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

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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

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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

tese muscle forces
have to be overcomed
in reduction + fx
fixation + healing

iliopsoas flexes the proximal fragment

adductor muscles
shorten the femur

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I prefer genucephalic nailing

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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)

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Three different entry points

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

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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

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Failed subtrochanteric Fx I

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

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Similar case preop x-rays

Subtrochanteric fracture with dislocation

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

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Subtrochanteric nonunion
blade plating severe osteoporosis

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blade plating multiple mistakes

severe osteoporosis
biomechanics
biology

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X-rays post op – peri-prosthetic FX

2 weeks after double-plating-bending moment too high

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X-rays at latest FUP

Refobacin-Palacos filling as spacer

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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