Intertrochanteric Fractures

Anatomic considerations

- Capsule inserts on IT line anteriorly, but at midcervical level posteriorly
- Muscle attachments determine deformity

Radiographs

Plain Films
- AP pelvis
- Cross-table lateral
- IR Traction view when in any doubt!!

Radiographic Evaluation

- Cross table lateral
- Posterior comminution and sag

“Fracture stability”

The ability of the reduced fracture to support physiologic loading

Fracture Stability relates not only to the # of fragments but the fracture plane as well
Fracture Reduction

*Surgical goal:* Biplanar, anatomic alignment of proximal & shaft fragments

Limited role for reduction & fixation of trochanteric fragments (biology vs stability)

Factors Influencing Construct Strength:

*Uncontrolled factors*
- Fracture Geometry
- Bone Quality

*Surgeon controlled factors*
- Reduction
- Implant Placement
- Implant Selection

Screw Position: TAD

Tip-Apex Distance = $X_{ap} + X_{lat}$

Probability of Cut Out

Baumgaertner, Curtin, Lindskog, Keggi JBJS (A) ’95
**Optimal Screw Placement**

*Dead Center and Very Deep (TAD<25mm)*

- Best bone
- No moment arm for rotational instability
- Maximum slide
- Validates reduction

**Sliding hip screw**

Historically the implant of choice for all IT fxs

**Sliding creates deformity, how much is too much**

**Significance of excess sliding**

- Jacobs (1980) – 15.7 mm sliding in unstable IT’s treated with DHS
- Rha (1993) – Excessive sliding major cause of fixation failure
- Steinberg (1988), Kyle (2000) – increased failure and decreased function when > 15mm sliding
- Baixauli (1999) – pain with >15mm sliding

**Intramedullary hip screws**

- Insertion through greater trochanter
- Valgus offset of proximal nail
- Proximal aspect of nail wider to allow lag screw passage
- Placed through small incision
- Limit amount of screw sliding
- More expensive than SHS
Advantages

- Biomechanically superior to screw/sideplate
- Shorter moment arm
- Decreased tensile strain on the implant may lead to decreased failure rates

Controlled collapse

- IM Buttress
  - Not dependant on lateral cortex
  - Screw has less excursion
  - Nail supports Intertrochanteric zone

Advantages

- Treatment is not dependent on plate fixation to an intact lateral cortex

Mechanical Advantage

- IM nail
  - IM nails better for subtrochanteric and some unstable trochanteric fractures

Cochrane collaboration 2010

SHS
- SHS has fewer complications and same functional outcome

IM nail
- IM nails better for subtrochanteric and some unstable trochanteric fractures

Further studies are required to confirm whether more recently developed designs of IM nails avoid the complications of previous nails
Gamma nails revisited: a meta-analysis  
Bhandari et al. JOT 2009

- Evaluated more recent RCTs of Gamma nails to SHS  
  Design change eliminated fractures at tip of nail  
  Earlier meta-analyses and randomized trials should be interpreted with caution

More “modern” IMN’s

- Proximal Bend 4-6 degrees  
- Some have distal bend  
- Some have AR option  
- Most are Titanium  
- Most are “narrow” distally compared to “stove pipe” femur

American Board of Orthopeadic Surgeons (ABOS) data

IM Fixation: Best Indications

Reverse Oblique Fractures

Intertroch + subtrochanteric fractures

Thank you