. Right: coronal view with personalized cutting guide (Materialise planning software).

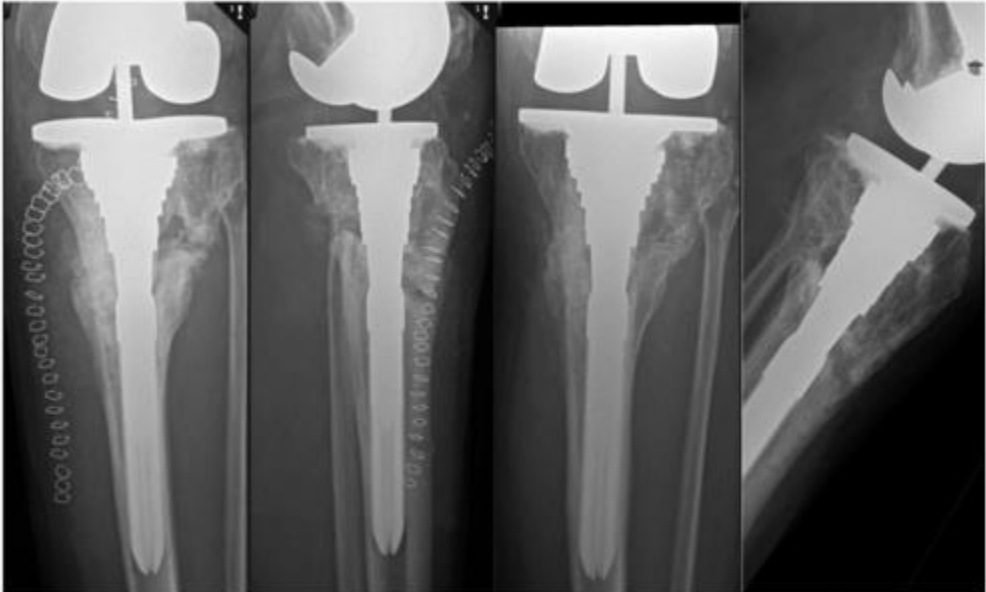
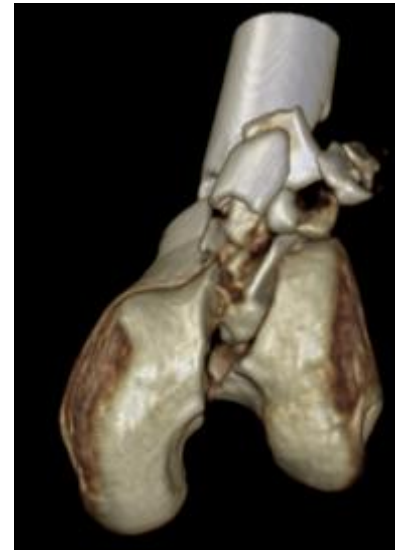
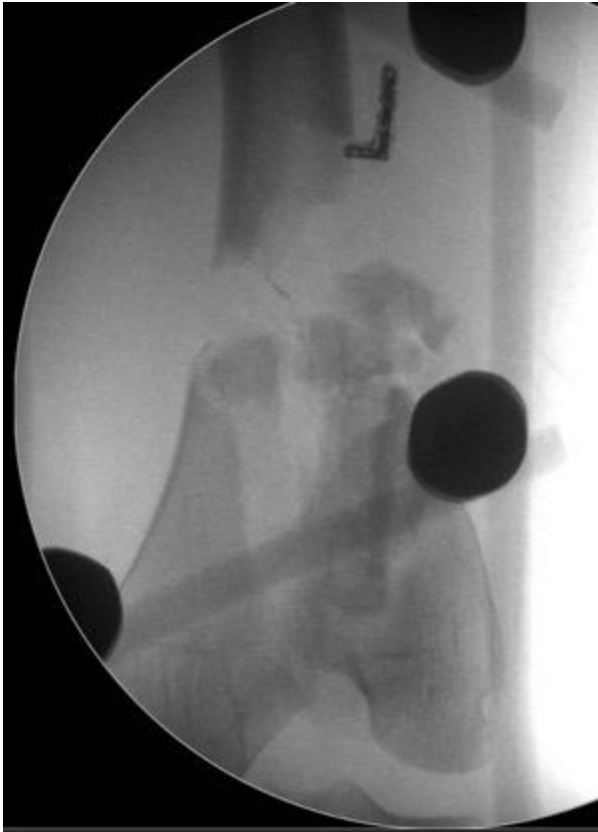


Figure 4. Postoperatively, planned correction and implant position obtained. Left: day 1. Right 12 months.

Planned mal-union

- 19 years old female
- Gustilo IIIB segmental femoral fracture with distal bone loss.





***PLAN: 2-step procedure
with retrograde nails***

1) Fracture healing
maintaining full knee ROM

2) Later correction of
malunion (shortening and
deformity)

Post-trauma day 10:

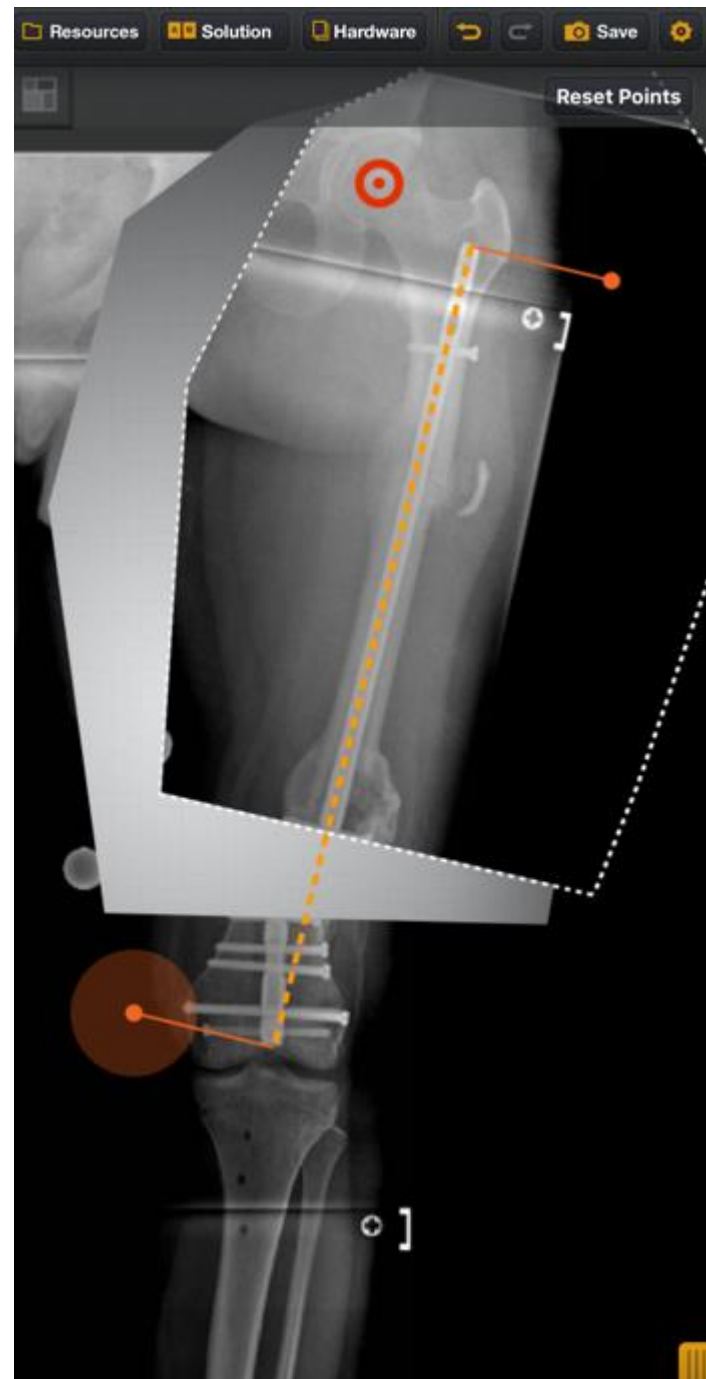
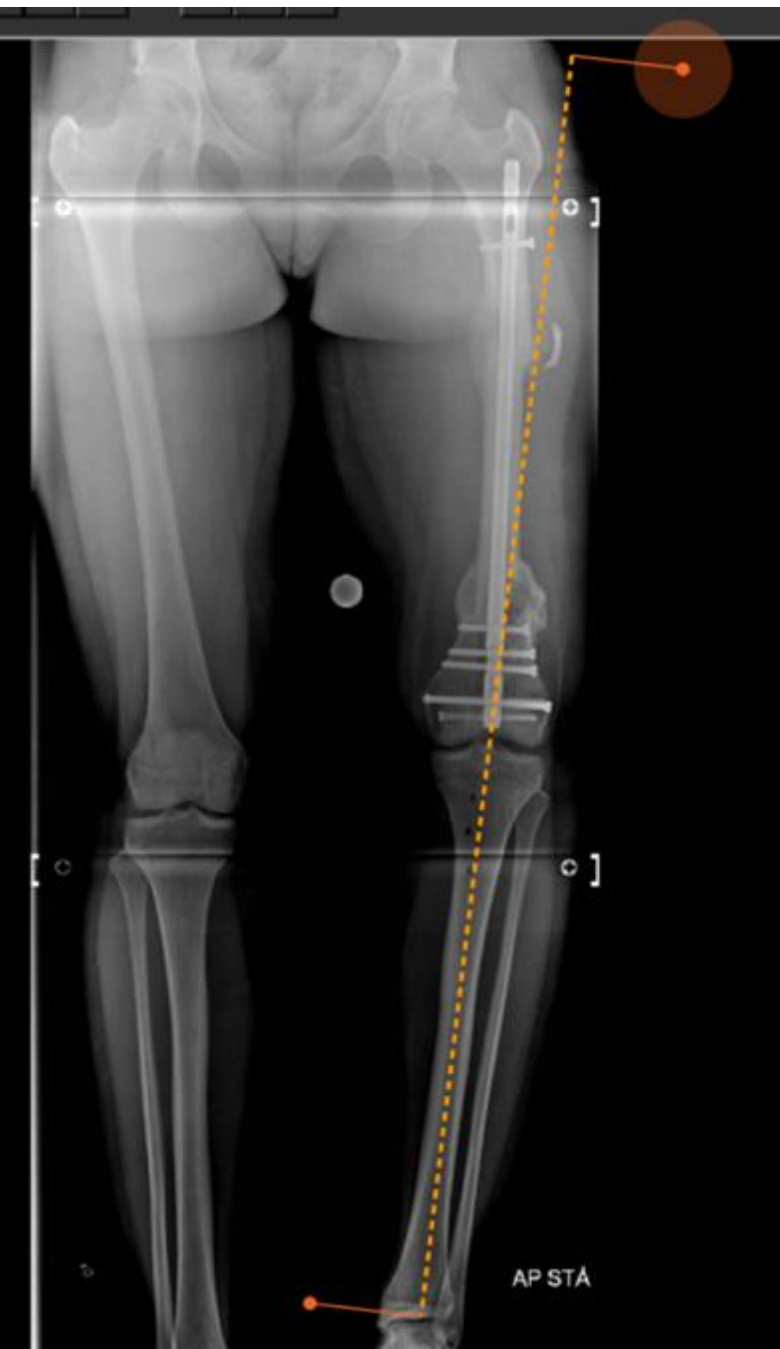
- Conversion from spanning ext. fix. to internal fixation.
- ORIF of articular fracture
- Retrograde trauma nail
- 50 mm shortening



6 months post-trauma:

- Fractures united
- Full ROM of knee and hip
- 50 mm shortening (femur)
- Varus prox. and distal femur
- No sagittal plane deformity
- No rotational deformity









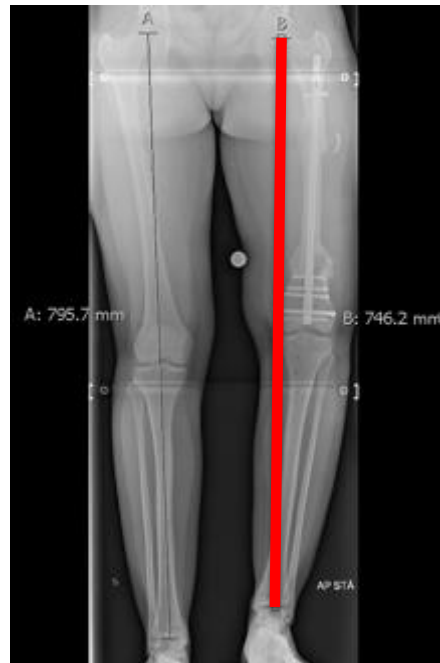
80 days lengthening:

- Full ROM
- 10 mm short
- Mechanical axis o.k.



Latest follow-up:

- 24 months post-injury /6 months after nail removal
- Running without pain
- Full ROM
- 5 mm short



Take home message: MALUNION

Indications for surgery:

Must have pain / functional deficit

Planned temporary malunion

Thank you