


Supracondylar fxs: Nail vs Plate



AAOS

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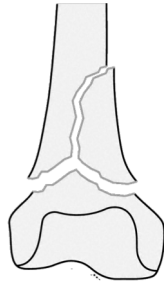
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What to Choose?



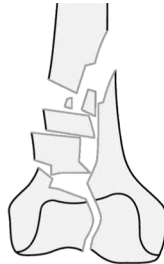
A vs B vs C

- **A: extraarticular**
- **B: partial articular**
 - Intact portion of joint to stabilize to
- **C: extraarticular with intraarticular extension**



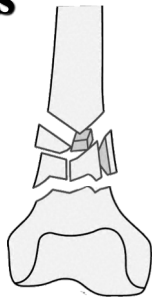
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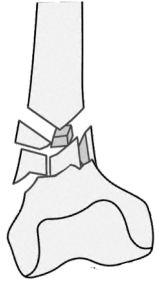
Principles

- **Restore**
 - Length
 - Alignment
 - Angular
 - Rotational
- **Shaft is the stable portion**



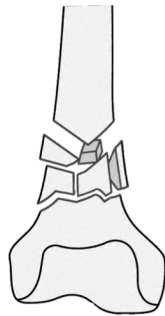
Principles

- Restore
 - ◊ Length
 - ◊ Alignment
 - Angular
 - Rotational
- Shaft is the stable portion



“A” Fractures

- Options
- Nail
 - ◊ Enough room for locking screws
- Plate
 - ◊ Fixed angle



“A” Fractures

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“A” Fractures

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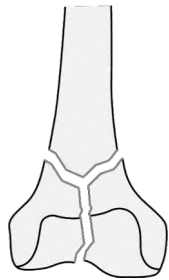


“C” Fractures

- Combination of “A” and “B”
- Principles:
 - ◆ Restore joint $C \Rightarrow A$
 - ◆ Stabilize the metaphysis to the shaft
 - ◆ Complexity of joint determines options for stabilization

Simple Joint Injury

- Lag screws for the joint
- Metaphysis
 - ◆ Nail
 - ◆ Plate
 - Fixed angle



IM Nails

• Advantages

- ◆ Midline incision
 - Indirect reduction
 - Minimal stripping
 - ↓ Blood loss
- ◆ Reaming distributes bone graft
- ◆ Metaphyseal comminution irrelevant



IM Nails

• Disadvantages

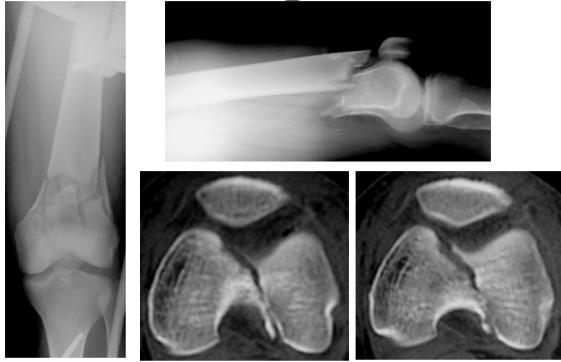
- ◆ Intraarticular starting point
- ◆ Large intercondylar portal ?
- ◆ Locking screws may be through coronal fracture lines
- ◆ Stress riser through unfilled holes

Indications

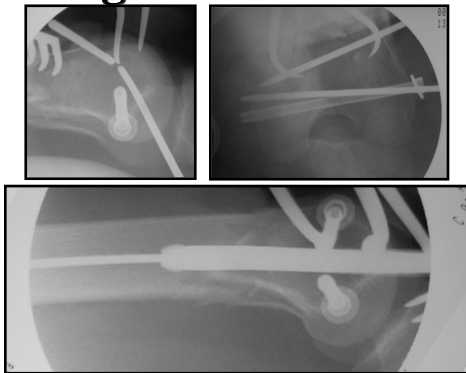
- Metaphyseal injuries > 4 cm from notch (type A)
- Minimal intraarticular extension
- Large condylar fragments that can be fixed with lag screws (C1)



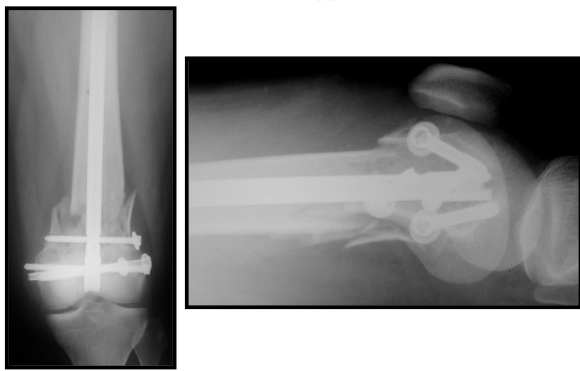
Grade 3 Open C2 Fx



Lag Screws + Nail




Final





- ### Technique
- **Midline incision**
 - **Poke hole vs arthrotomy**
 - **Reduce and lag intercondylar fracture first**
 - **Indirect reduction of the metaphysis**

- ### Technique
- **Radiolucent table**
 - **Bolster**
 - **Distractor ?**
 - **Portal**
 - **Direct up shaft on AP and lat**
 - **Over-ream 1.5 mm**
 - **Lock at lesser trochanter**
- 

Incision

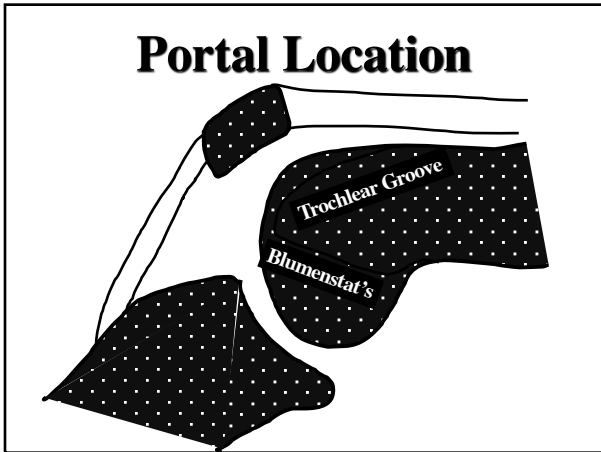


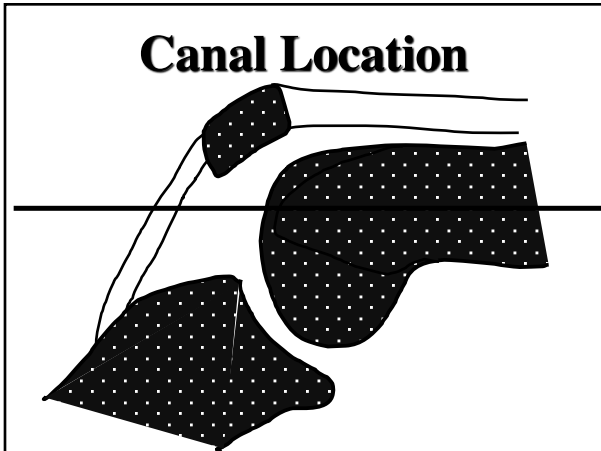
Free Medial Side

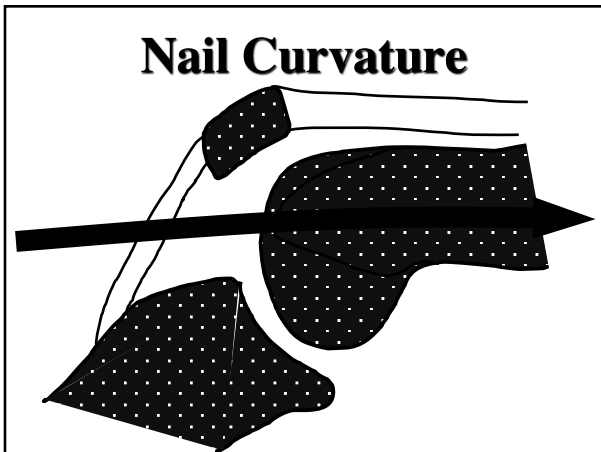


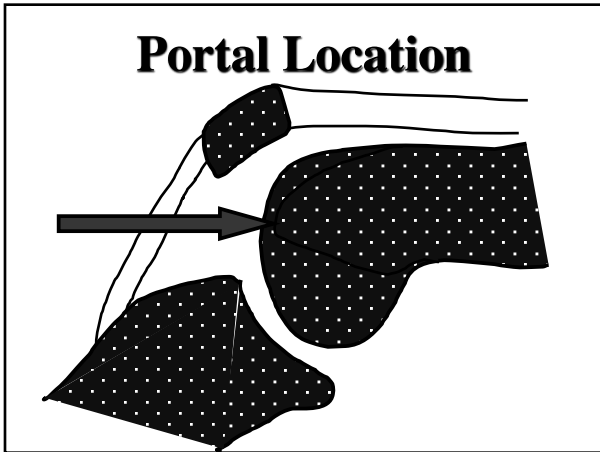
Arthrotomy

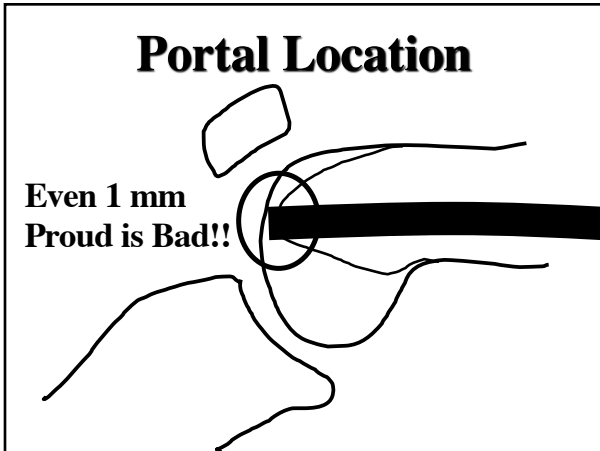


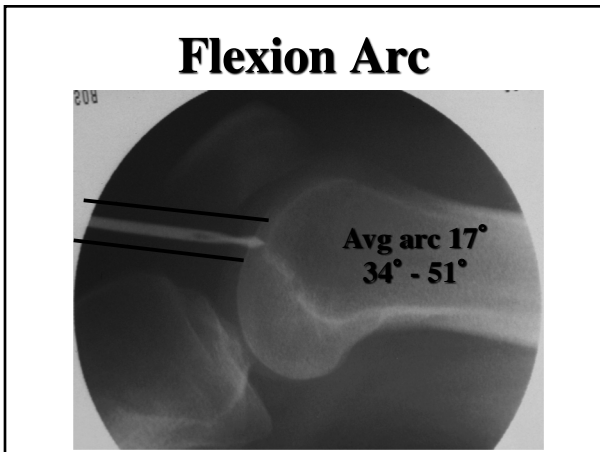


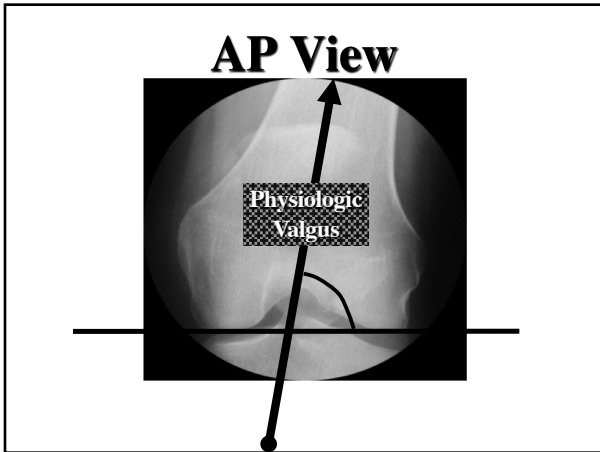




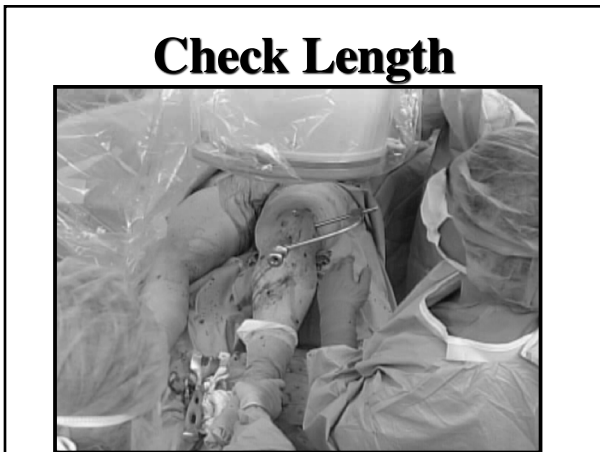






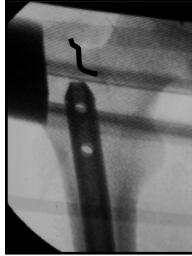




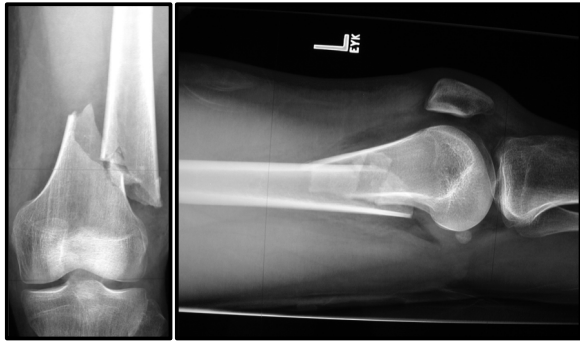


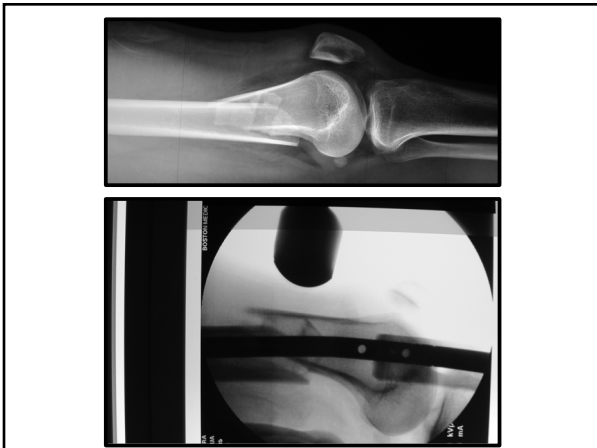
Proximal Locking

- Level of the lesser trochanter
- Safest level
 - ◆ Nerves cross
 - ◆ Artery 1 cm medial
- Just at the piriformis

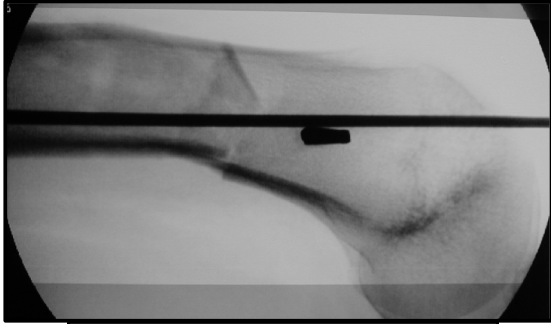


Watch Sagittal Alignment





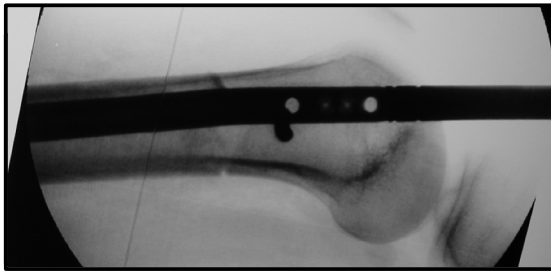
Blocking Screws



Distal Third Femur Fractures Treated With Retrograde Femoral Nailing and Blocking Screws

Robert F. Ostrum, MD and James P. Maurer, DOF*

Blocking Reduction!

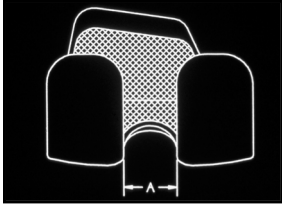


Finals



Fractures Above TKA

- Requires 12 mm intercondylar region

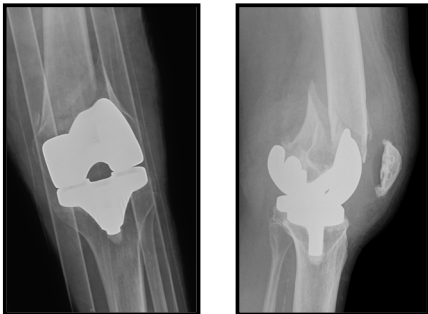


- Contraindicated if closed intercondylar box

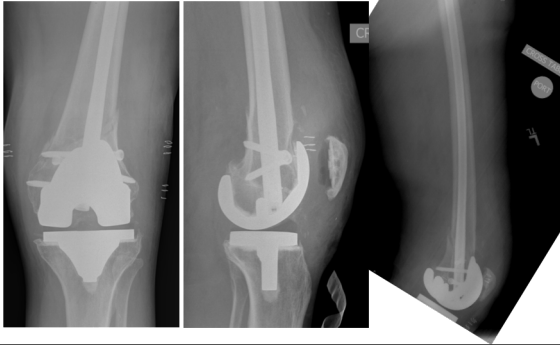
Technique

- Midline incision
 - Slightly larger than standard
- Obtain reduction
- Ream 1.5 mm over nail size
- Statically lock
- Postop early motion

74 Year Old Woman



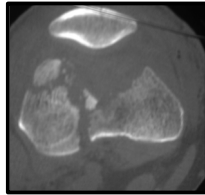
Treatment



Plates

• Indications

- ◆ Complex Intraarticular
- ◆ Below THA
- ◆ Low A type fractures
- ◆ Bowed femora
- ◆ Distal 1/3 fractures



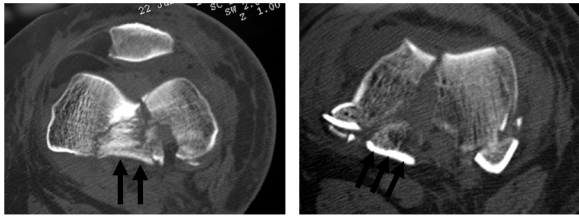
“Old” Plate Case...



Deformity



Intraarticular Fragment



Articular Reduction



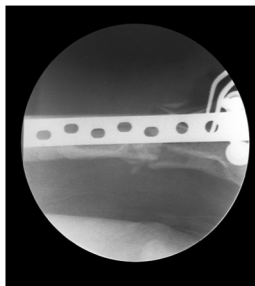
Articular Reduction



Reduction



Fluoro...

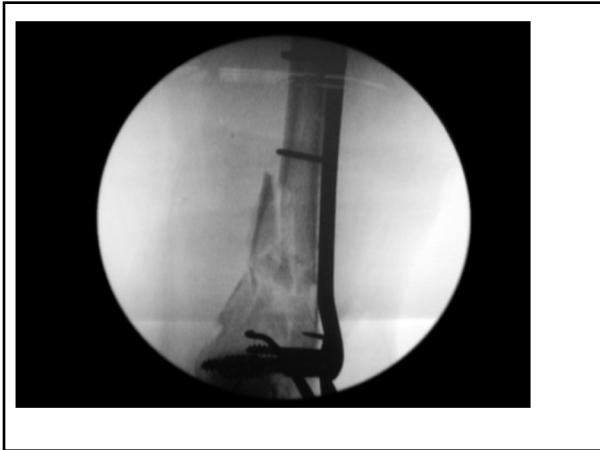


Affix Plate to Bone

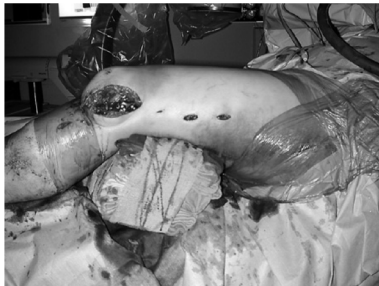




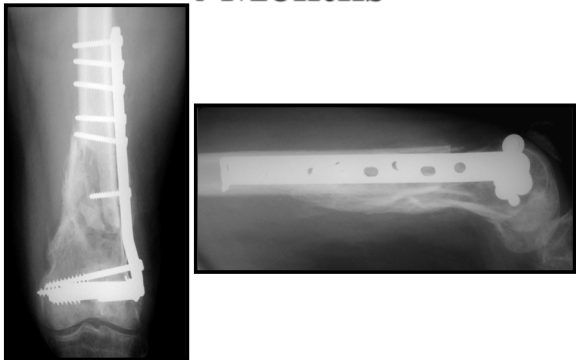




Incisions

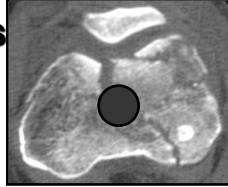


4 Months



Complex Joint Injury

- Joint has comminution
- Posterior fragments
- Will not accept nail
 - ◆ Hoop stresses
 - ◆ Poor fixation of the locking screws



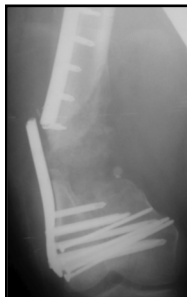
Complex Joint Injury

- Plate is treatment of choice
- Fix joint (screws)
- Connect to shaft
- *Fixed angle!!*
 - ◆ Prevents varus collapse



Problems..

- Locked plates:
 - ◆ Fixed angle periarticular segments
 - ◆ Indirect reductions
 - ◆ Biologically friendly
 - ◆ Osteoporotic bone
 - Different failure modes



Problems...

- **Locked plates:**
 - ◆ **Fixed angle periarticular segments**
 - ◆ **Indirect reductions**
 - ◆ **Biologically friendly**
 - ◆ **Osteoporotic bone**
 - **Different failure modes**



Problems

- **Locked plates:**
 - ◆ **Fixed angle periarticular segments**
 - ◆ **Indirect reductions**
 - ◆ **Biologically friendly**
 - ◆ **Osteoporotic bone**
 - **Different failure modes**



Old Ideas...New Tricks?

- **How can we improve?**
- ***Plate contours***
- ***Hole configuration***
- ***Screw direction***
- ***Reduction techniques***
- ***Instrumentation***

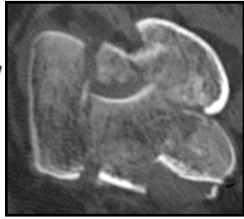
When do we need them?

- **Periarticular fractures**

- With metadiaphyseal dissociation

- **Poor bone quality**

- Osteoporosis
- Nonunions
- Revision surgery



Locked Plating...

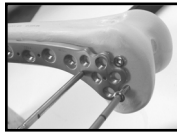
- **Intraarticular fractures**

- **Joint fixation**

- Outside plate
- Metadiaphyseal reduction

- **Extraarticular fractures**

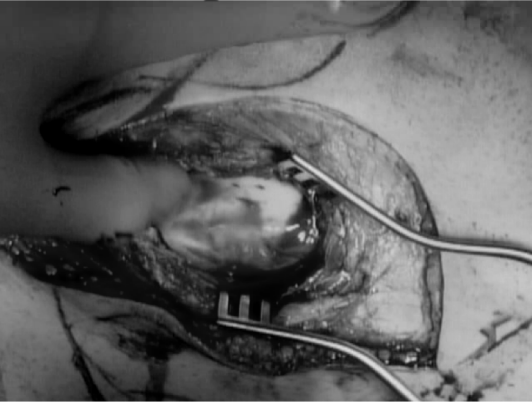
- **Around knee implants**



Incision



Deep Incision



Visualization



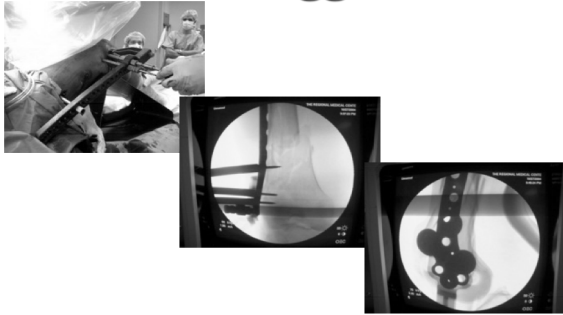
Screws Around Plate



Lag Screw Position



Outrigger



Metadiaphyseal Reduction



Slide in Plate



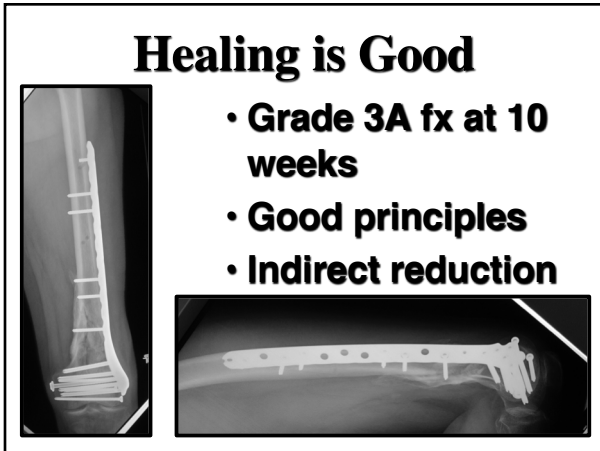
Provisionally Fix

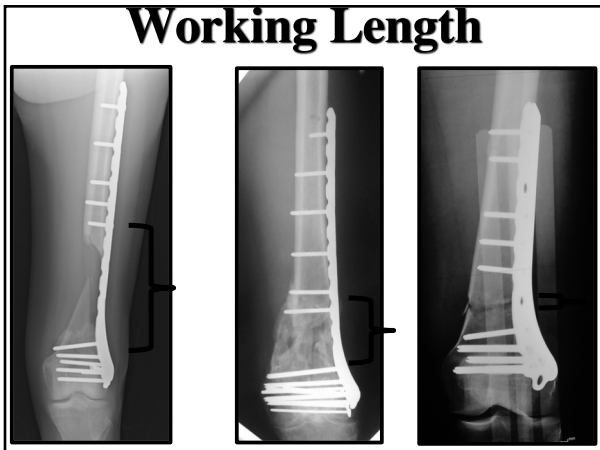


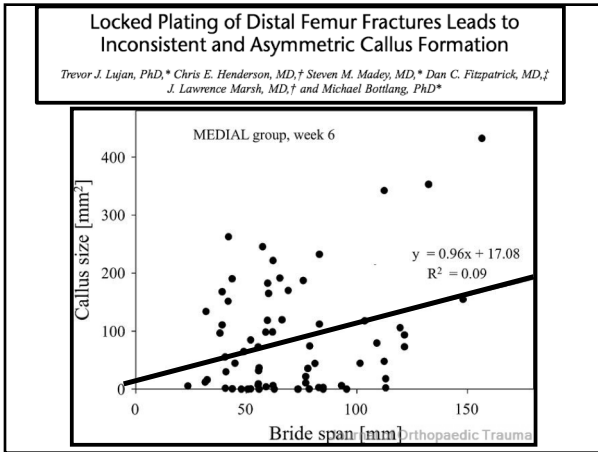
Place Fixation





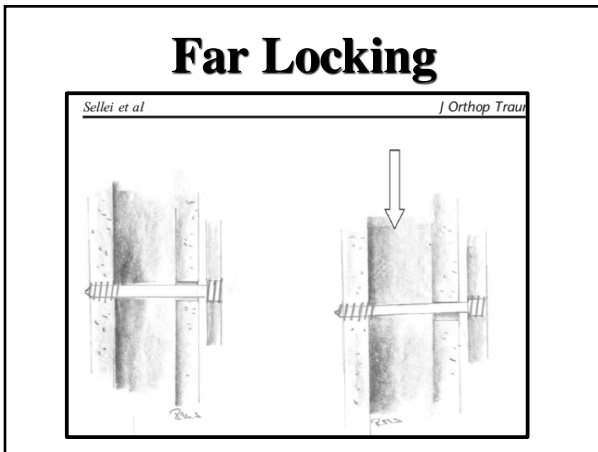






Far Locked Fixation

- **Concept**
 - ◆ Create more symmetry
 - ◆ More axial flexibility
 - ◆ Shoot for greater callus
 - ◆ Works in animals
 - ◆ Logical
 - ◆ Necessary?

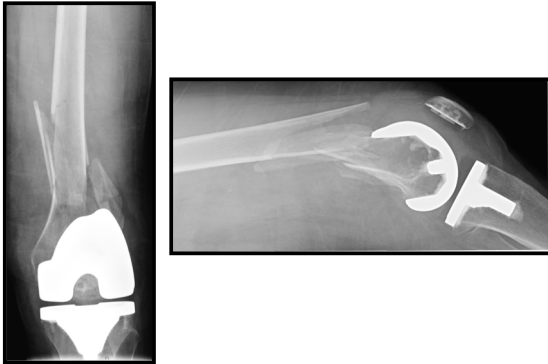


Far Locking

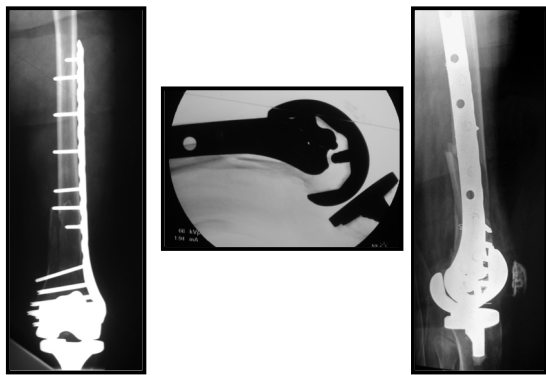
- ◆ Greater plate callus
- ◆ Greater torsional strength
- ◆ Can do with 1mm overdrill



Periprosthetic Fractures



Periprosthetic Fractures



Periprosthetic Fractures



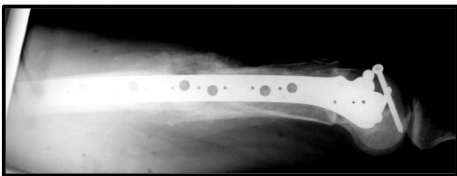
Locking Plates for Distal Femur Fractures: Is There a Problem With Fracture Healing?

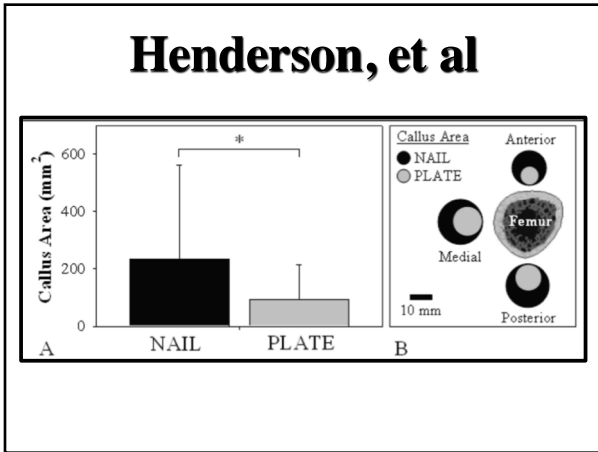
Christopher E. Henderson, MD, Lori L. Kuhl,* Daniel C. Fitzpatrick, MD,† and J. L. Marsh, MD**

- **Review 15 pubs, 3 abstracts**
- **Healing complications 0% - 32%**
- **75% Failures > 3 months**
- **50% Failures > 6 months**

Henderson, et al

- **12 Matched pairs**
- **Not for reduction**
- **Plate vs nail**
- **More callus for nail in all areas**





SOLVED

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1. Synopsis	2. SOLVED	3. Abstract	4. Framer Outcomes	5. Damage Control
6. Special Fractures	7. Ankle Fracture	8. Spinal Fractures		
Status	Steering Committee	Study Materials	Jump To	
Open and Enrolling	Ms Shandae	Protocol	Summary	
23 Centers	Phil Kruger	Forms	Randomized Design	
	Bob Ostum	Visit Windows	Outcomes	
	Bill Ricci	Amendments	Inclusion Criteria	
	Paul Tomatta	QIMB Report - June 09	Exclusion Criteria	
	Phil Wolinsky		References	
Study Registration				
NCT00909999				

Title

A Study of Locked Plates Versus Intramedullary Nails in Distal Femur Fractures: A Multicenter Randomized Trial Comparing IM Nails and Plate Fixation

Summary

Distal femur fractures are unstable injuries that are generally treated with surgical fixation to maintain alignment of the extremity during the healing process. The two most common methods of fixation are intramedullary nailing and plate fixation. Both techniques are considered the standard of care. Each method has risks associated with it, and some surgeons prefer one method over the other. However, no comparison between the two techniques has been performed. We plan a randomized trial comparing these two fixation methods using standardized validated general and disease specific measures as well as standard radiographic and clinical outcomes.

With the advent of locked plating and advanced instrumentation, plating of distal femur fractures can now be performed without extensive incisions. This has created a shift in procedures done for distal femur fractures that extend into the metaphysis and epiphysis. While good results have been reported for locked plating, it is a different form of fixation than intramedullary nailing. While both techniques are considered standard, no comparison of the two has been performed. Advantages and disadvantages of each technique may be different, leading to better results or alignment using one versus the other. We seek to elucidate the respective advantages and disadvantages of each technique in a randomized trial. Patient based, radiologic, and objective physical examination outcomes will be collected and compared. These will demonstrate similarities (and possibly) differences between the treatments and help orthopaedic surgeons decide on the ultimate treatment for patients with this injury.

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- 158 Patients
- Malalignment >5°
 - ◆ 22% Nails
 - ◆ 32% Plates
- No difference
 - ◆ WB, ROM, revision, outcomes

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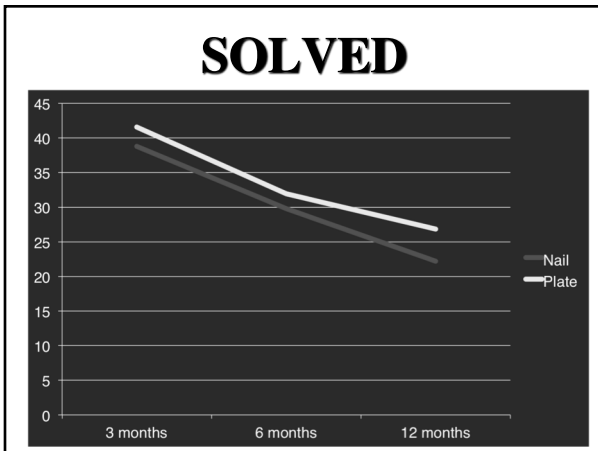
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	SMFA	Bother	EQ Health	EQ Index
Nail	22.2	22.9	79.1	0.76
Plate	26.8	28.5	72	0.70
p =	0.29	0.3	0.11	0.25



Adverse Events

- **5 DVT, 1 Death**
- **20% Both groups**
- **Revision**
 - ◆ **5% Nails**
 - ◆ **8% Plates**
- **Hardware removal**
 - ◆ **15% Nails (90% screws)**
 - ◆ **10% Plates**



Alignment

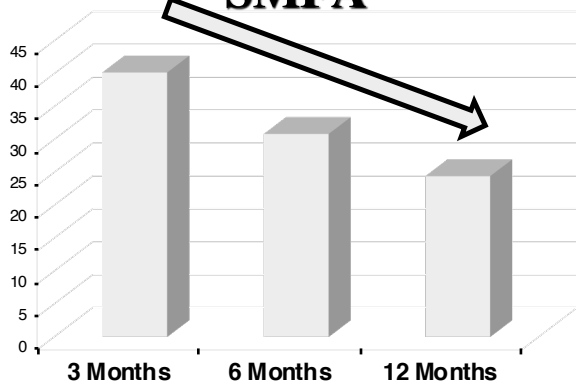
	Valgus > 5°	Varus > 5°
Nail	12%	10%
Plate	28%	4%

Alignment

	Valgus > 5°	Varus > 5°
Nail	12%	10%
Plate	28%	4%

P = 0.05

SMFA



Summary

• **Nails...**

- ◆ **Metaphyseal comminution**
- ◆ **Long shaft extension**
- ◆ **Elderly patients**
- ◆ **Minimal intraarticular extension**
- **Large condylar fragments**



Summary

• **Plates...**

- ◆ **Complex joint injury**
 - **Lock distally**
 - **Flexible construct**
- ◆ **Deformity of shaft**
- ◆ **TKA with no box**



Thank You



Boston Medical Center
