When Can I Use a SHS?

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When CAN’T I Use a SHS?

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Sliding Hip Screw

• Time proven
• Technically simple
• Cheap
• Quick
Trends:
Is it because, “almost anything that can be treated with a SHS can be treated with an IMN”?

REFERENCE: Anglen et al. (2008)

REALLY...

• How to read the x-ray
• How to judge the fracture
• How to judge the complication
• How to avoid sabotage

Pauwels’ Type 3 Vertical Femoral Neck Fractures - What is the Best Internal Fixation Device?
Frank A. Liporace MD, Robert Gaines MD, Cory Collinge MD, George Haiblum MD
JBJS - Am 2008

• Screws (n=37)
  - Nonunion 14%
  - Osteonecrosis 17%
• Fixed Angle Device (n=25)
  - Nonunion 6%
  - Osteonecrosis 12.5%
Let’s Focus on Peri-trochanter

- Fractures in region between greater and lesser trochanters
- Extracapsular
- Calcar femorale
  - internal trabecular strut
- IT region is cancellous bone
  - AVN and nonunion rare

Let’s Focus on Peri-trochanter

- If CATASTROPHIC FAILURE does NOT occur these fractures WILL HEAL...
- Problem is which are at risk for Loss of Offset
  - Ambulatory Status
  - Function
  - Mortality Risk

Intertrochanteric Femur Fx Epidemiology

- 350,000 hip fx/yr
- IT account for half of proximal femur fx
- 4x more common than FN fx
- Average age is 10-12 yr older than FN (66-76)
- F > M 2:1 to 8:1
Radiographic Evaluation

- AP (15 deg internal rotation)
- Fx obliquity, location, medial comminution

- Cross table lateral
- Posterior comminution and sag

Evans Classification (JAMA1949, 1951)

Based on pre and post reduction stability, i.e., the ability to convert a fx into a stable reduction

- **Type I**
  - Stable fx
  - Unstable fx can be converted to stable reduction

- **Type II**
  - Unstable due to the abductors' pull on proximal fragment and adductor pull on distal fragment
Fracture Stability

• Cortical contact prevents fx displacement

• **Stable IT**—cortical contact without comminution medially or posteriorly

• **Unstable IT**
  • Medial or posterior comminution
  • Reverse obliquity fx

Does instability matter?

STABLE

UNSTABLE

UNSTABLE
Does instability matter?

- What is instability?
  - PM cortical loss
  - 3-4 part fracture

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No DISTAL extension
Intact LATERAL CORTEX
Does instability matter?

- What is instability?
  - IPM cortical loss
  - 3-4 part fracture
- What else can it be?
  - Reverse obliquity
  - 2-5% reduction is paramount
  - Haidukewych et al. JBJS 2001
  - Subtrochanteric extension

Special Fractures

- Reverse Obliquity
  - Fracture in Lateral Cortex
  - Different treatment
  - Resist Medial Shaft Displacement

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Reverse Obliquity Fracture
(Kuzyk PR, Schemitsch EH, et al: JOT 2009)

DHSHS

Reverse Obliquity Fracture
(Kuzyk PR, Schemitsch EH, et al: JOT 2009)

DCSDCS

Reverse Obliquity Fracture
(Kuzyk PR, Schemitsch EH, et al: JOT 2009)

IMHSIMHS
Lateral Cortex

*Im G-I, Shin Y-W, Song YJ, MD: Potentially unstable intertrochanteric fractures. JOT 2005*

- **208 patients**
- **T.A.D. ~18mm**
- **Failures / Re-operation Rates**
- **D > 20.5mm → SHS okay**
Sliding Hip Screw Insertion

- Central position
- Within 1 cm of subchondral bone
- T.A.D. < 25 mm (AP + Lateral)

Tip-Apex-Distance

DOESN’T COUNTER INSTABILITY

Based on GEOMETRY

Reduction Technique

- Stable: anatomic reduction
- Unstable pattern: posteromedial comminution
  - Medial displacement
  - Valgus osteotomy

Anatomic +/- fixation PMF

Clinical Data

Anatomic Reduction Using SHS

- Less shortening
- Less shaft medialization
- Abductors preserved
Number of Holes?
(NOT Reverse obliquity, NOT Subtroch, Intact Lat Cortex)

- 2-hole DHS
  - 92% mild-mod collapse
  - 14.5 wk to union
  - < 5% failure rate


- Biomechanical
  - As stable as 4-hole


If SHS won’t Avoid Excessive Slide

What is Excessive Slide?
• Significance of increased sliding
• Beyond 15 mm leads to increased failure and decreased function Kyle 2000

SHS avoiding excessive slide: TSP / Regazzoni side plate
• Trochanteric Stabilization Plate
  • Butters against the greater trochanter providing a mechanical hindrance against the distal fracture fragment
Madsen (1998)

- 170 unstable IT fx's
- Compared: DHS
  - DHS/TSP
  - Gamma Nail
- Significant secondary (>20mm) fracture displacement at 6 mos f/u
  - DHS: 34%
  - Gamma: 13%

TSP

- Babot (1998) - 46 unstable IT fractures with DHS/TSP
  - Limited fracture impaction in 90%
  - 4 fractures >15mm limb shortening
- Avg OR time: 119 minutes compared to 77 minutes in their historical control of DHS alone
- Bong (2004) - biomechanically compared TSP w/ IMHS
  - Similar resistance to medial displacement

DCS – to the RESCUE ????

68 yo m s/p unstable peri-troch 4 yrs prior in Nepal
- Originally had a DHS and in Dec 2005 had a DCS
IMN to the RESCUE!

68 yo m s/p unstable peri-troch 4 yrs prior in Nepal
Originally had a DHS and in Dec 2005 had a DCS
Is IMN better?

- **SHS vs IMN – when it doesn’t matter:**
  - Crawford: J Trauma 2006
    - 94% vs 89% uneventful healing
  - Audige: Int Orthop 2003
    - 94% vs 89% uneventful healing
  - No significant diff in failure
  - Slightly higher iatrogenic complication w/ IMN
  - Harrington: Injury 2002
    - Greater fluoro and OR time w/ IMN
    - No diff w/ transfusion, 1 yr outcome, mobilization
    - No diff w/ any parameters (small increased post-op complication w/ IMN)

What’s the price we pay?

Classification Based Treatment Algorithm for Hip Fractures

- Intertrochanteric hip fractures, ORIF with three types of fixation (entire construct, 2013 pricing*):
  - Long Intramedullary Nail: $4,143
  - Short Intramedullary Nail: $3,886
  - Sliding Hip Screw: $1,652.50

* Reference: Stryker and Synthes pricing provided via email correspondence
In March 2012, NYU School of Medicine institutional hospitals implemented a classification based treatment guide for IT hip fractures.

**AO/OTA Intertrochanteric Fracture Classification**
- **SHS**
- Short Nail
- Long Nail

**Classification Based Treatment Algorithm for Hip Fractures**
- Overall, the classification based protocol resulted in real cost savings: $70K +
- This savings seen by only changing implant choice for IT hip fractures during a 6 month period
- No other treatment measures were changed
- High rate of physician compliance: 88% within first few months of implementation
- Can similar algorithms be adapted for other fractures?

**Exhibit Selection**

**Cost-Effective Trauma Implant Selection**

**Classification Based Treatment Algorithm for Hip Fractures**

**Take home - IT fx treatment**

- Most important to understand radiographic picture
- Is it an IT fx?
  - 2-4 part
- Is the lateral wall okay?
- Is it a reverse obliquity?
- Is there subtrochanteric extension?
Take home - IT fx treatment

- Most important to understand radiographic picture
- SHS w/ plate
  - Time proven
  - Very effective
  - Excellent results
  - Inexpensive

THANK YOU