

Surgical treatment of osteoporotic proximal femoral fractures

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Proximal femoral fractures

- big challenge for orthopaedic surgeons

Incidence

USA (280 mil. inhab.) 310 000 / year

U.K. (60 mil. inhab.) 80 000 / year

Czech republic (10 mil. inhab.) 18 000 / year

World 1.8 million / year

Incidence of proximal femoral fractures

95 % over 65 y. of age

5 % under 65 y. of age

90 % in osteoporosis



Features

Lower bone quality

More comminution of bone fragments

Lower fixations of implants in the bone

Higher demands on perfect technique of internal fixation



Patients with fractures of proximal femur

Mortality 20 % within one year

Only 40 % get their previous quality of life

20 % require care in long term facility



Proximal femoral fractures

St. Anna Hospital, Brno, Czech republic

Period	2006 - 2010 y.
Number of patients	612
Male	184
Female	428
The mean age	72 y. (26- 96)

Proximal femoral fractures

n= 612

Intracapsular	142
Trochanteric	342
Subtrochanteric	127

Intracapsular fractures

Usually in elderly

Osteoporotic

Femoral head - varus
- retroversion

Comminution of posterior aspect
of the femoral neck

Disruption of the blood supply

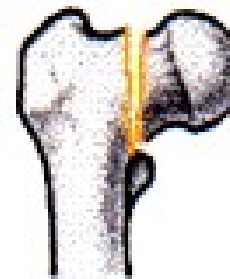
Complications:

Avascular necrosis of the femoral head

Nonunion



B1
Extra-articular fx,
neck,
subcapital,
with slight
displacement



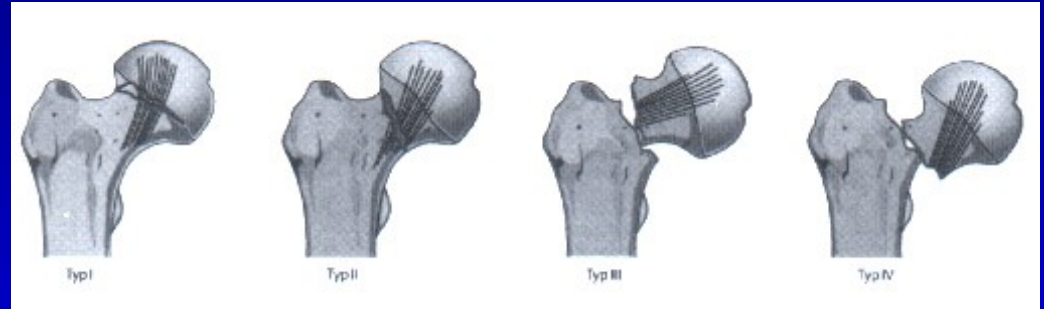
B2
Extra-articular fx,
neck,
transcervical



B3
Extra-articular fx,
neck,
subcapital,
displaced,
non impacted

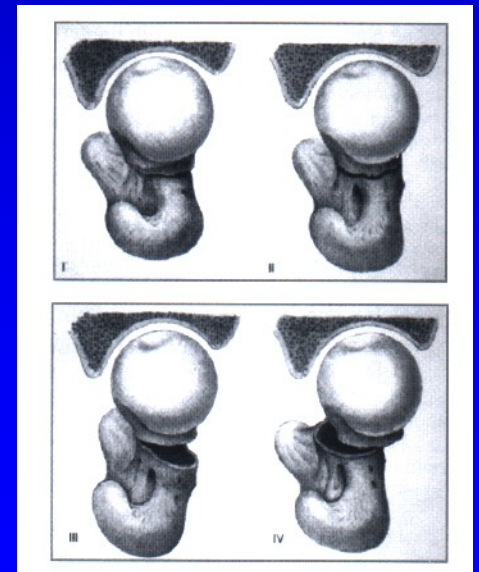
Intracapsular fractures

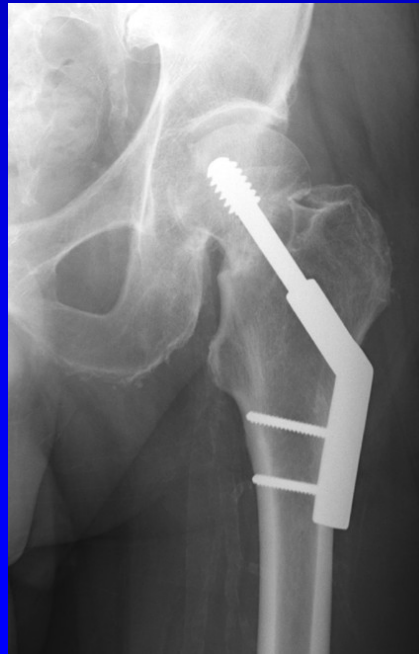
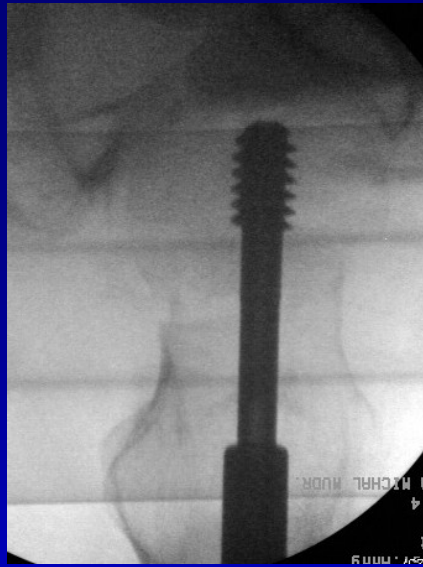
Surgery should be done
within 24 hours



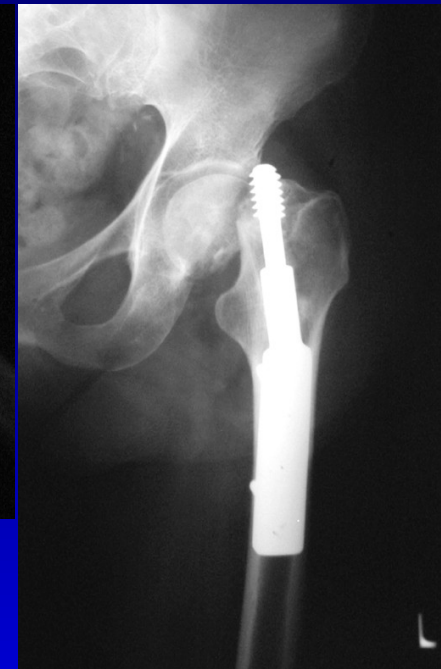
The risk of nonunion and
avascular necrosis of the
head increases after
2 days progressively

Garden classification





M 66 y., intracapsular fx.
Reduction in slight valgus
Correct position of the screw
Successful healing with DHS



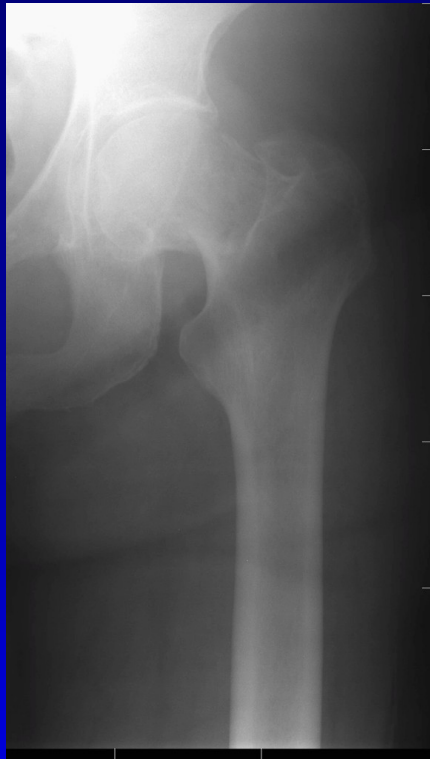
F. 76 . Intracapsular fx of the neck, Garden IV.
short lag screw of DHS
thread in fracture line
cut out phenomenon
Thompson hemiarthroplasty



M 73 y. Intracapsular fr., Garden IV.
DHS with a short screw,
thread in fracture line
cut out phenomenon



M 79 y. Intracapsular fx, cut out phenomenon of DHS
indication for THR or hemiarthroplasty



F 73 y. Intracapsular fx with varus dislocation
Uncorrect reduction with DHS
long thread of the lag screw in fracture line
nonunion of the neck



F 86 y, Subcapital fx Garden IV.
Dislocation of Thompson prosthesis
Revision with cemented THR



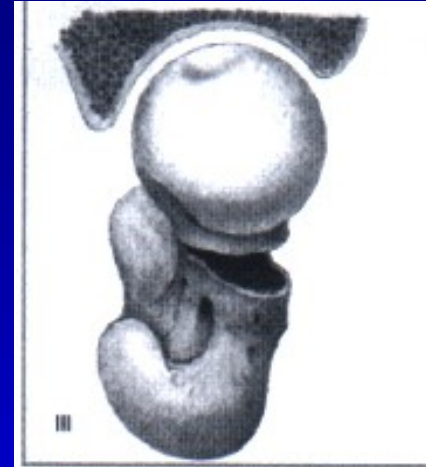
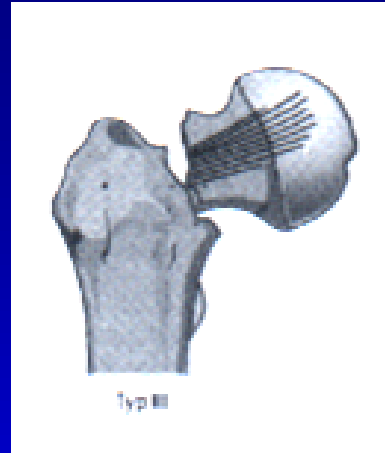
F 57 y. Intracapsular fx
Patient admitted 48 hours after injury
Indication for THR

Intracapsular fx, n= 142 - complications

Cut out phenomenon (nonunion)	4
Fracture of DHS (nonunion)	3
Instability of DHS (nonunion)	6
Necrosis of femoral head	21

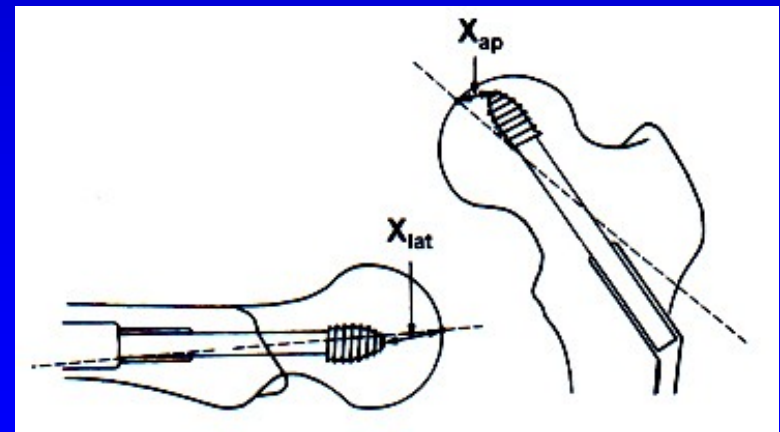
Causes of failure- intracapsular fx

Uncorrect reduction
(CCD angle and retroversion)



Garden III.- retroversion

Uncorrect insertion of screws
in the head – neck region



Short screws (TAD over 25 mm)

Normal TAD index 10 mm

Causes of failure- intracapsular fx

Wrong indication for DHS instead of THR in Garden III. fx. in patients over 65 y.

Longer time of dislocation of the fx over 48 hours – head necrosis

Underestimation of the stage of osteoporosis



Vascularity of femoral head

Disturbance of perfusion of the head by

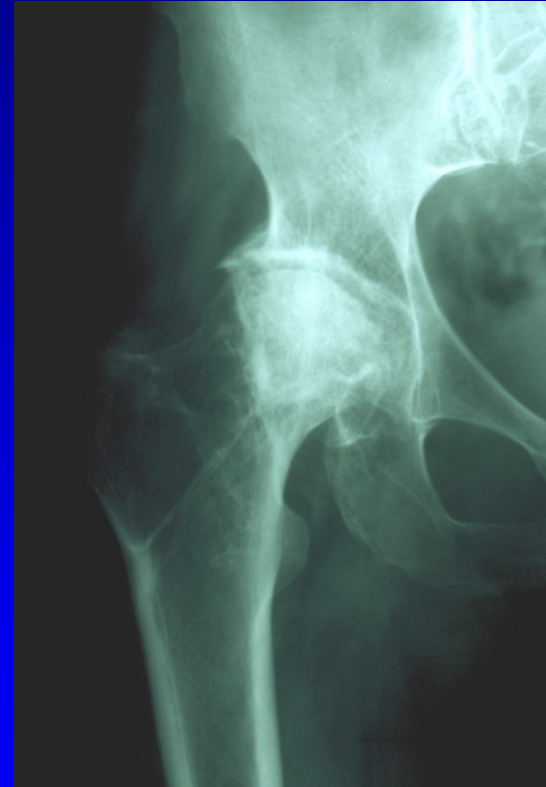
- dislocation of fragments
- pressure of intracapsular hematoma

Assessment of vascularity by MRI

Decompression: aspiration
leading K- wire into the joint

Internal fixation – within 24 hours

After 48 hours higher risk
of avascular necrosis



Management of femoral neck fractures

Garden I.

Conservative treatment

If not successful - arthroplasty



Garden II.

Up to 70 y. DHS

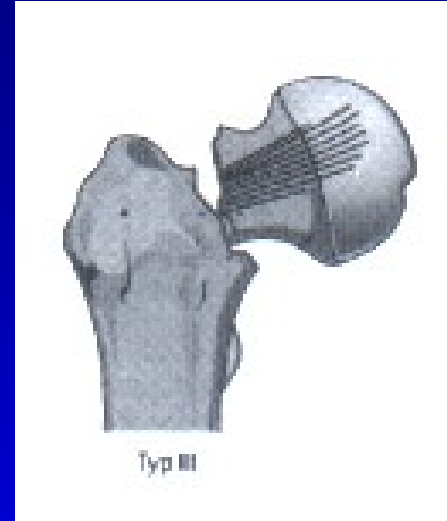


Management of femoral neck fractures

Garden III.

Up to 65 y. DHS

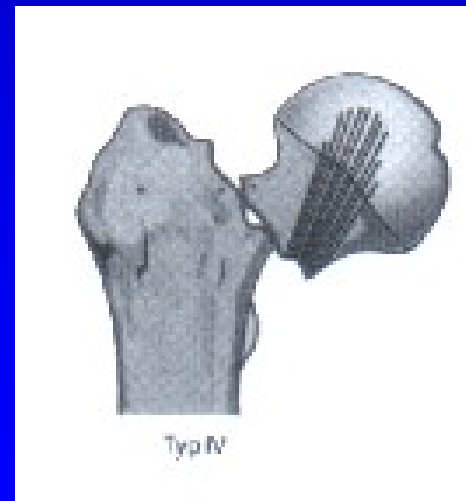
Over 65 y. arthroplasty



Garden IV

Up to 60-65 y. DHS

Over 65 y. arthroplasty

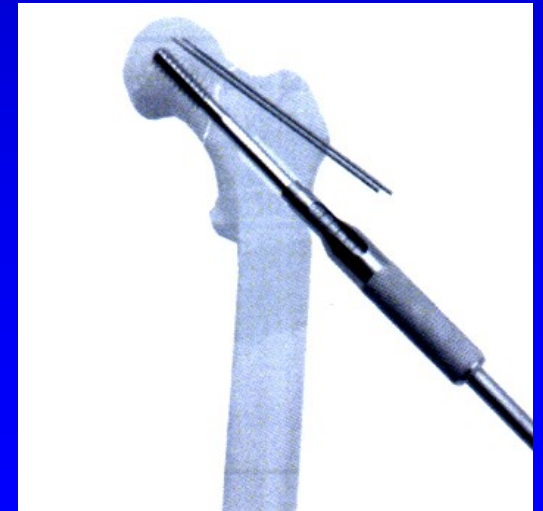


DHS

Implant of choice in
intracapsular fx
stable pertrochanteric fx

1-2 K wires in upper part of the neck
intraoperatively to avoid twisting of the head

DHS is preferable versus 3 screws



Hemiarthroplasty

Cemented - uncemented

Monoblock - modular type

Unipolar - bipolar

Metal head - ceramic head

Over 80 y.

Higher risk of acetabular erosions



THR

It is preferable versus hemiarthroplasty

In dislocated fx over 65 y.

In fractures with O.A. of the hip

3 - 5 % of dislocation

2 - 4 % of septic complication

Reoperation rate in elderly:

Internal fixation 40 %

Arthroplasty 4,5 %



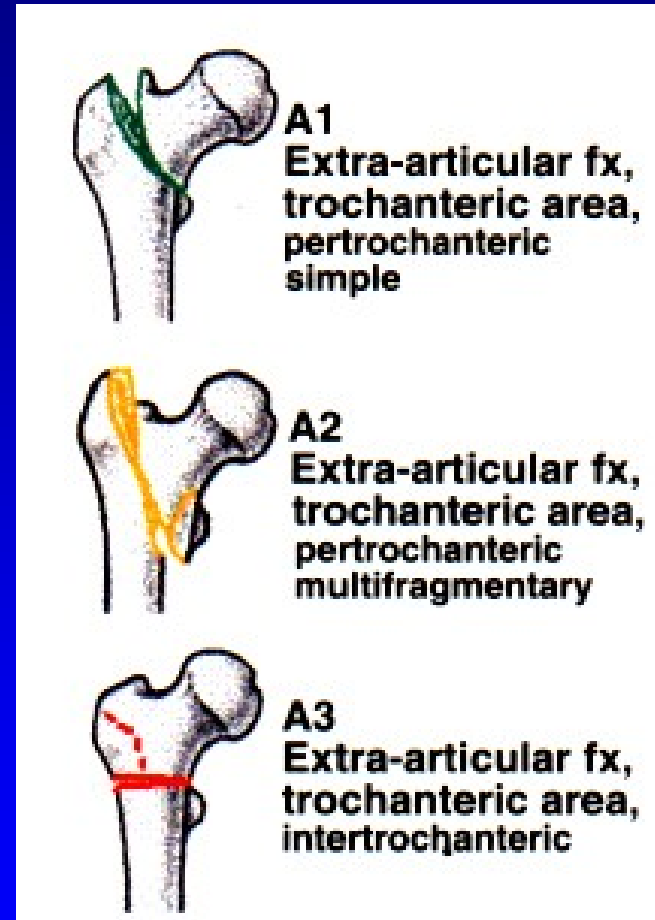
Trochanteric fractures

Occurs usually over 65 y.

Often osteoporotic

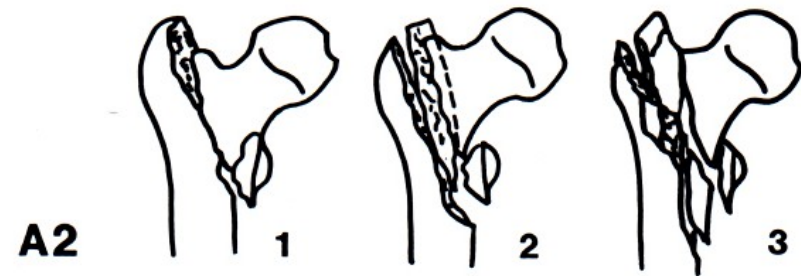
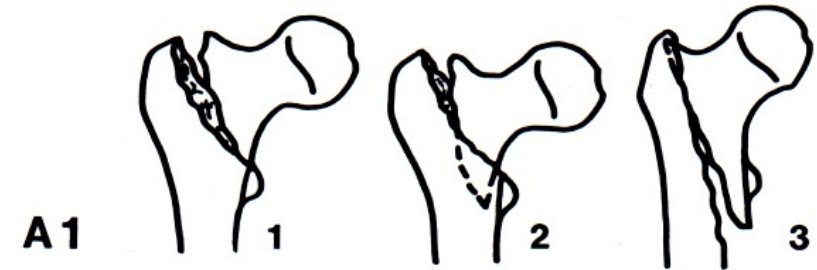
Significant comminuted fractures

Low energy trauma

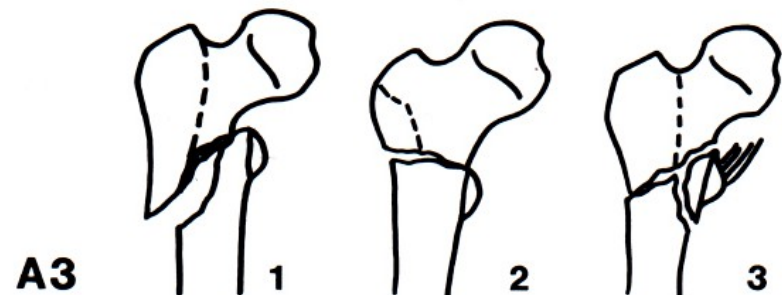


Trochanteric fractures

A1 stable

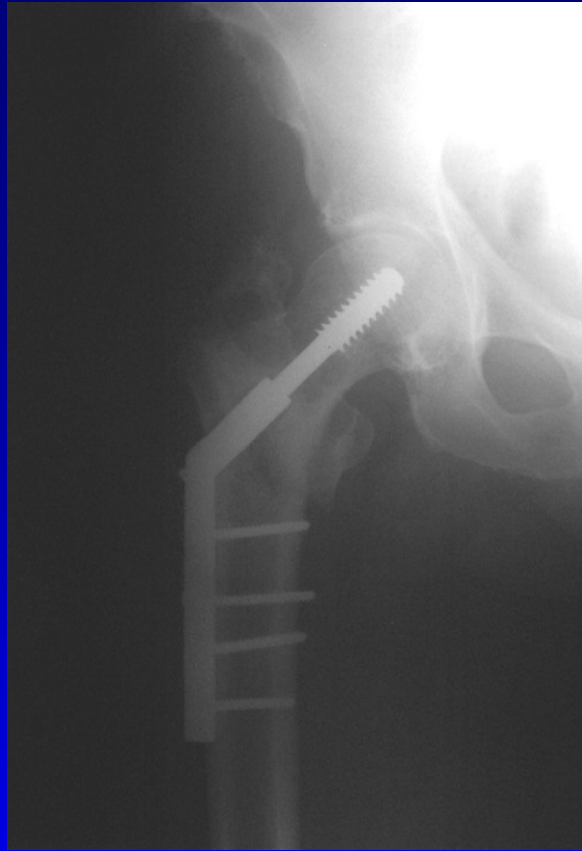
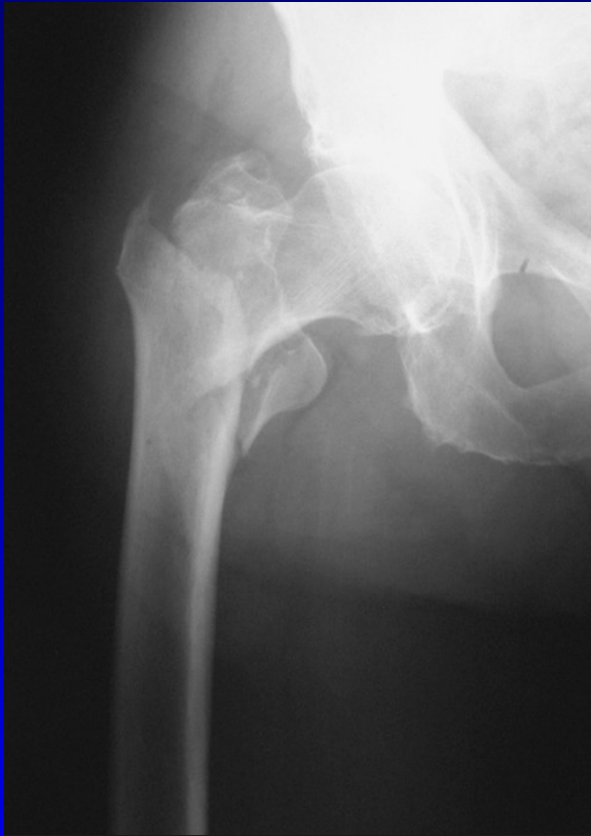


A2 , A3 unstable



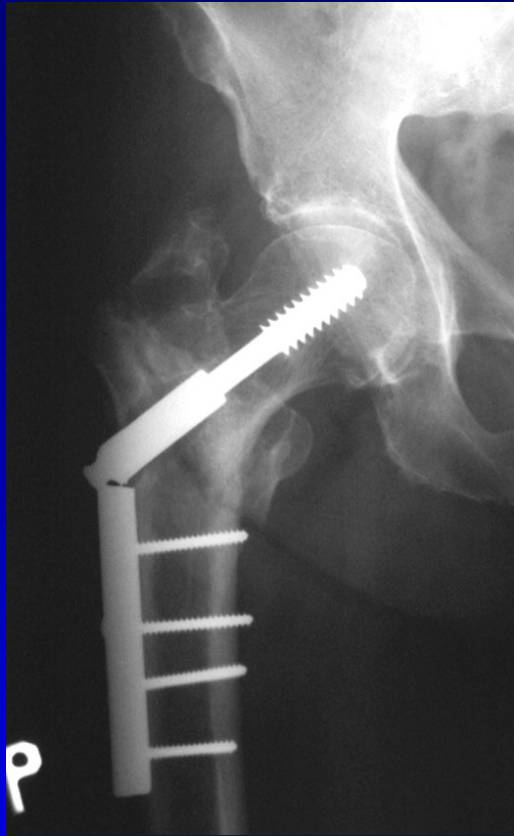


F 69 y. Unstable pertrochanteric fx, 31A2
short lag screw
failed OS with varus redislocation
Thompson hemiarthroplasty



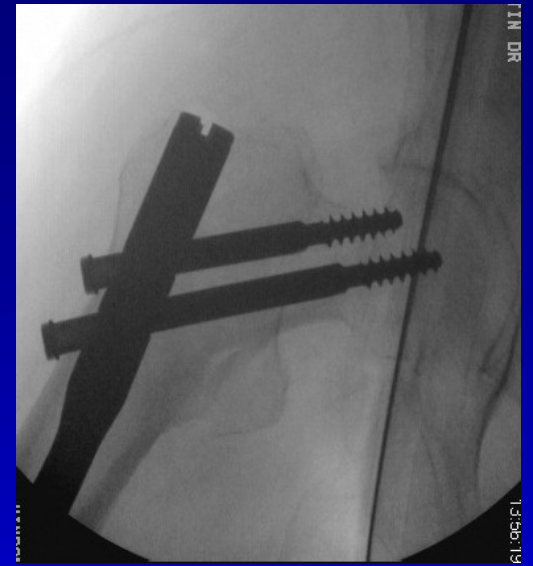
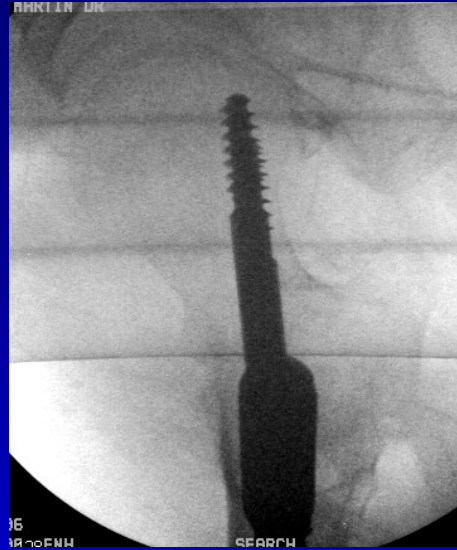
F 65 y.

Pertrochanteric fx, 31 A2
DHS in situ
indication for PFN

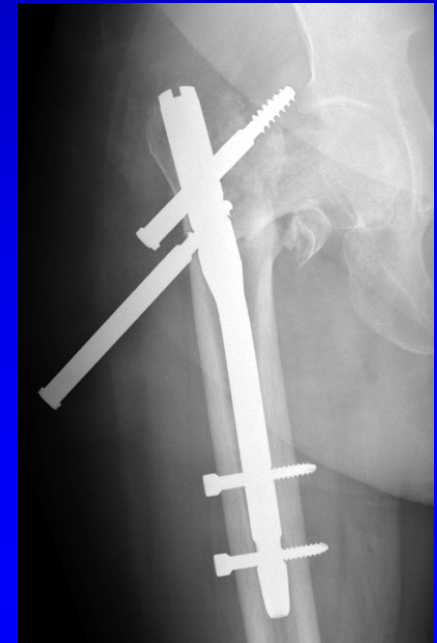


F 65 y.

Fracture of the implant
healed fx with a shortening

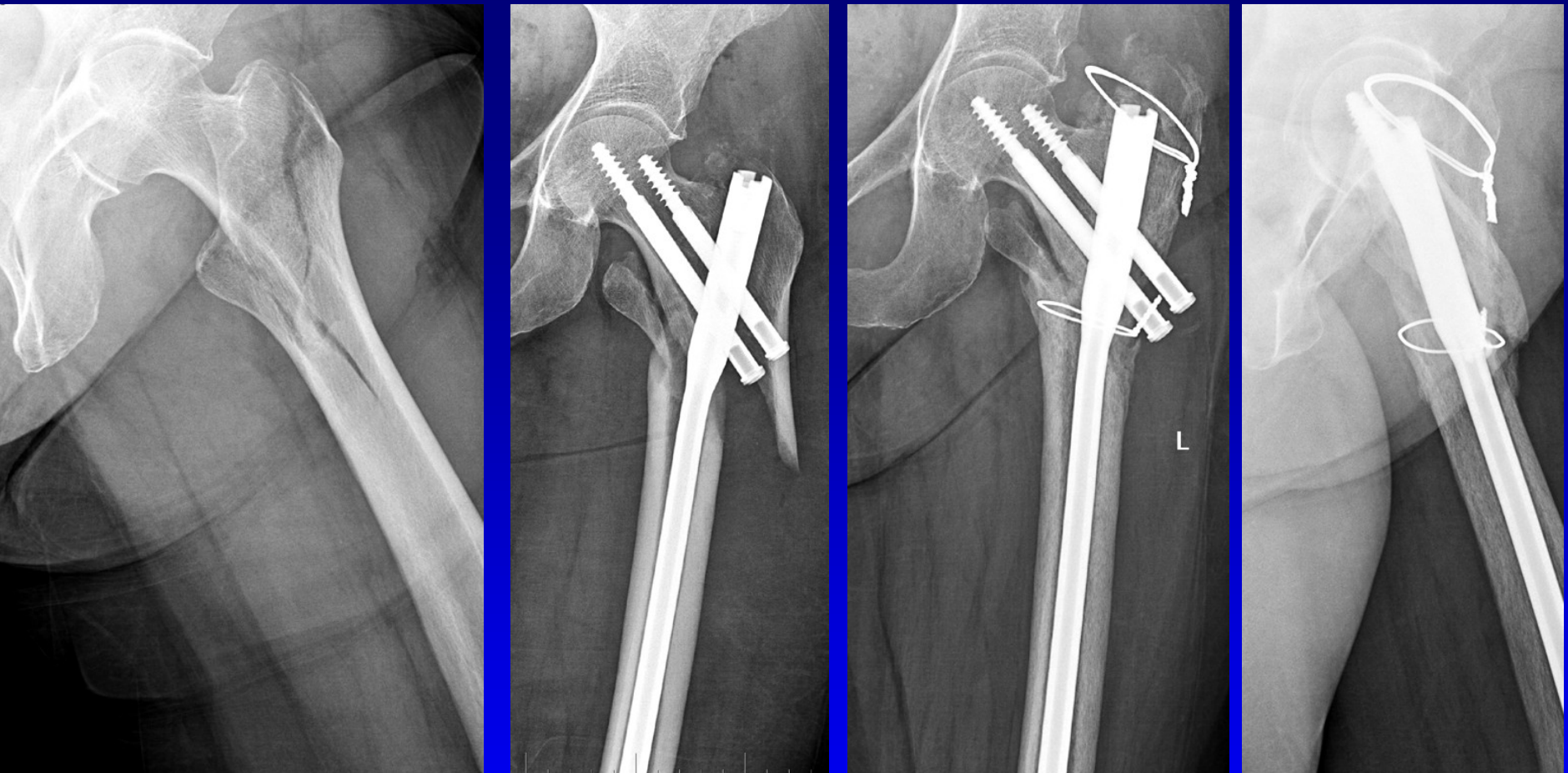


F 64 y Pertrochanteric fx, 31 A2
posterior position of the screw
screw cut - out, varus collapse

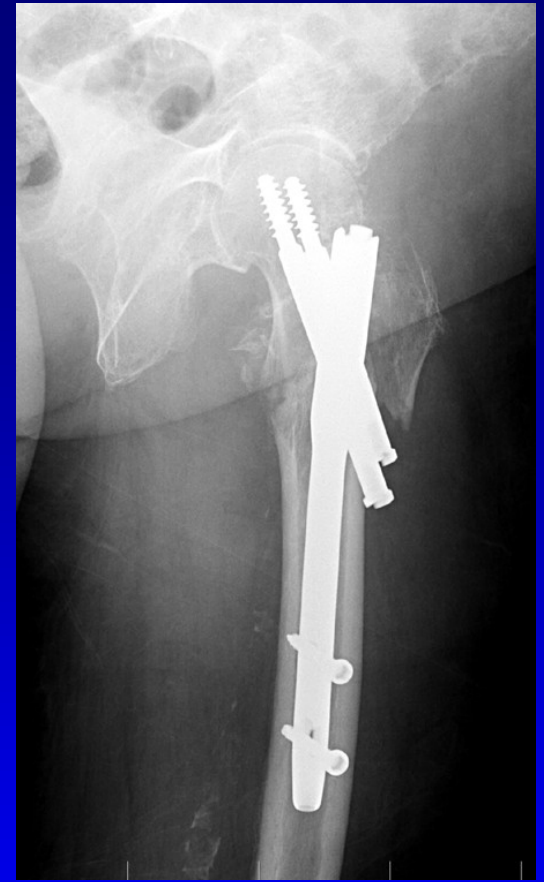




F 64 y. Reosteosynthesis, good result with reconstruction nail



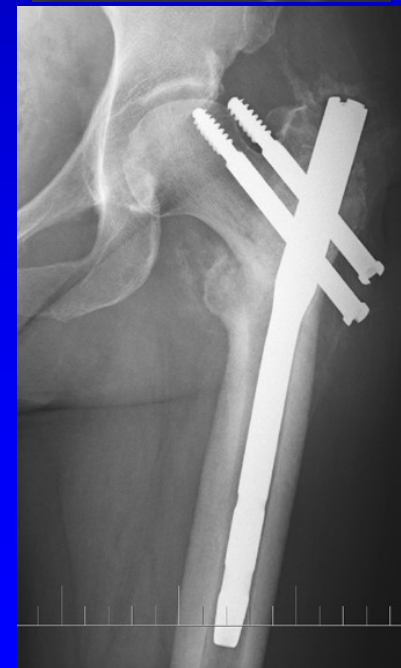
F. 60 y. Pertrochanteric fx with a subtrochanteric extension
uncorrect reduction and OS
succesful reosteosynthesis with reconstruction PFN



F 83 y. Comminuted trochanteric fx with severe osteoporosis, 31 A2 PFN osteosynthesis



F 83 y. after 6 weeks redislocation in osteoporotic bone
salvage with cemented THR



M 58 y. Pertrochanteric fx
Osteosynthesis with PFN nail
proximal and posterior position of screws

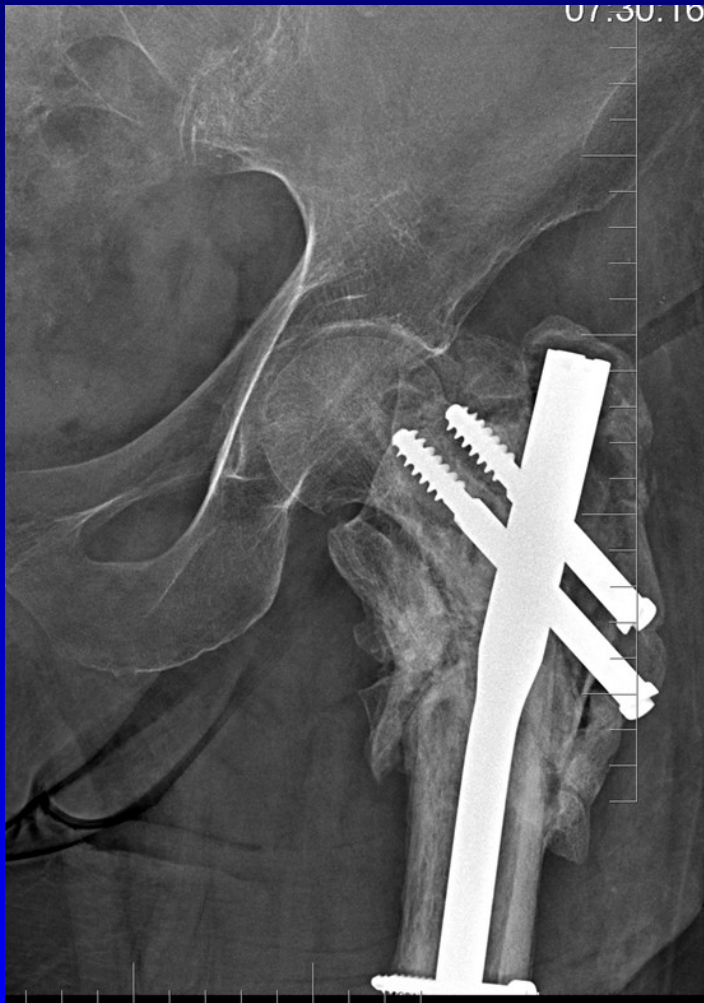


M 58 y. Reosteosynthesis
Correct entry point of the screw
Screw in the centre of the neck and head

Healed fx



F 64 y. Reverse comminuted 31A3 fx
severe comminution, screw cut - out



F 64 y. Healed with shortening, ossifications
progression of O.A. of the left hip joint

Trochanteric fx, n= 342 - complications of PFN

Uncorrect reduction	2
Short screws	3
Proximal placement of screws	2
Instability	3

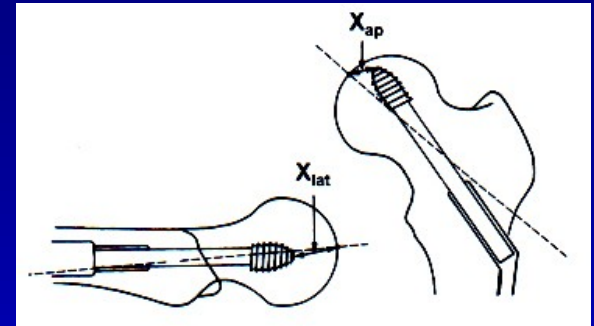
Causes of failure in trochanteric fx

Uncorrect reduction

Short screws (index TAD over 25 mm)

Uncorrect insertion of screws
in the neck – head region

Severe distraction of fragments



Normal TAD index 10 mm



Causes of failure in trochanteric fx

Varus instability

- comminution with posteromedial fragment

Medial instability

- comminution of lateral cortex

Too early weight bearing

Infection

Underestimation of the stage of osteoporosis



Subtrochanteric fractures

Intramedullary nails
reconstruction nails or IMHS

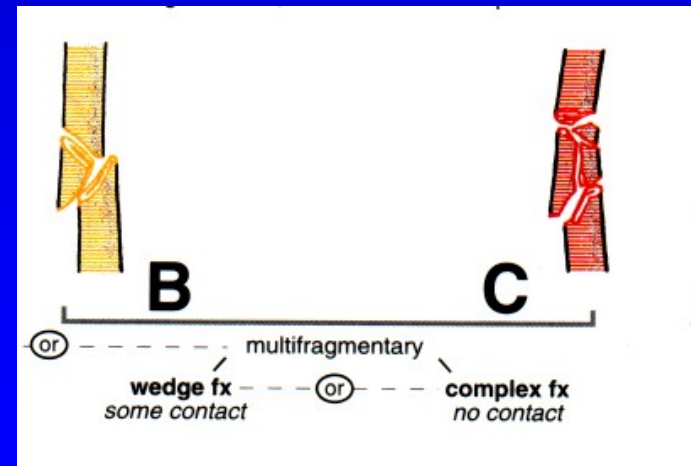
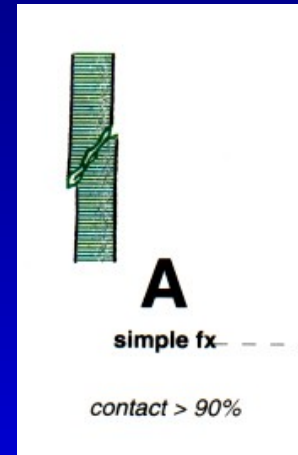
Proximal double screw locking mode

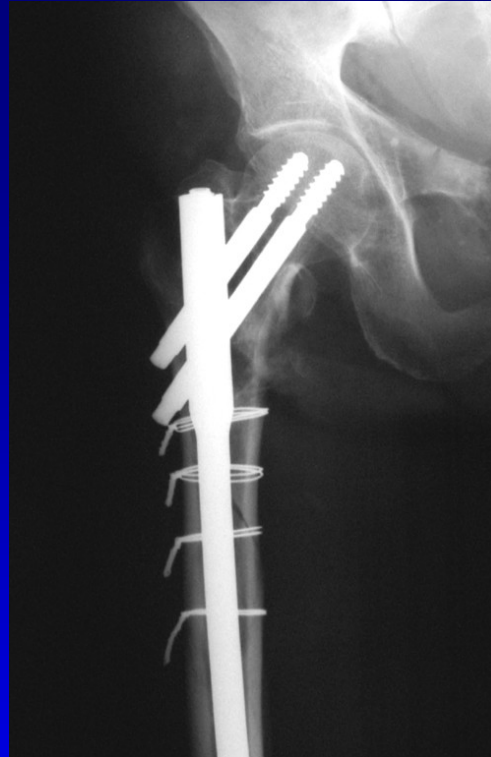
Potential for dynamic gliding

Stronger PFN in geriatric patients

Cerclage wires

THR- a salvage procedure

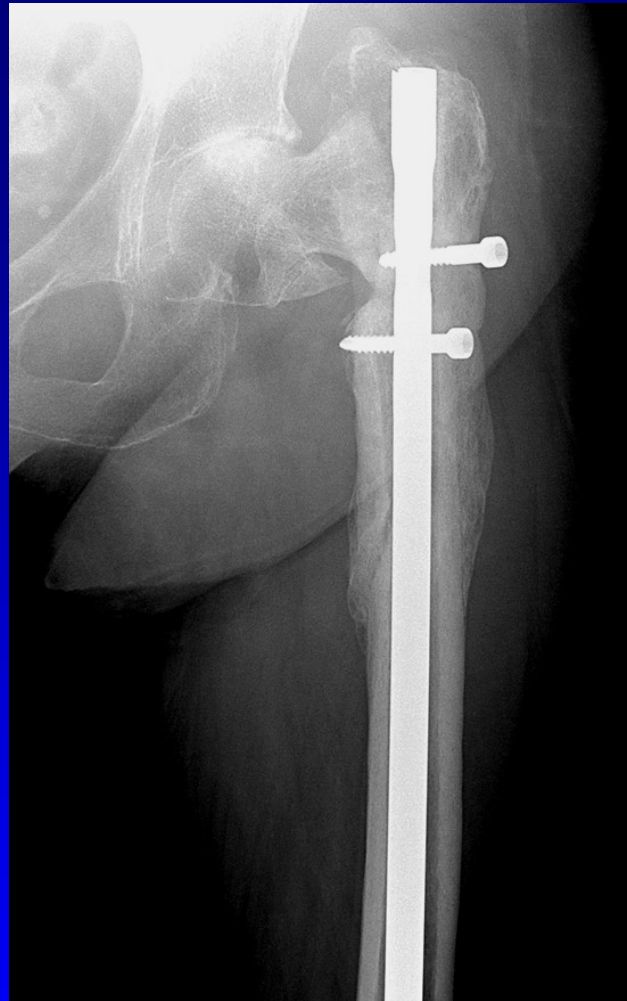




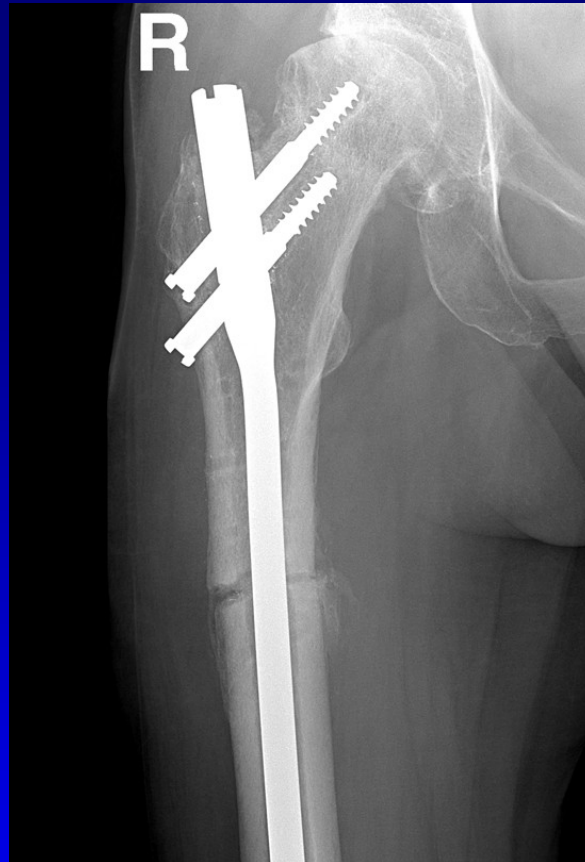
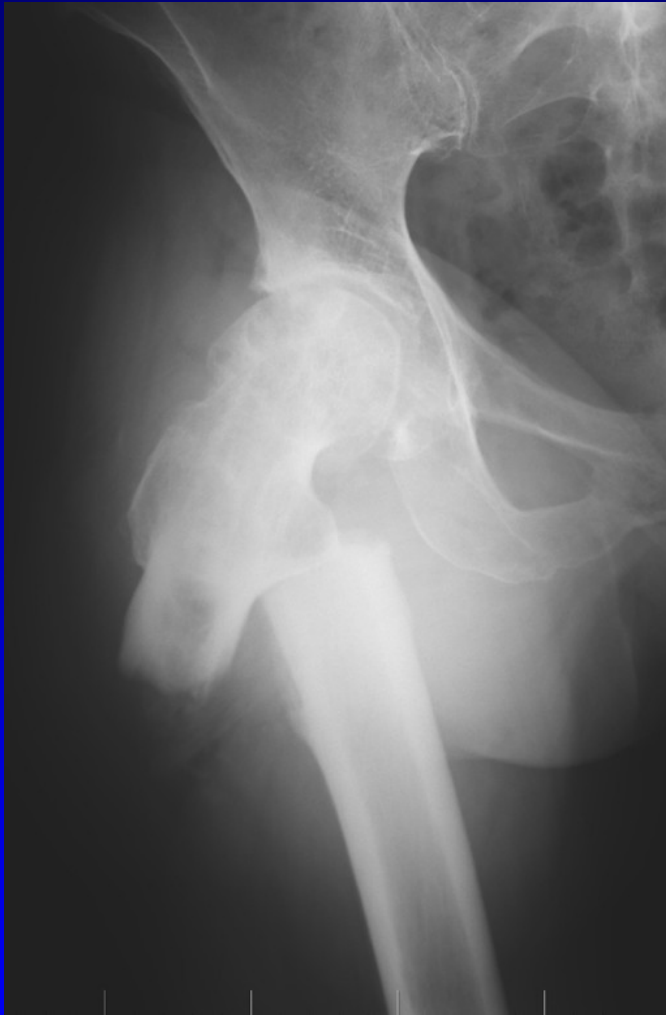
F 68 y. Subtrochanteric fx with a large posteromedial fragment even in a case of osteoporosis we can achieve good result with correct reduction and stable internal fixation - reconstructive nail with cerclage wires



F 66 y Subtrochanteric fx., O. A. of the left hip
coxa vara after pertrochanteric fx.
healing with reconstructive nail
indication for THR



F 66 y. Healed subtrochanteric fx.
coxa vara with O.A. of the left hip
indication for THR



F 65 y. Subtrochanteric fx, O.A. of the hip joint reconstruction nail



F 65 y. Progression of O.A.
Solved by cemented THR

Management of trochanteric fractures

In stable and unstable fractures

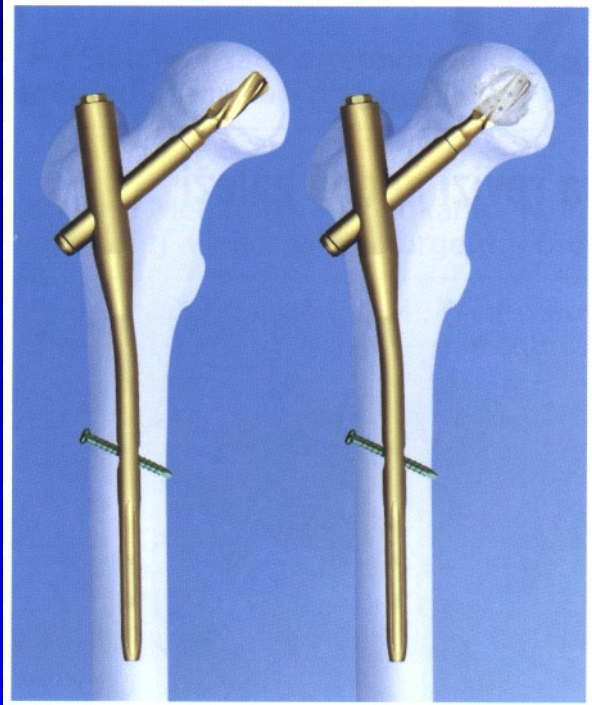
– PFN Medin

Advantage: - mininvasive procedure
- one surgeon

Dynamic distal fixation



Implants in osteoporotic bone



PFN A Synthes
Spiral blade in neck
Impaction of trabecular porotic bone
in subchondral region



Augmentation with
bone cement

Implants in osteoporotic bone



Drilling with small diameter holes
2 compression screws
Rotational stability
Controlled fracture impaction
Indication: intracapsular neck fx
stable pertrochanteric fx

Gotfried P.C.P

Conclusion

Correct assessment of the fracture type

Correct indication- OS or arthroplasty

Choice of implant

Correct reduction

Correct position of the screws

Stable fixation

More complications come from
incorrect technique than from osteoporosis



Thank You for Your attention

