Supracondylar fxs: Nail vs Plate

I (and/or my co-authors) have something to disclose.

Detailed disclosure information is available via:

"My Academy" app;

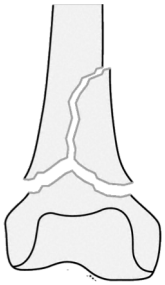
Printed Final Program; or

AAOS Orthopaedic Disclosure Program on the AAOS website at http://www.aaos.org/disclosure

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



A vs B vs C

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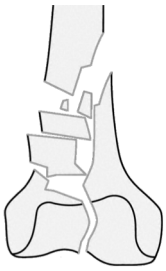
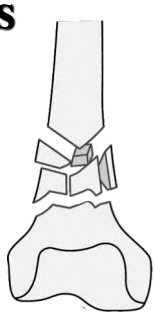
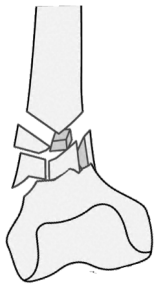


Principles

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



Principles



- Restore
  - Length
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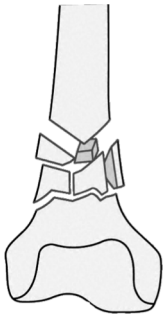
"A" Fractures



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

"A" Fractures

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

"A" Fractures

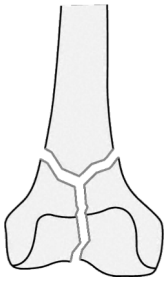
- Options
- Nail
  - Enough room for locking screws
- Plate
  - Fixed angle

"C" Fractures

- Combination of "A" and "B"
- Principles:
  - Restore joint …. C ⇒ 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

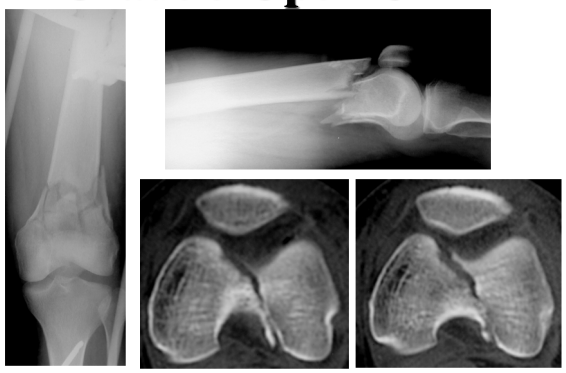
IM Nails

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

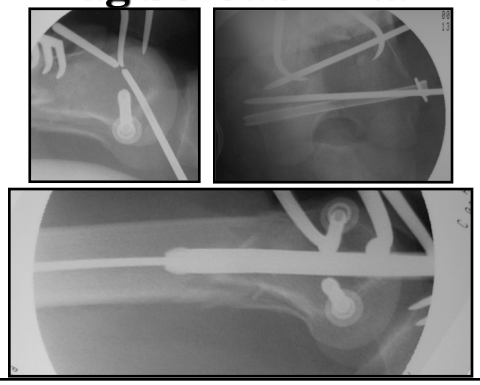
Indications

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

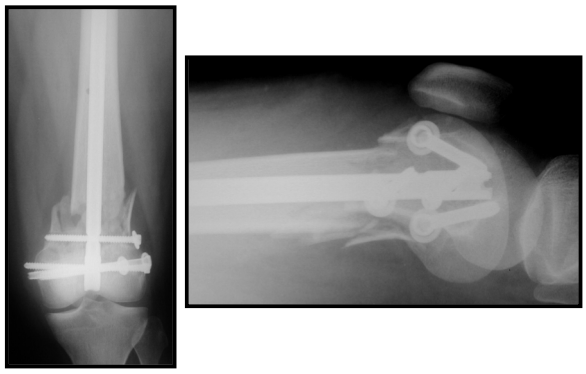
Grade 3 Open C2 Fx



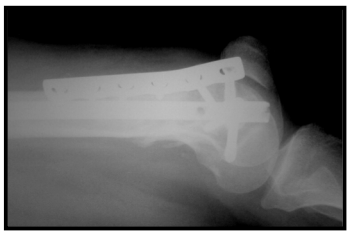
Lag Screws + Nail



Final



Nonunion….BG



Technique

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

Technique

- Radiolucent table
- Bolster
- Distractor ?
- Portal

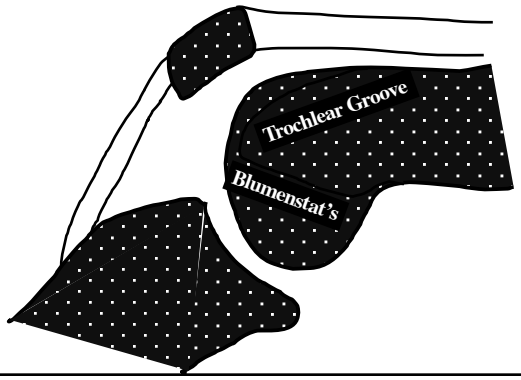
- Direct up shaft on AP and lat
- Over-ream 1.5 mm
- Lock at lesser trochanter

Incision

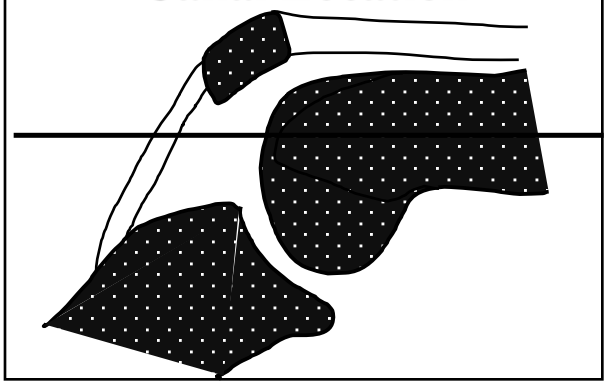
Free Medial Side

Arthrotomy

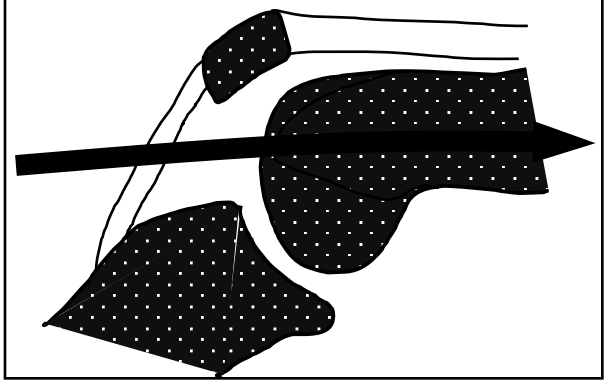
Portal Location



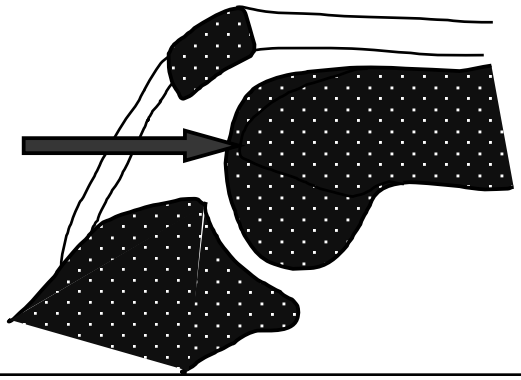
Canal Location



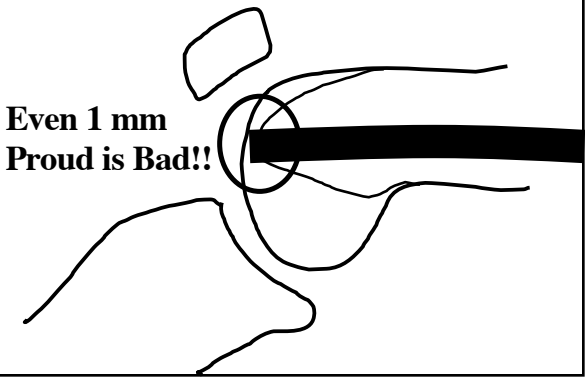
Nail Curvature



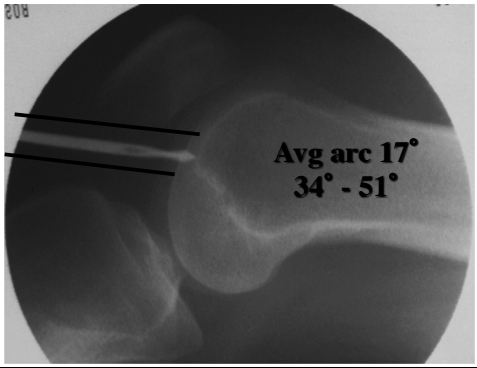
Portal Location



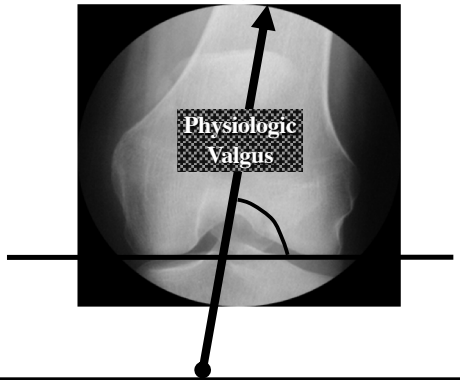
Portal Location



Flexion Arc



AP View

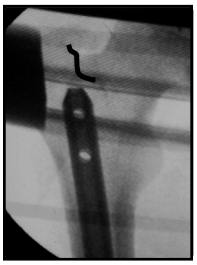


Starter Reamer

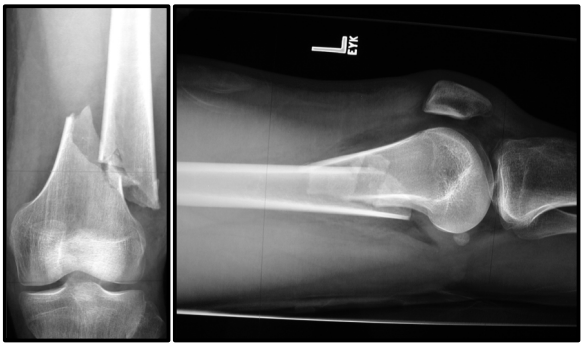
Check Length

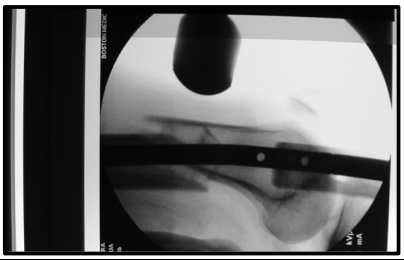
Proximal Locking

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

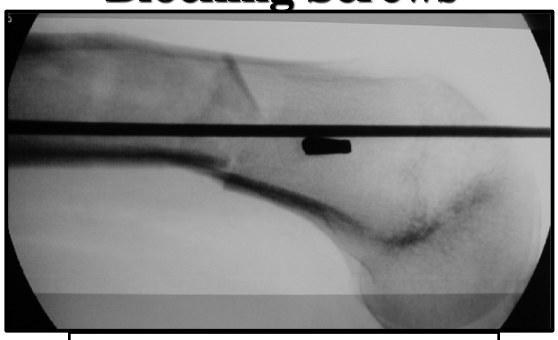


Watch Sagital Alignment





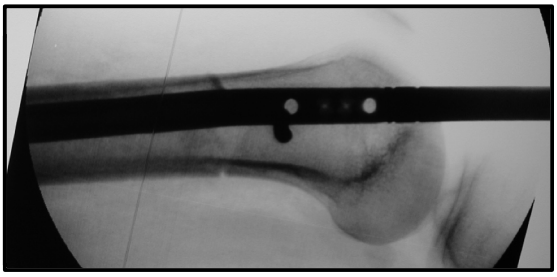
Blocking Screws



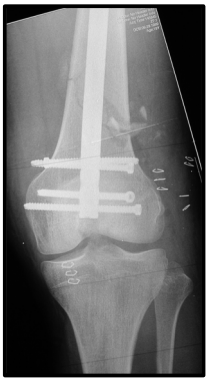
Distal Third Femur Fractures Treated With Retrograde Femoral Nailing and Blocking Screws

Robert F. Ostrum, MD and James P. Maurer, DO†*

Blocking Reduction!

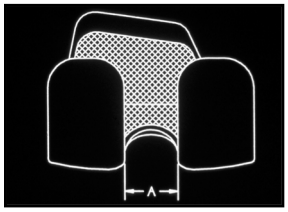


Finals



Fractures Above TKA

- Requires 12 mm intercondylar region

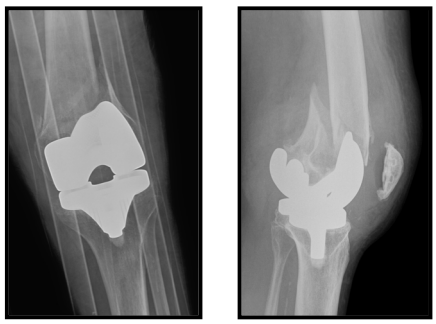


- Contraindicated if closed intercondylar box

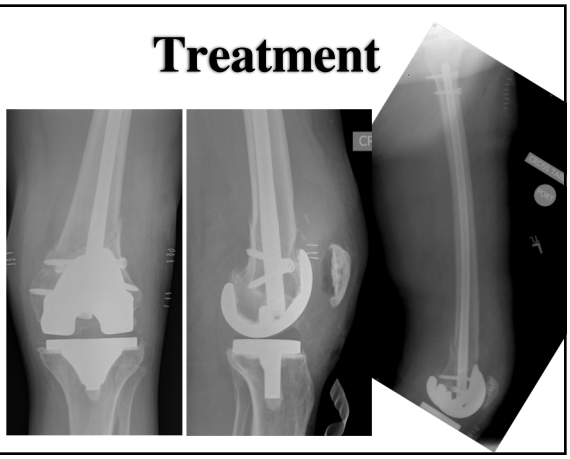
Technique

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

74 Year Old Woman

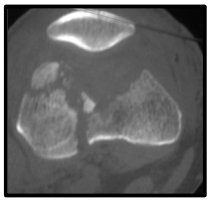


Treatment



Plates

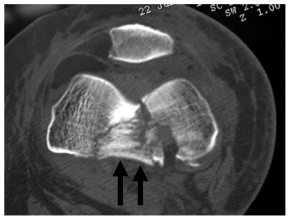
- Indications
  - Complex Intraarticular
  - Below THA
  - Low A type fractures
  - Bowed femora
  - Distal 1/3 fractures



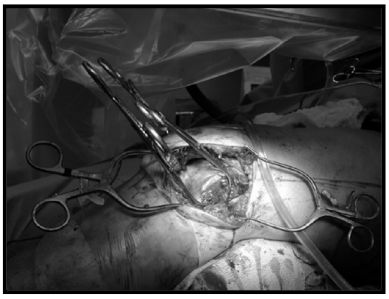
"Old" Plate Case…

Deformity

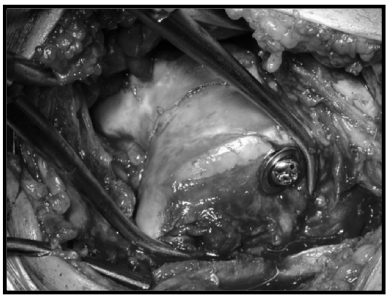
Intraarticular Fragment



Articular Reduction

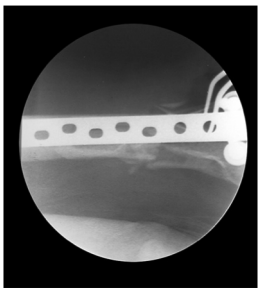


Articular Reduction

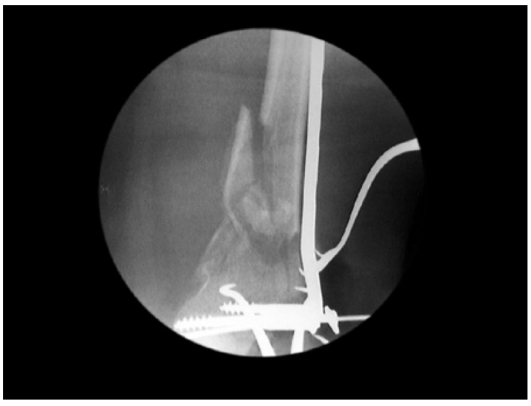


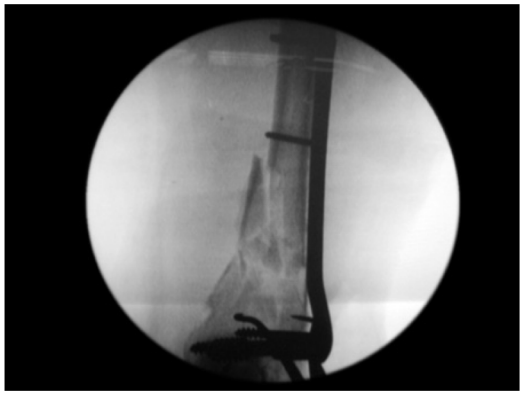
Reduction

Fluoro…



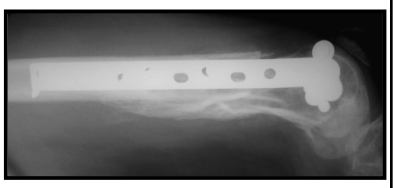
Affix Plate to Bone





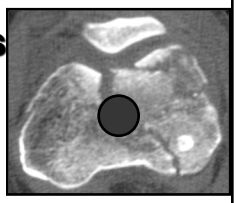
Incisions

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

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Problems

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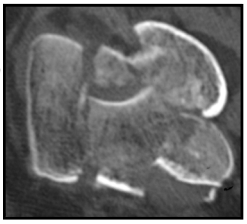
  - Osteoporotic bone
    - Different failure modes

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

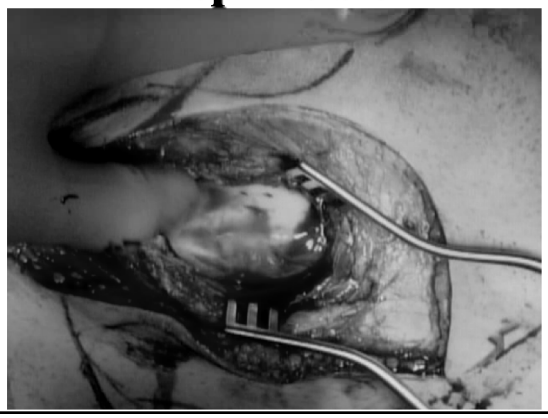


Locked Plating…

- Intraarticular fractures
- Joint fixation
  - Outside plate
  - Metadiaphyseal reduction
- Extraarticular fractures
- Around knee implants

Incision

Deep Incision

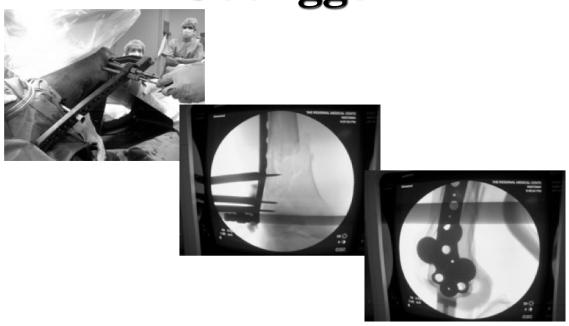


Visualization

Screws Around Plate

Lag Screw Position

Outrigger



Metadiaphyseal Reduction

Slide in Plate

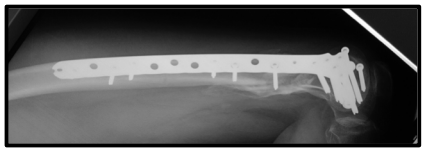
Provisionally Fix

Place Fixation

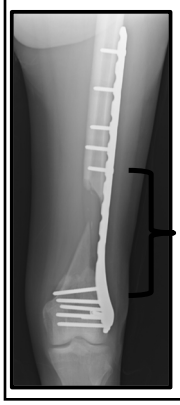
Final Alignment

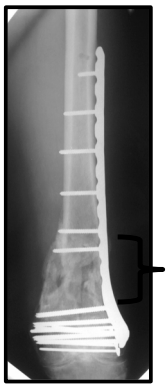
Healing is Good

- Grade 3A fx at 10 weeks
- Good principles
- Indirect reduction



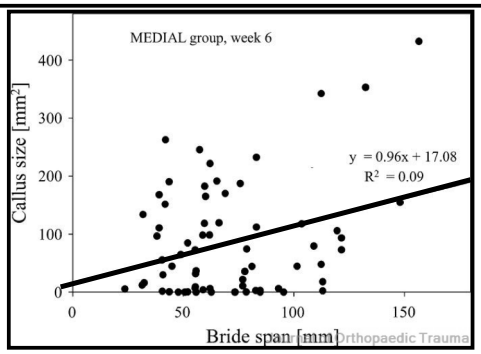
Working Length





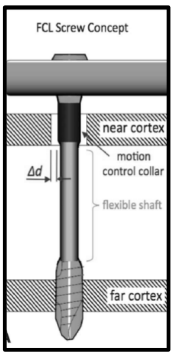
Locked Plating of Distal Femur Fractures Leads to Inconsistent and Asymmetric Callus Formation

Trevor J. Lujan, PhD, Chris E. Henderson, MD,† Steven M. Madey, MD,* Dan C. Fitzpatrick, MD,‡ J. Lawrence Marsh, MD,† and Michael Bottlang, PhD**

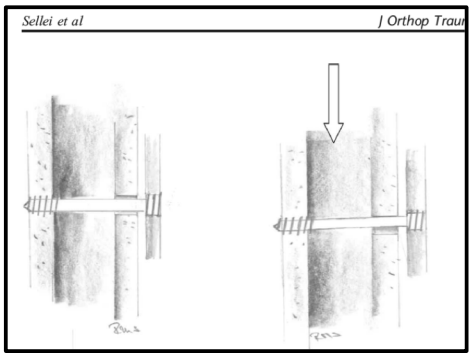


Far Locked Fixation

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



Far Locking



Far Locking

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

Periprosthetic Fractures

Periprosthetic Fractures

Periprosthetic Fractures

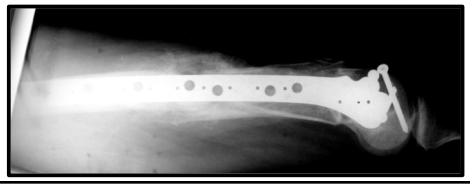
Locking Plates for Distal Femur Fractures: Is There a Problem With Fracture Healing?

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

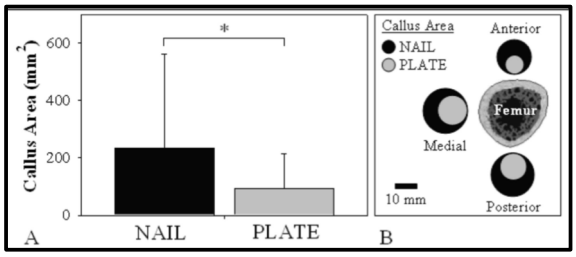
- **Review 15 pubs, 3 abstracts**
- **Healing complications 0% - 32%**
- **75% Failures > 3 months**
- **50% Failures > 6 months**

Henderson, et al

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

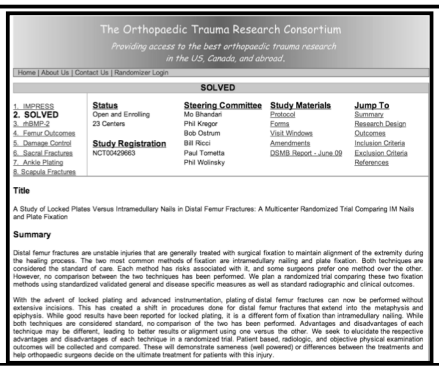


Henderson, et al



SOLVED

- **www.orthotraumaresearch.com**



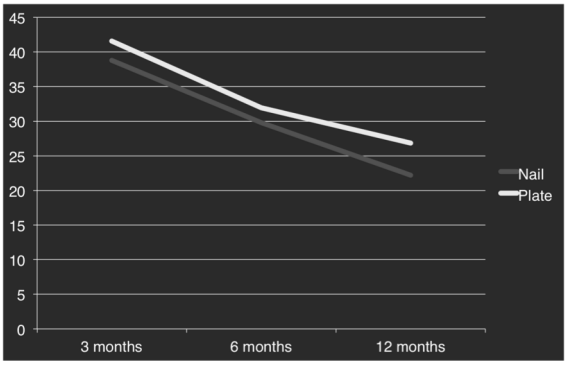
SOLVED

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

SOLVED

	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

SOLVED



Adverse Events

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

Alignment

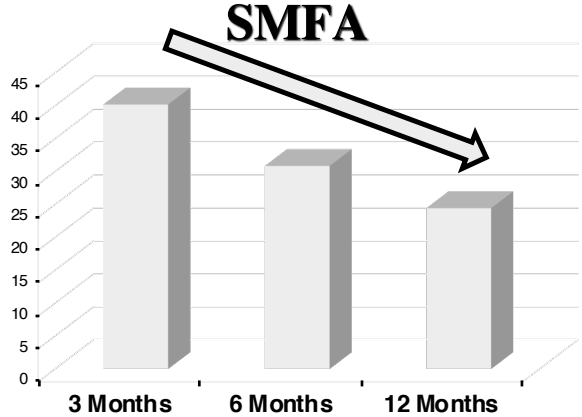
	Valgus > 5°	Varus > 5°
Nail	12%	10%
Plate	28%	4%

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