




Peritroch Hip Fractures




Should be treated with an IMHS
Robert M Harris MD





Hip Fractures

- General principles
 - Approximately 250,000 hip fractures/ year
 - Cost approximately \$8.7 billion annually
 - The number of hip fractures is expected to double by the year 2050




Factors Influencing Construct Strength:

Uncontrolled factors

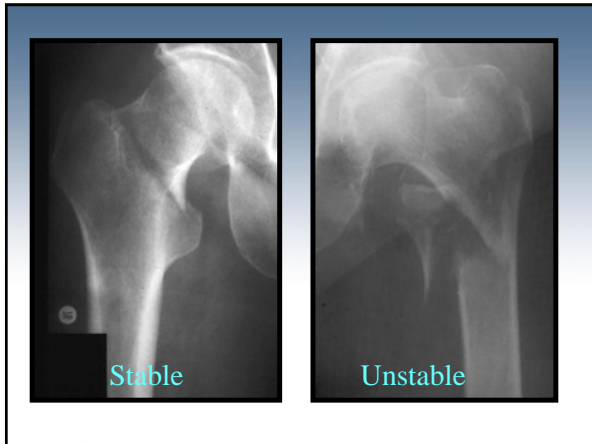
- Fracture geometry
- Bone quality

Surgeon controlled factors

- Quality of reduction
- Implant placement
- Implant selection



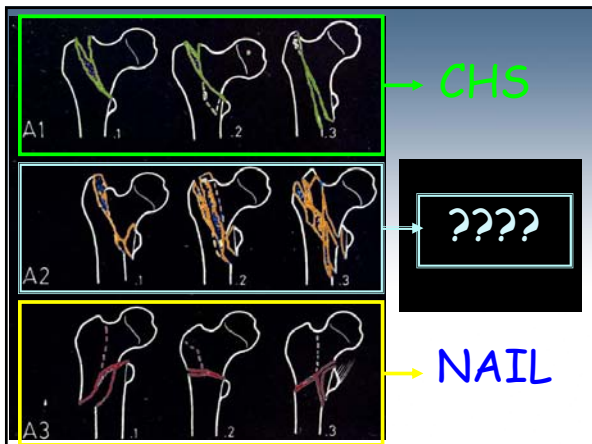
Kauffer, CORR 1980

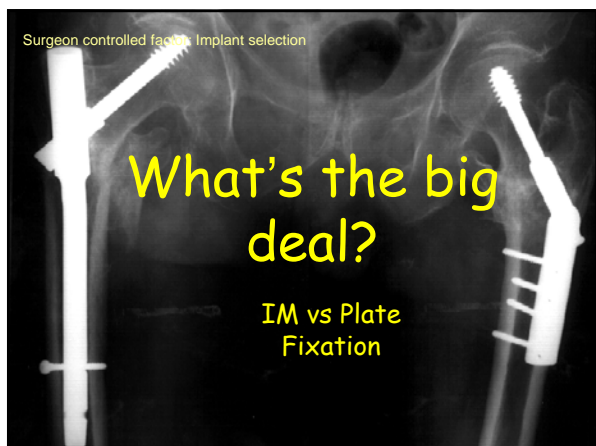


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Implant Options

- Compression Hip Screw & Side Plate
- Intramedullary Sliding Hip Screw
- Calcar Replacing Prosthesis





Implant Options

- Intramedullary Sliding Hip Screw
 - Decreased Implant Bending Strain
 - Potential Percutaneous Technique
 - Inter Troch Shaft
 - Reverse Obliquity
 - Pathologic Shaft Fracture

Special Fractures

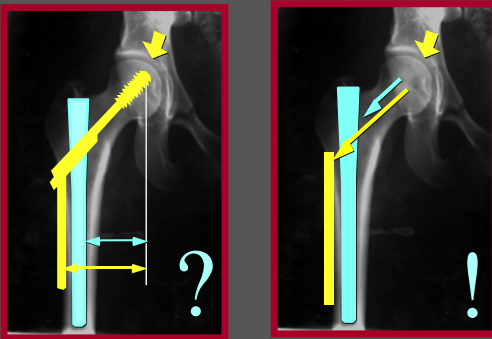
- Reverse Obliquity
 - Fracture in Lateral Cortex
 - Untable With Sliding Hip Screw
 - Im Nail or Fixed Angle Device

Reverse Obliquity Fracture

- DCS
- Blade Plate
- IM Nail
- Resist Medial Shaft Displacement



IM Fixation: Mechanical Advantages





Key point

It is not the reduced lever arm that offers the clinically significant mechanical advantage, but rather the intramedullary buttress that the nail provides to resist excessive fracture collapse*

* Reduced collapse has been demonstrated in most every randomized study that has looked at the variable

IM Fixation Recent History:
Theoretical *Biologic* Advantages


Percutaneous Procedure



EBL, Muscle stripping,
Complications, Rehab time?

Surgical wounds s/p ORIF with IM device

IM Devices



Which nail design is best ??



Proximal diameter?
Nail Length?
Distal interlocking?

Proximal screw ?
Sleeve or no sleeve? Loch & Kyle, JBJS(A)'98
One or two needed ?

Nobody knows!

CHS: Unique risk of failure

Palm, et al JBJS(A) '07



Iatrogenic, intraoperative lateral wall fracture

31% risk in A2,2&3 fxs
22% failure rate
(vs. 3% overall)

Surgeon controlled factor: Implant selection

IM Fixation: *Selected Clinical Results*
RCT, IMscrew vs CHS, N = 436

- less sliding, shaft medialization*
Ahrengart, CORR '02

RCT, IMscrew vs CHS, N = 46
5° in neck shaft angle @ 6 wks (*all*)
shaft medialization @ 4mo *
Pajarinen, Int Orth '04

- Improved post-op mobility (4 months *)
- less sliding, shaft medialization*

(* $p < 0.05$)

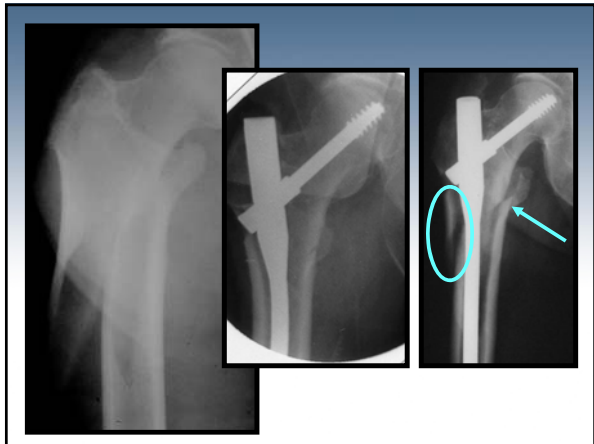
Pajarinen, JBJS(B) '05

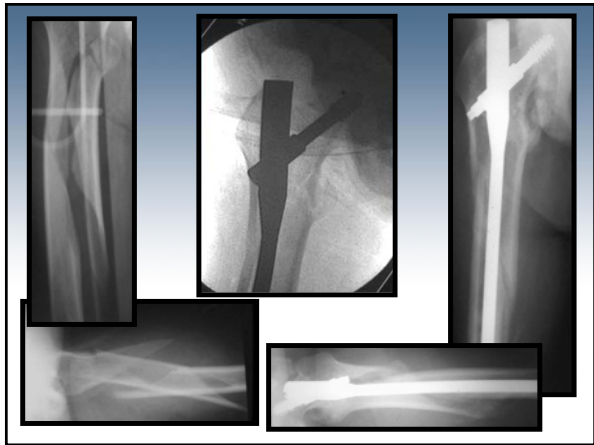
IM Fixation: Indications

Reverse Oblique Fractures

Pertrochanteric Fractures



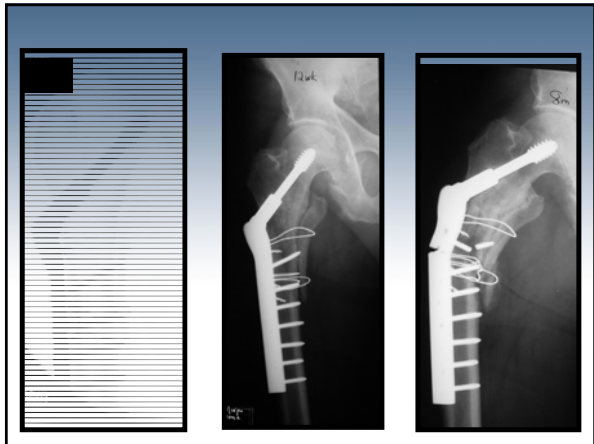





Surgeon controlled factor: Implant selection

**Intertroch/
subtrochanteric
fxs**

Greater mechanical demands, poorer
fracture healing





Long vs. short nails?

Thigh pain from short, locked nails?

Periprosthetic fracture: Still an issue?


Anterior cortex perforation with long nails?

6% impinge/ 2% fx Robinson, JBS(A) 05

Cost/ benefit?

-Nobody knows-

Radius of Curvature



Surgeon controlled factor: Implant selection

Long Gamma Nail for IT-ST Fxs

Barquet, JOT 2000

52 consecutive fractures; 43 with 1 year f/u

- 100% union
- 81 minutes, 370cc EBL

The authors describe the key percutaneous reduction techniques that lead to successful management of these difficult fractures

Surgeon controlled factor: Implant selection

Unstable Pertroch Fractures (OTA31A.3)

*347 articles reviewed: 10 relevant; 5 RCTs**

"Evidence-based bottom line:"

- Unacceptable failure rates with CHS
- Better results with 95° devices
- Best results with I M devices*
- Best "functional outcome" not known

Kregor, et al (Evidence Based Working Group) JOT '05

Surgeon controlled factor: Implant selection

IM Fixation vs. CHS

Randomized/prospective trial of 210 pts.

Utrilla, et al. JOT 4/05

- Patients
All ambulatory, no ASA Vs

- Fractures
Excluded inter/subtrochs fractures (31A.3)
--excludes the fxs KNOWN to do best with IM

- Surgeons
Only 4, all experienced

- Technique
All got spinals, Closed reduction, percutaneous fixation
All overreamed 2mm, all got 130° x 11mm nail, one distal interlock
pm rotational instability (rarely used)

Surgeon controlled factor: Implant selection

IM Fixation vs. CHS

Randomized/prospective trial of 210 pts.

Utrilla, et al. JOT 4/05

Results

- Skin to skin time unchanged
- Fewer blood transfusions needed with IM
- Better walking ability in Unstable fractures with IM
 - No shaft fxs
- Fewer re-ops needed in IM group (1 vs 4)

Conclusion

- IM fixation or CHS for stable fxs
- *Unlocked IM for most Unstable fxs*

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A commentary by Jeffrey O. Anglen, MD, is available at www.jbjs.org/commentary and as supplemental material to the online version of this article.

2010

A Comparison of IM Fixation with the Sliding Hip Nail for the Treatment of the Femur: A Randomized Trial

By Tristan M. Barlow, MD, FRCS(Orth), Claire Toplis, FRCS(Orth), Rosemary Greenwood, MS, FRCS(Orth), and Timothy JS. Chesser, FRCS(Orth)

Investigation performed at the Department of Trauma and Orthopaedics, Frimley Hospital, United Kingdom

SHS remains the "Gold Standard"

No difference:

- Transfusions
- Hospital stay
- Re-ops
- Mobility
- Residence

However....

- Grossly underpowered (beta error)
 - 300-500/arm needed
- Any patient eligible (age 42-99)
- Used Long Nails
- Outcome measures perfunctory
 - No X-rays
 - 32% mortality
 - 21% phone /proxy only

• *This is gold?*

Score	Mobility
1	Unaided
2	One cane or crutch
3	Two canes or crutches
4	Walker
5	Wheelchair

Cut Out

- Major cause of implant failure
 - 80% of DHS
 - 3.2 to 8%
Cephalomedullary nail devices
- Cochrane review



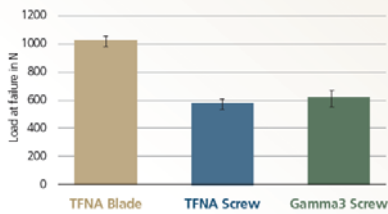
Failed Fixation


- Screw Cut Out
- Screw Barrel
Disengagement



Cut Out Resistance


TFNA Helical Blade Shows Greater Resistance in the Off-Center Position Compared to TFNA Screw and Gamma3 Screw¹⁹




IM Hip Screws
Author's Opinion

- Data supports use for unstable fractures
- RCTs document improved anatomy and *early* function
- Iatrogenic problems decreased with current designs and technique
- Indicated only for the geriatric fracture

Surgeon controlled factor: [Implant selection](#)


Postoperative Management

- Allow all patients to WBAT
- Patients “self regulate” force on hip
- No increased rate of failure
- X-rays post-op, then 6 & 12 weeks Koval, et. al, JBJS(A)98

Thank you



 **HUGHSTON**
CLINIC

