
 **Debate: Sliding Hip Screw Fixation for Peritrochanteric Femur Fractures**
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Atlanta Trauma Symposium 2016 

Disclosure

- none

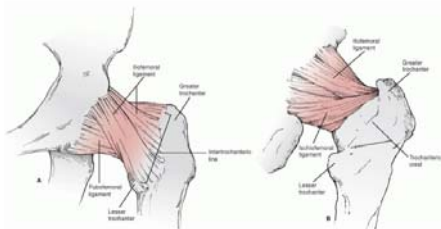
Outline

- Peritrochanteric Femur Fracture
 - Definition
- Classifications: Are they helpful?
 - Implant choice?
- Economic Considerations
- Review of recent Literature



Pertrochanteric Femur fracture

– Fracture involving proximal femur from extra capsular femoral neck to lesser trochanter region

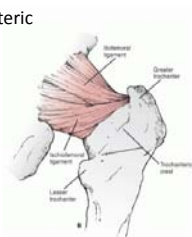


Pertrochanteric Femur fracture

– Fracture involving proximal femur from extra capsular femoral neck to lesser trochanter region



-Subtrochanteric Extension



Pertrochanteric Femur Fracture

- Classifications
 - Evans (1949)
 - Boyd and Griffin (1949)
 - Ramadier (1956)
 - Decouls & Lavarde's (1969)
 - Jensen's classification (1975)
 - Briot (1980)
 - **AO (1981)**

AO Classification

Müller et al (1981)

- A1 Simple pertroch
- A2 Multifrag pertroch
- A3 Intertroch
 - Distal to vastus ridge

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AO/OTA Classification

31 – A __

	Proximal femur					
	Diagnosis	Indication	Preparation	Approach	Reduction & Fixation	Aftercare
Trochanter	31-A1 pertrochanteric simple	31-A2 pertrochanteric multifragmentary	31-A3 intertrochanteric			
	31-B1 subcapital, with slight displacement	31-B2 transcervical	31-B3 subcapital, displaced, not impacted			
	31-C1 split (Pipkin)	31-C2 with depression	31-C3 with neck fracture			

AO/OTA Classification

31 - A __

Classification


- Stable
 - Simple fracture pattern
- Unstable
 - Postero-medial comminution
 - Subtrochanteric extension
 - Reverse Oblique Fractures

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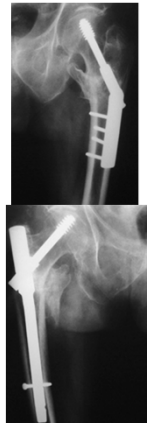
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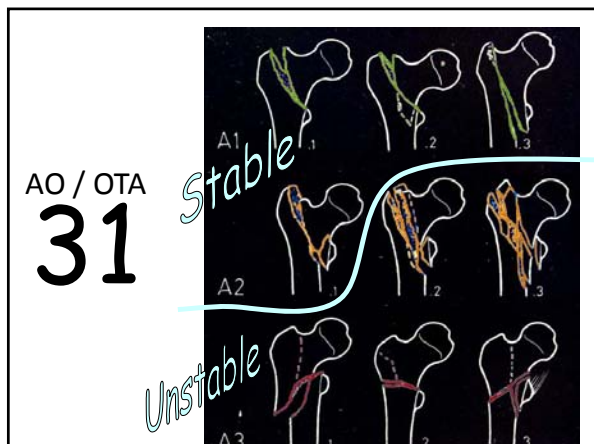
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Sliding Hip Screw

- No studies definitively show superiority of IM fixation constructs for stable fracture patterns.
- Conflicting literature on “unstable fracture patterns”

The image shows two X-rays of a hip. The top X-ray is an anteroposterior view showing a sliding hip screw (SHS) implanted in the femoral head and neck. The bottom X-ray is a lateral view of the same hip, also showing the SHS. Technical data on the X-ray includes: S: 159, C: 512, W: 1024.

Plate versus Nail

- “ Although unstable fx’s may theoretically benefit from load-sharing IM implants, **this result has not been demonstrated in the current evidence-based literature**”

Kaplan, Egol, Zuckerman JAAOS 2008

Economic Impact

- Total Annual Cost of Hip fractures in the US
 - Currently \$ 8 billion
 - Predicted to be \$16 billion in the year 2040
- More expensive intramedullary implant
 - Multiplied by 280,000 hip fxs per yr.



Economic Impact

- “Stable” fracture pattern present in up to 70% of all pertrochanteric hip fractures
 - Forte *JBJS* 2008
- From 1999 to 2006, intramedullary fixation for IT hip fx’s has increased from 3% to 67%
 - Part 2 ABOS data
 - Anglen *JBJS*_2008
- Substantial Geographic variation in implant use
 - Forte, Swiontkoski *JBJS* 2008

Provider Factors Associated with Intramedullary Nail Use for Intertrochanteric Hip Fractures

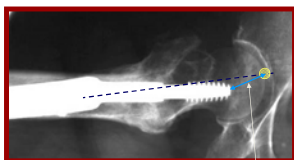
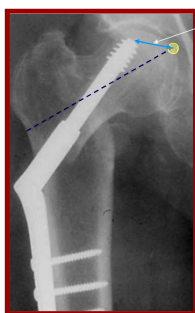
By Mary L. Forte, PhD, DC, Beth A. Virnig, PhD, MPH, Lynn E. Eberly, PhD, Marc F. Swiontkowski, MD, Roger Feldman, PhD, Mohit Bhandari, MD, MSc, FRCSC, and Robert L. Kane, MD
Investigation performed at the University of Minnesota, Minneapolis, Minnesota
2010 BY THE JOURNAL OF BONE AND JOINT SURGERY, INCORPORATED

- Medicare data from 2000-2002, age >65
- Factors associated with increased IMN use
 - Early career surgeons
 - Surgeon age , <45 yo
 - Osteopathy training
 - High volume of IT femur fractures
 - Teaching hospital status

The Sliding Hip Screw

- Fixed Angle implant
- Allows controlled sliding of the fracture
- Important Intraoperative Considerations
 - Tip Apex Distance
 - “Thou shall not varus”
 - Screw placement: error on inferior/posterior side

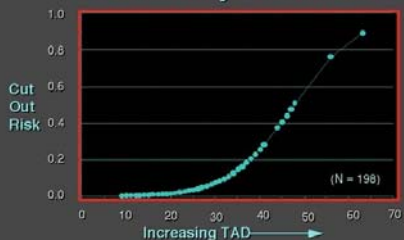
Tip Apex Distance (TAD)



$$TAD = X_{ap} + X_{lat}$$

Needs to be < 25 mm

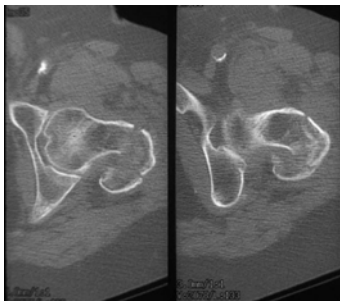
Probability of Cut Out



Baumgaertner, et al. JBJS (A) '95

Sliding Hip Screw

- Avoid screws in osteopenic areas
 - Avoid short screws
 - Avoid anterior screw
- Failure occurs in varus and apex anterior position
 - Avoid too superior and anterior screws



Other Considerations



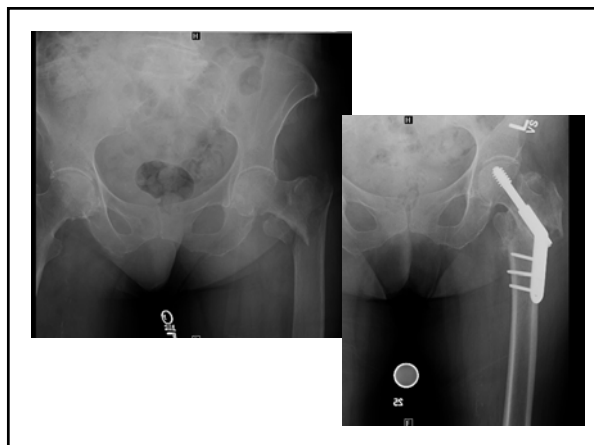
Iatrogenic, intraoperative lateral wall fracture

- Palm, et al *JBJS(A)* '07
 - 31% risk in A2.2 and A2.3
 - 22% failure rate









Other Considerations
Trochanteric Stabilizing Plate (TSP)

- Plate adjunct to limit shaft medialization
- Madsen, *JOT* '98; Su, *Trauma* '03; Bong, *Trauma* '04
 - Decreased major fx collapse (>20mm)
 - Increased operative time/blood loss

The Literature





December 7, 2015
Editor's Choice

JBJS Editor's Choice: IM Nails vs Hip Screws—How Many More Trials Do We Need?

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“There have been more than 20 RCTs comparing intramedullary fixation with sliding hip screws... These studies generally concluded that nails provide no clear outcome benefits, except perhaps in unstable fractures.”

Marc Swiontkowski, MD
JBJS Editor-in-Chief

Intramedullary Versus Extramedullary Fixation for Unstable Intertrochanteric Fractures

A Prospective Randomized Controlled Trial

Rudolf Reinold, MD, FRCSC, Edward J. Harvey, MD, FRCSC, Gregory K. Berry, MD, FRCSC, and Elham Rahme, PhD, on behalf of the Canadian Orthopaedic Trauma Society (COTS)

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- Randomized Control Trial: AO/OTA 31 A2
 - 204 patients, \geq 55 yo
- No difference in clinical outcome measures
 - Lower Extremity Measure
 - Functional Independence Measure
 - Timed “up and go” test
- Radiographic measurements favored IMN
 - Less femoral neck shortening

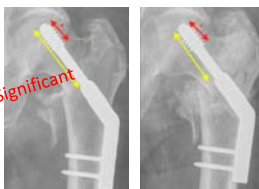
Canadian Ortho Society RCT 2015

- Implant Failures: Not statistically sig
 - DHS group: 2 pts
 - Nail group: 1 pt
- Average neck shortening
 - DHS group: 1 cm
 - Nail group: 0.2 cm
- All Shortening occurred in the 1st 6 weeks after surgery



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Summary

- Multiple Classification System
 - AO/OTA 31A
 - Stable vs Unstable
- Tip Apex Distance: < 25mm
- Economic impact of implants used
 - 3-5 x cost difference
- Abundant literature
 - Conflicting at times
 - All agree that SHS have more radiographic shortening
 - No definitive evidence of clinical superiority of IMN in stable fractures
 - Role for IM fixation in certain fracture types, e.g. AO/OTA 31 A 3 fxs

