

Failed Subtrochanteric Fracture

How I Decide What to Do?

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Purpose of my talk

review anatomy + background of subtrochanteric fx

describe biology + biomechanics

discuss treatment options

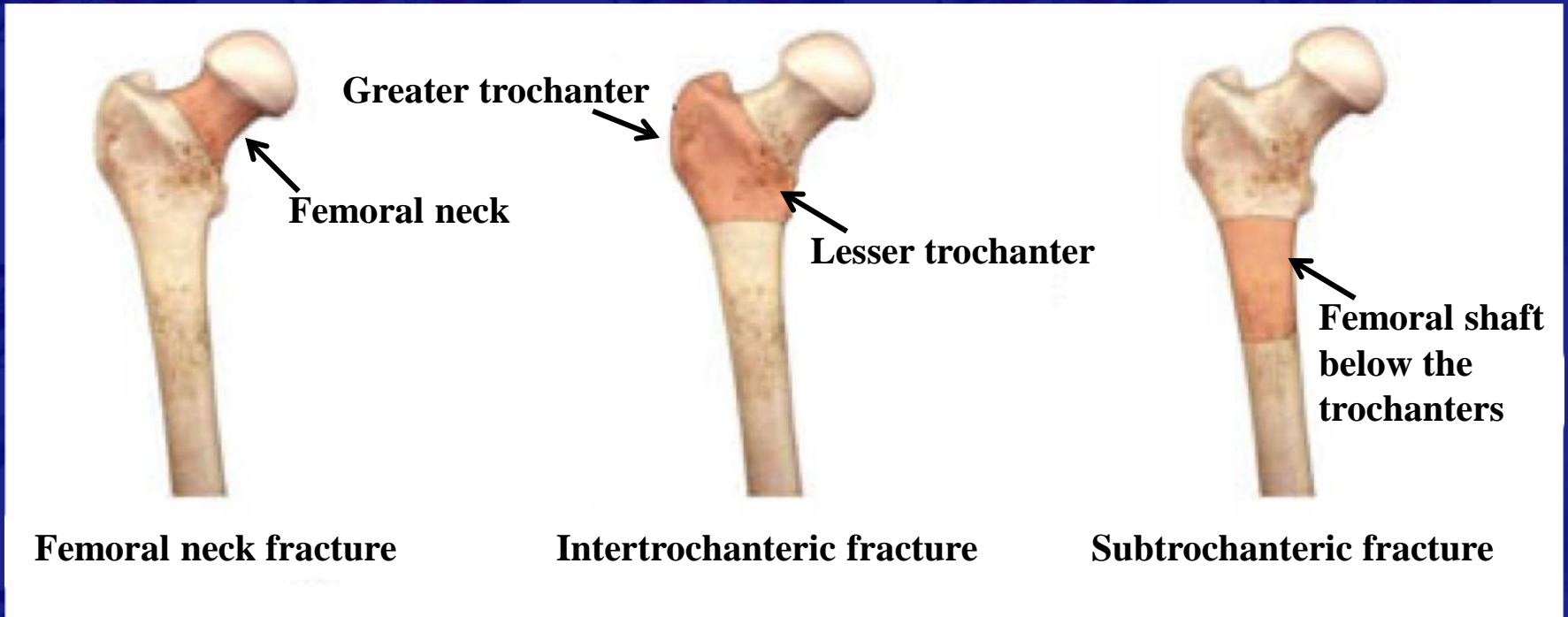
analyze mistakes in my “bad” experience

recommend treatment plan for difficult cases

Background

- **Subtrochanteric fractures: 10 to 34% of all hip fractures** (Loizou CL et al. Classification of subtrochanteric femoral fractures. Injury 2010;41:739–45.)
- **Incidence present with a bimodal age distribution**
 - young people – high energy trauma
 - older people – low velocity trauma, osteoporosis, pathological fractures

Anatomy



Subtrochanteric region – between the lesser trochanter and 2 inch (5 cm) distal

Forces and Problems I

- **High concentration of stresses**
 - high compressive stresses on the medial side
 - high tensile stresses on the lateral side
- **Bad vascularity** ← predominantly cortical bone; reaming destroys intramedullary endosteal blood supply
- **Longer time for healing**

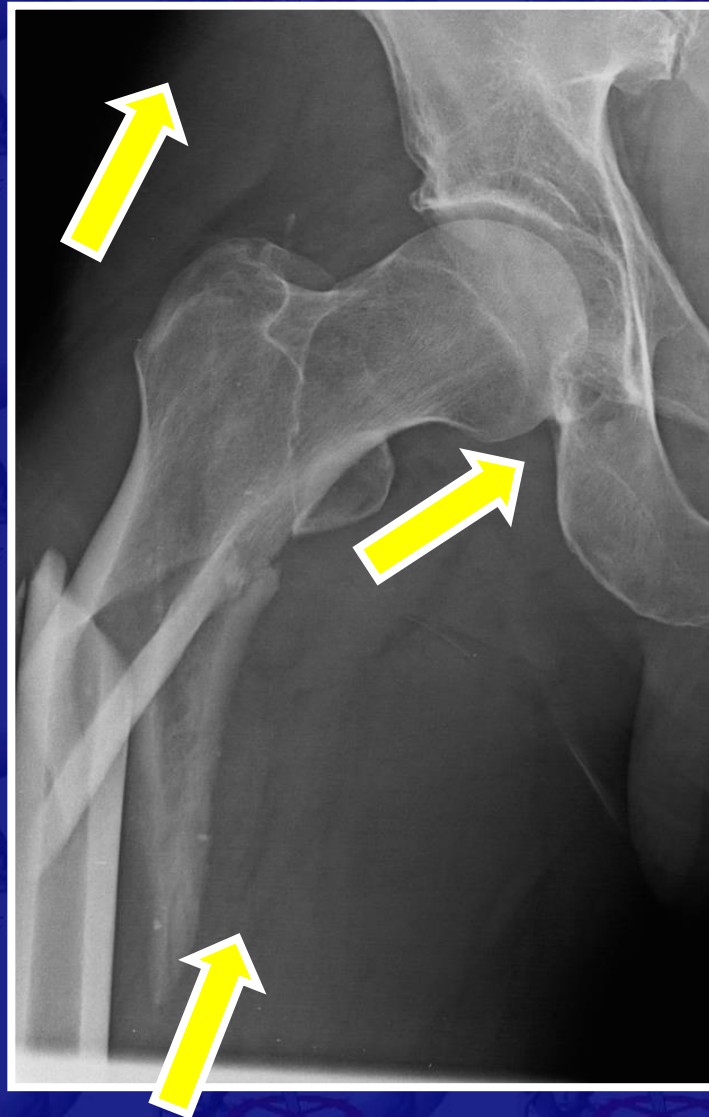
Forces and Problems II

- **region below the lesser trochanter is**
 - **eccentrically loaded**
 - **compressive medial forces are considerably greater than the lateral tensile ones**
- **Any internal fixation device is subject to significant concentrated bending stresses**
- **Leading to implant fatigue and fixation failure if fracture does not unite in time**

Forces and Problems III

gluteal muscles
abduct

these muscle forces
have to be overcome
in reduction + fx
fixation + healing



iliopsoas flexes the
proximal fragment

adductor muscles
shorten the femur

I prefer genucephalic nailing

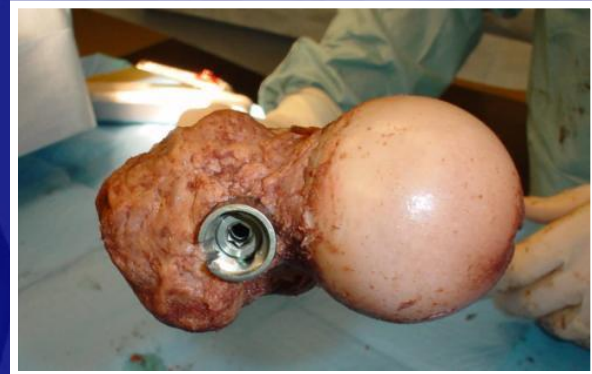
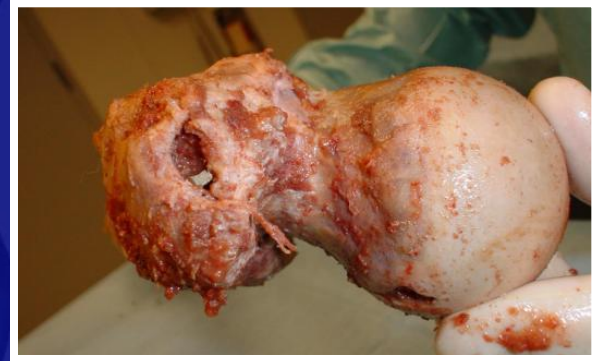


Problem insertion point-nailing

- **Reduction and starting point are key issues !**
- **Inappropriate starting point leads to malreduction**
 - The tip of the trochanter or slightly medial is the entry site of choice for antegrade trochanteric nailing of subtrochanteric fractures
 - The lateral starting point, even 2-3 mms from the tip of the trochanter, is to be avoided (Ostrum R, JOT 2005)

Three different entry points

- tip of trochanter
- 2-3 mm medial to tip
- 2-3 mm lateral to tip



Treatment I

- **Extramedullary devices**
 - **ORIF**
 - **DHS, Sliding Plate, DCS, locking plates**
- **Intramedullary devices**
 - **short vs. long**

Treatment II

- **“Golden Standard” – genucephalic nail (antegrade)**
 - shorter lever arm of the fixation
 - extraarticular starting point
 - better load sharing
 - less bending movement across the fracture site and implant

→ however 7 to 20% non-union rate

Complications

- **Infection**

- **VTE**

- **Implant failure**

- varus malreduction
- screw placement in femoral

head

- **Malunion**

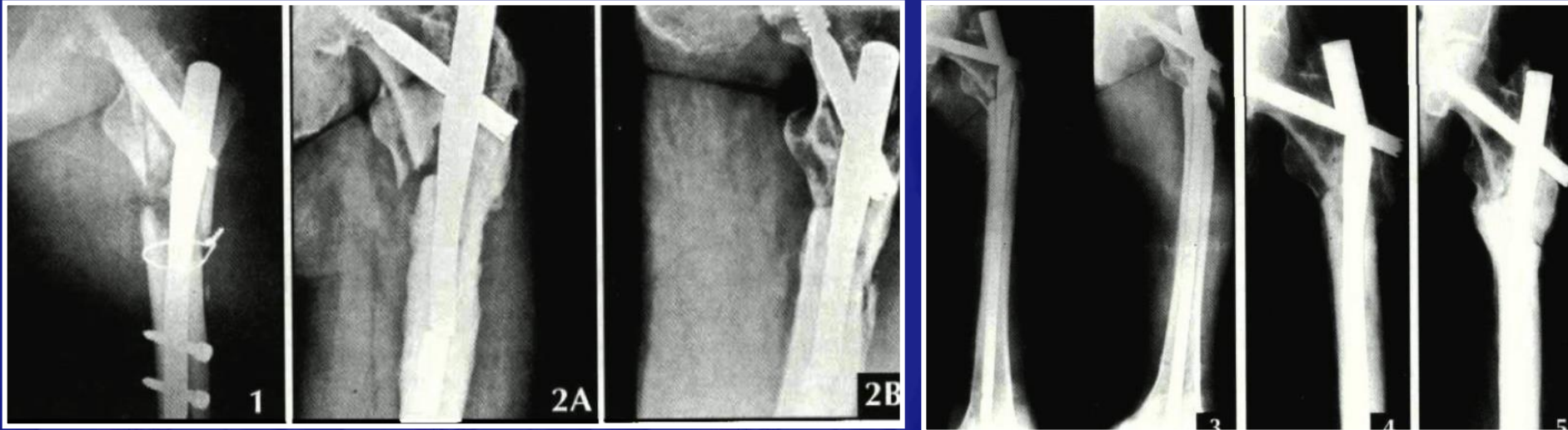
- shortening
- rotational deformity
- varus

- **Non-union**

- pain > 6 months
- stable fixation – autogenous bone grafting
- exchange nailing with over-reaming

Failed subtrochanteric Fx I

- Implant breakage (at 6 months)
- Mal / Non-union
- Cutting through ← poor bone quality

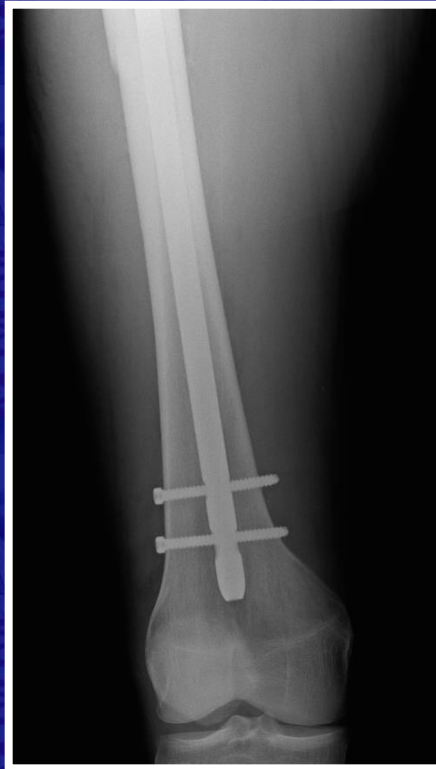


Similar case preop x-rays



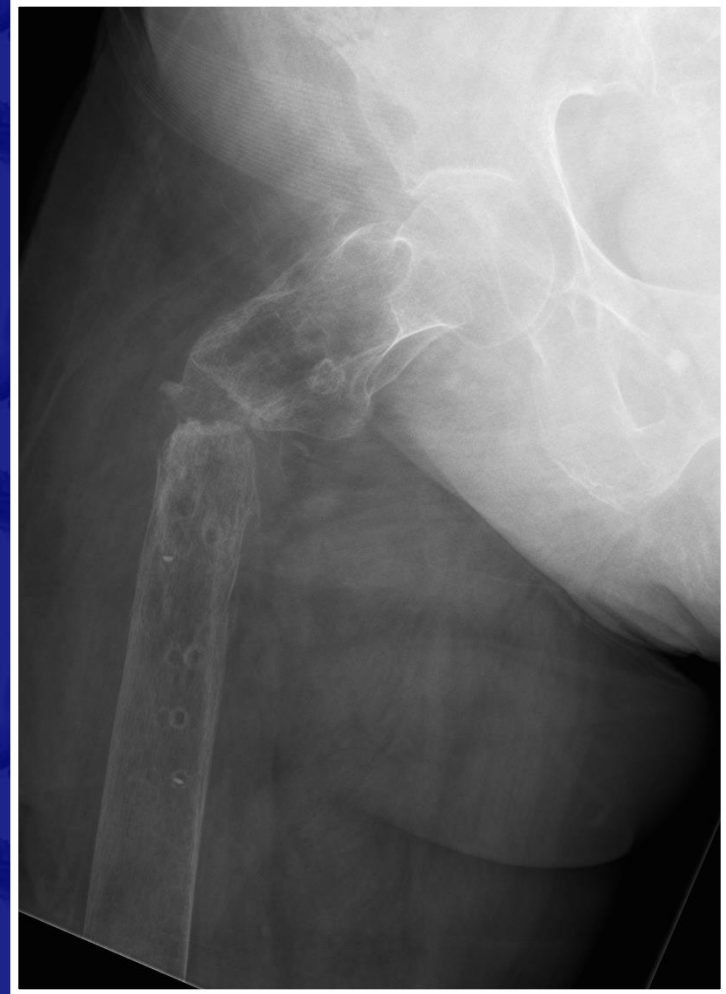
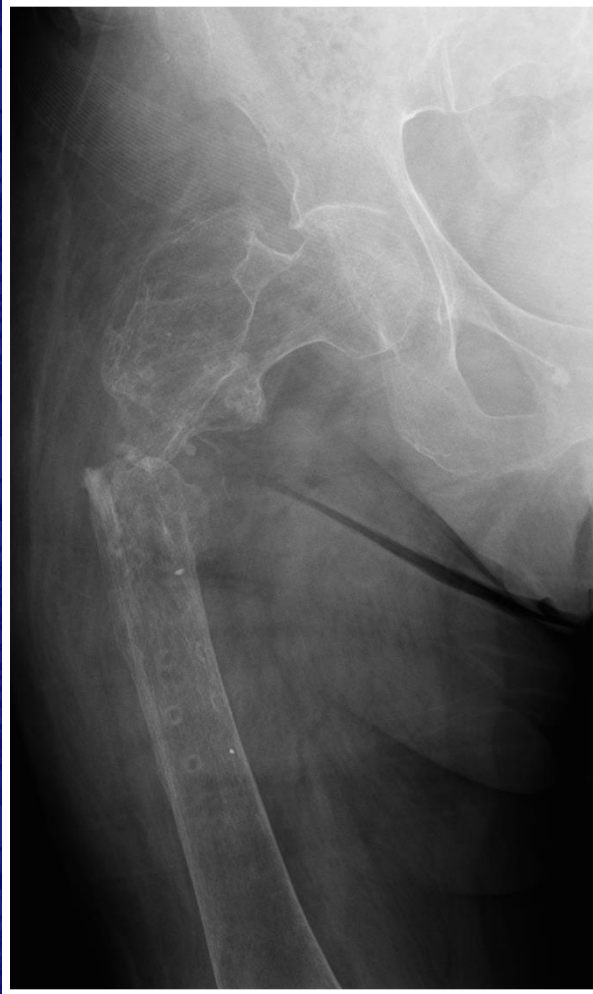
Subtrochanteric fracture with dislocation

X-rays post op

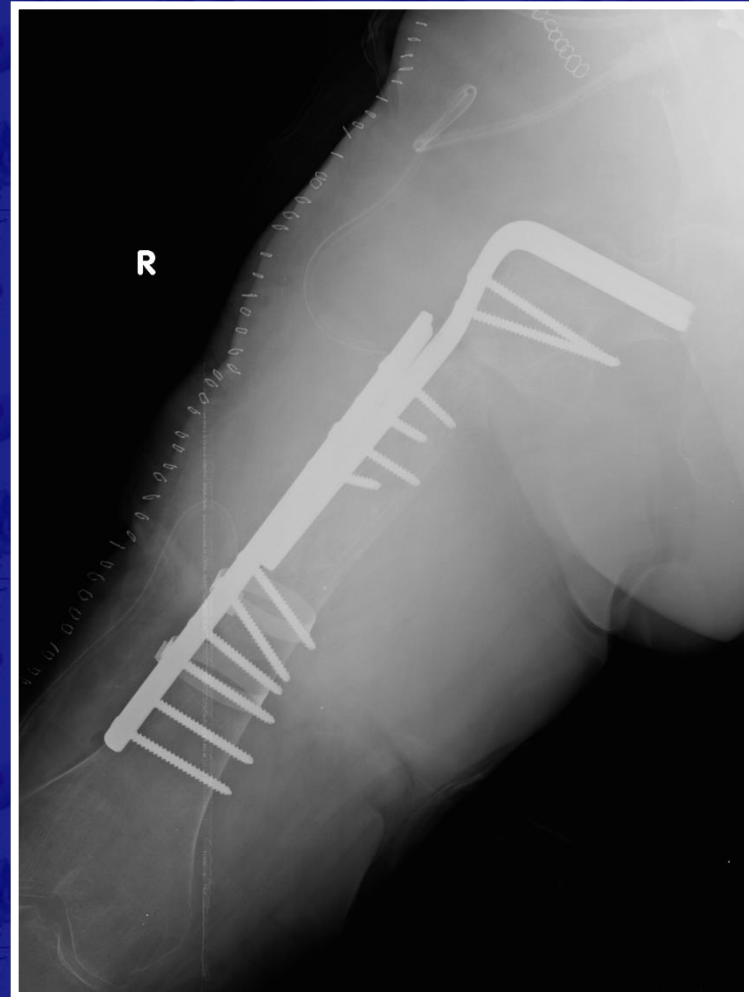
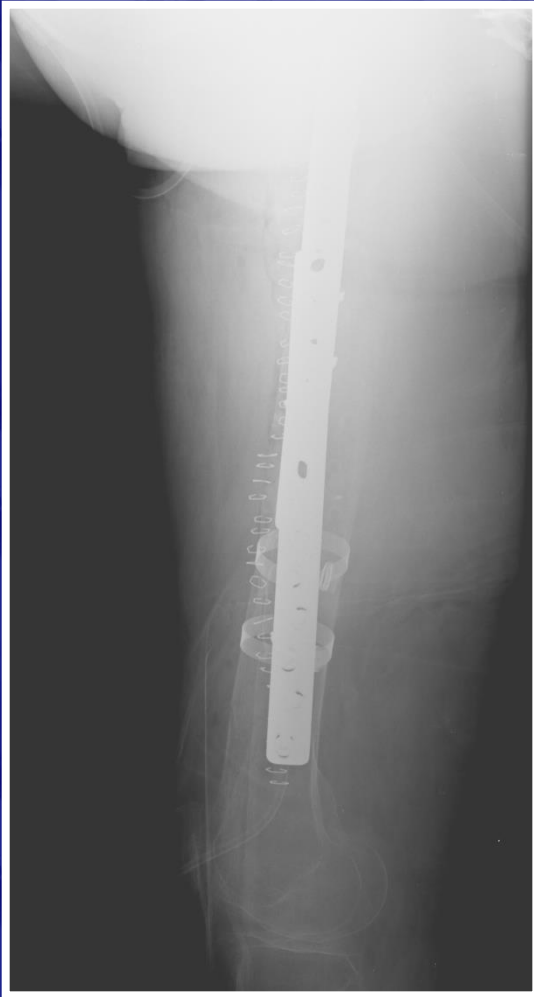


nail + cerclage prerequisite for nonunion
periosteal + endosteal blood supply destroyed

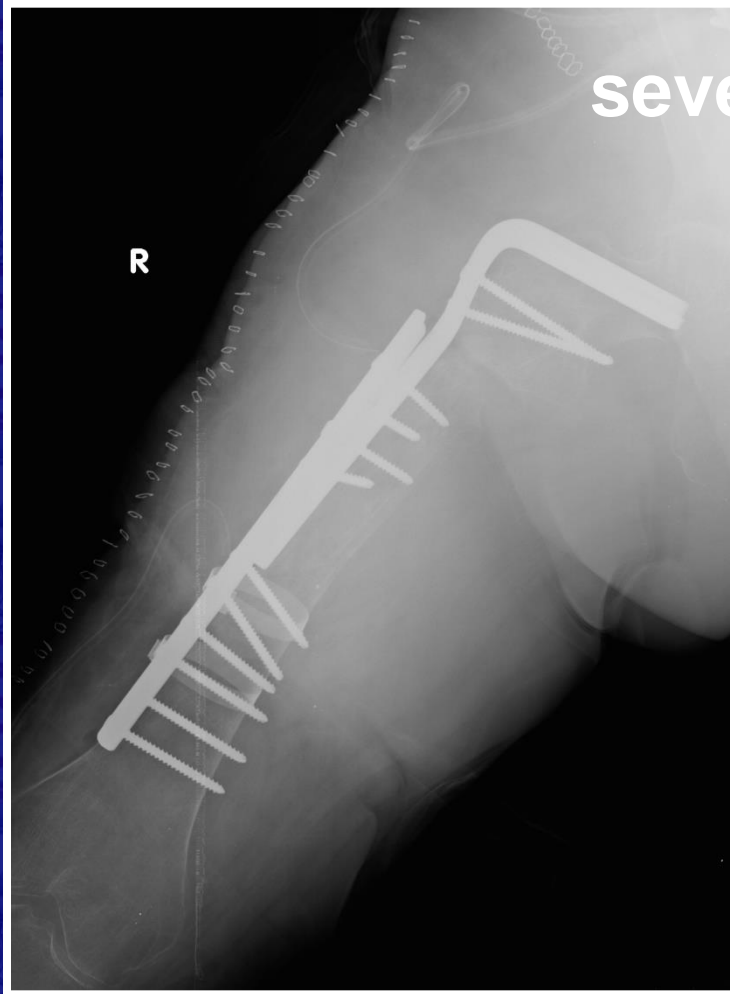
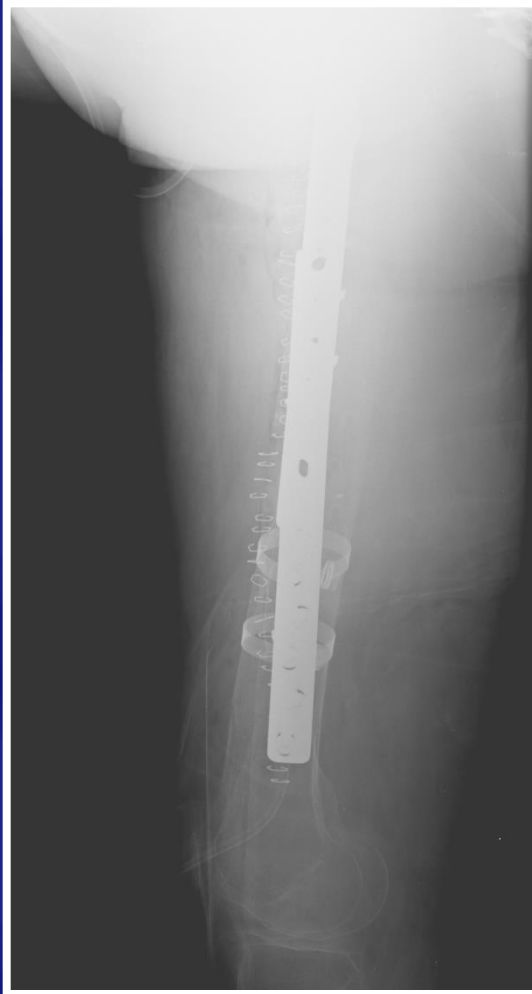
Subtrochanteric nonunion



blade plating severe osteoporosis

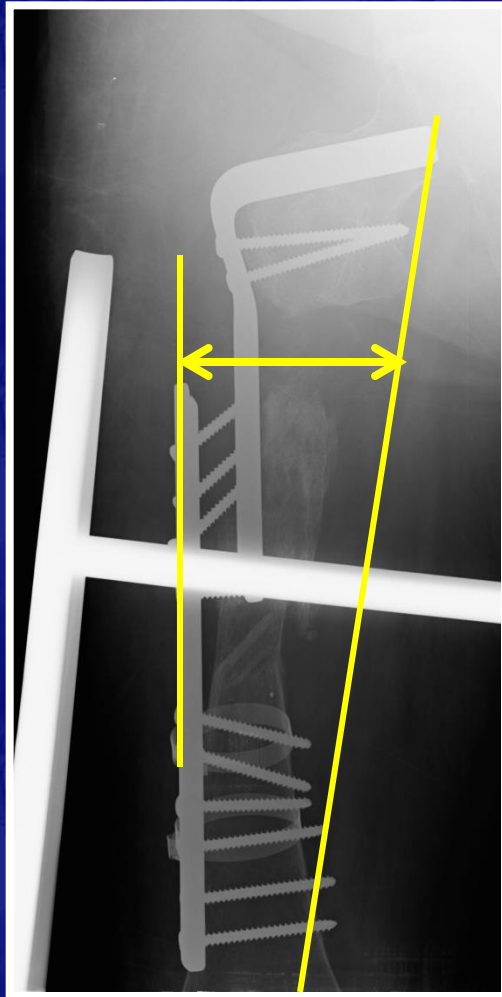


blade plating multiple mistakes



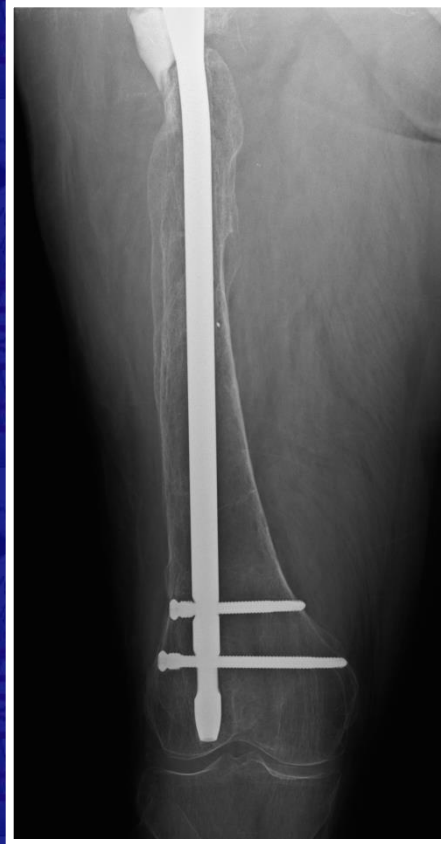
severe osteoporosis
biomechanics
biology

X-rays post op –periprosthetic FX



2 weeks after double-plating-bending moment too high

X-rays at latest FUP



Refobacin-Palacos filling as spacer

Take Home Message

bone healing requires a harmony of best biology + fixation

attention to bone quality, fx reduction + fixation

avoid plate fixation in obvious osteoporosis

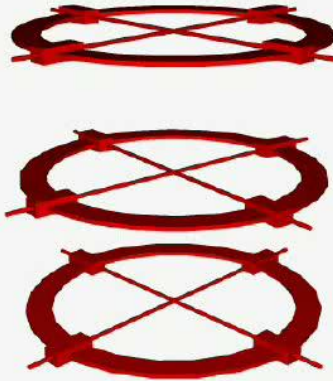
cephalomedullary nail treatment of choice

restricted weight-bearing postop

think before nailing + avoid cerclages



Thank you



USA

Austria