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Disclosures

- *Institutional Support-AONA, Smith&Nephew*
- *Consultant-Smith&Nephew, Biomet, Stryker*
- *Royalties-Smith&Nephew, Wright Medical*
- *Editorial Roles-Rockwood & Green's*
- *Reviewer-JBJS-A, JBJS-Br, JOT, CORR*
- *Board-OTA*

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- **Population**
  - **350,000 City**
  - **1,000,000 County**

Barnes – Jewish Hospital

- 1,243 bed teaching facility
  - Level I Trauma Center
  - ED 83,000 visits annually
- Referral area extends over 6 states, 300 miles
  - Serves 2.5 million
- 54 Orthopaedic faculty
  - 3 Ortho Trauma

Periprosthetic Fractures

William M. Ricci, MD

Department of Orthopaedic Surgery

Washington University School of Medicine

St. Louis, MO

Epidemic?

- **Increased #'s**
  - **Baby boomers come of age**
  - **More revisions**

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Treatment Goals

- United fracture
- Anatomic alignment
- Stable prosthesis
- Early mobilization
- Return to previous function

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Treatment Options

- **Non-Operative**
  - Cast
  - Brace
  - Traction
- **Operative**
  - ORIF
  - IM Nail
  - Ex-Fix
  - TJA
  - Amp

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Treatment Options

- **Operative**
  - ORIF
  - TJA

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Critical Factors

- Stability of the prosthesis
- Location of the fracture
  - Relative to prosthesis(es)
- Quality of bone
- Patient
  - Age
  - Medical condition
  - Baseline status

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Type A
Intra-operative Fx

- Calcar
  - 86% Cable
  - 10% No treatment

Abdel et al, Bone Joint J, 2016

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Type A
Intra-operative

- Trochanter
  - 52% Cable
  - 20% Suture
  - 8% Claw Plate
  - 16% No treatment

Abdel et al, Bone Joint J, 2016

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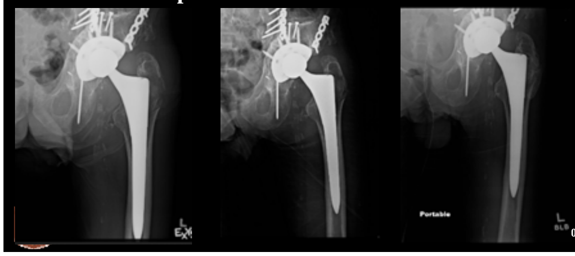
Type A_G Post-operative Fx

- Trochanter
  - 90% Non-op
  - 7.6% Operative ORIF



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Type B_1 Fractures

- Stable Implant
- No Bone Loss

⬇

ORIF

+/- Bone Graft

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Haddad et al., 2002

- 40 patients B_1 fractures
  - 50% Strut alone
  - 50% Strut + Plate

8 ICBG
29 Morselized allograft
15 DBM

JBJS

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Haddad et al., JBJS, 2002

- 39/40 union (98%)
- "Cortical strut grafts should be used routinely ……"

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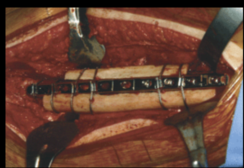
Allograft Disadvantages

- Used alone - decreased biomechanical stability compared to plate fixation
- Used with plate - more soft tissue disruption
  - Delayed fracture healing
- Additional cost
- Potential for infection
  - Viral
  - Bacterial
  - Fungal



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JBJS

- 41 Patients Prospectively Studied
- ORIF single lateral plate
  - Biologic fracture reduction techniques
- No struts
- No adjuvants

Ricci et al.,JBJS 2005

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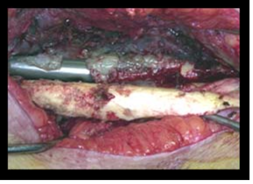
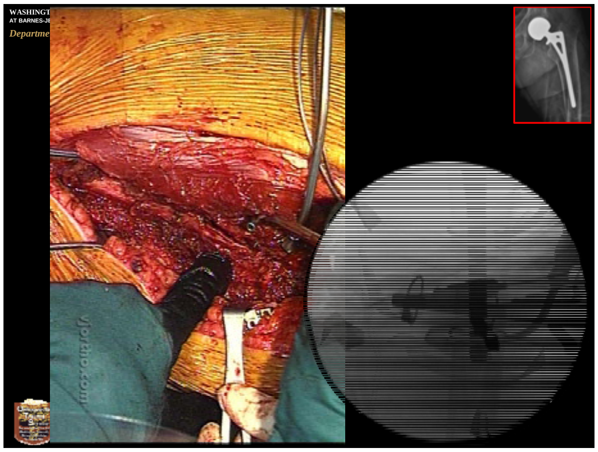
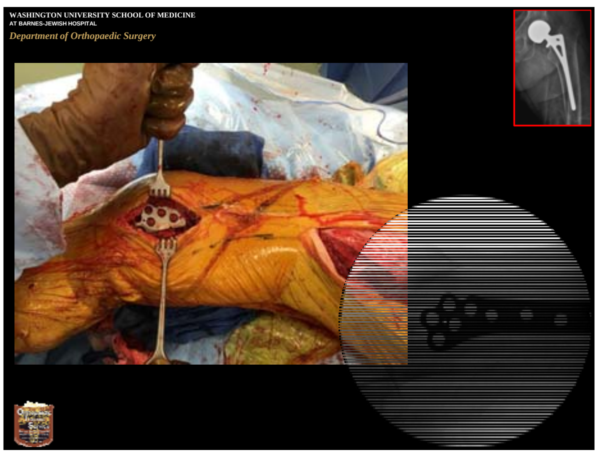
Biologic Reduction Technique

- **Well established technique**

- **Minimize soft tissue disruption**



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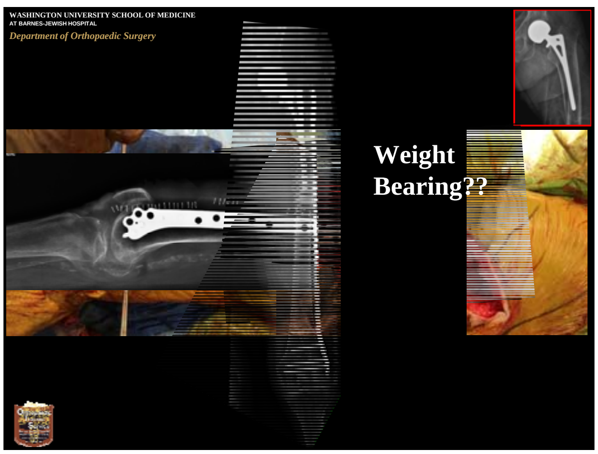

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Results

- **41/41 union after index procedure**
- **1 cable fracture**
- **2 screws fractured**
  - **All healed without loss of reduction at between 10 -12 weeks**

Ricci et al.

JBJS

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Study Conclusions

- Structural allograft is *not* necessarily required for the treatment of periprosthetic femur fractures
- When associated with
  - Stable intramedullary implant
  - Without associated bone loss

Ricci et al. JBJS

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Type B_2 and B_3 Fractures

Loose Implant	Loose Implant + Bone Loss
↓	↓
Revision Arthroplasty +/- ORIF	Revision Arthroplasty + Bone Graft +/- ORIF

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Vancouver Type B_2 Treatment

- Fx at tip
- Loose Implant
- Adequate bone stock
  - Long stem revision
    - Non-cemented
  - ORIF
  - +/- strut graft

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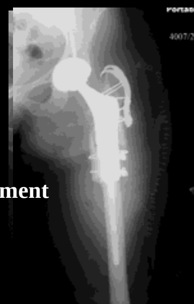
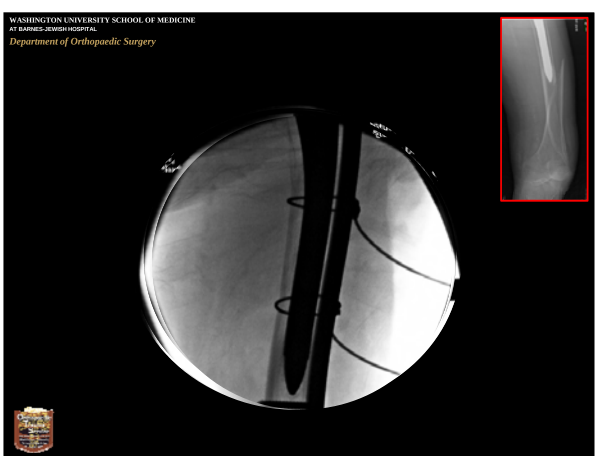
Vancouver Type B_3

- Fx at tip
- Inadequate bone stock
- Loose stem
  - Revision arthroplasy
    - Proximal femoral replacement
    - Custom prosthesis
  - Structural allograft





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Periprosthetic Femoral Shaft Fracture Summary

- ORIF for majority with stable implants
  - No requirement for strut for B_1 fractures
- Revision Arthroplasty of B_2 and B_3
  - Usually with adjuvant allograft
- Use biologically friendly techniques

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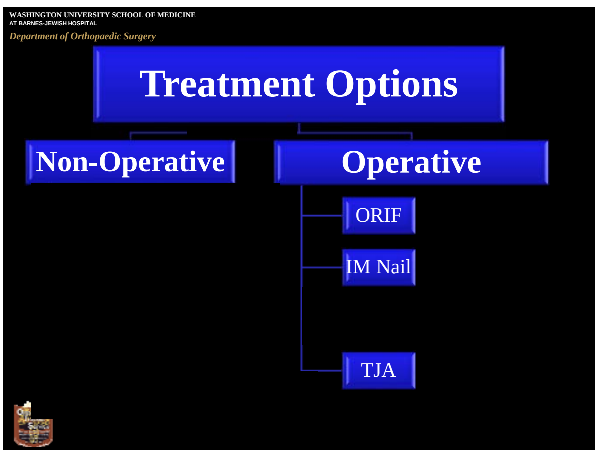
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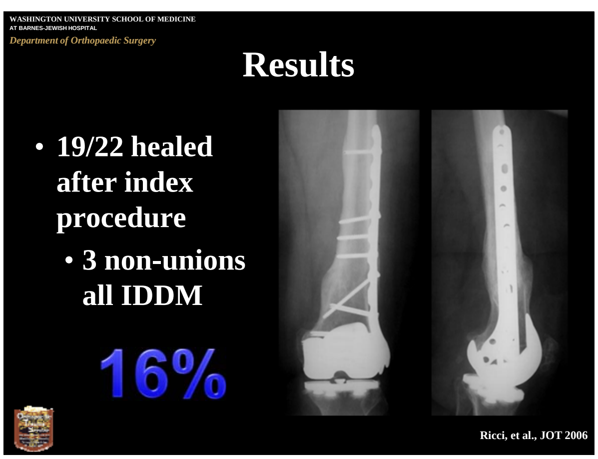
Treatment Options
Non-Operative
Operative
ORIF
IM Nail
TJA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Results
• 19/22 healed after index procedure
• 3 non-unions all IDDM
16%
Ricci, et al., JOT 2006

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Risk Factors for Failure of Locked Plate Fixation of Distal Femur Fractures

An Analysis of 353 Cases

William M. Ricci, MD, Philipp N. Streubel, MD, Saam

Washington University School of Medicine, St. Louis, MO
Harborview Medical Center, Seattle, WA
John Peter Smith Orthopaedic Surgery Residency Program, Fort Worth, TX

14% Non-Union Rate

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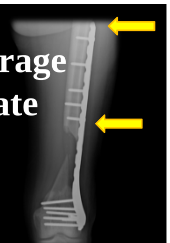
Short Proximal Coverage
4 x higher failure rate



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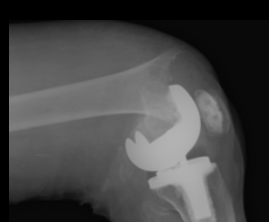
Technique

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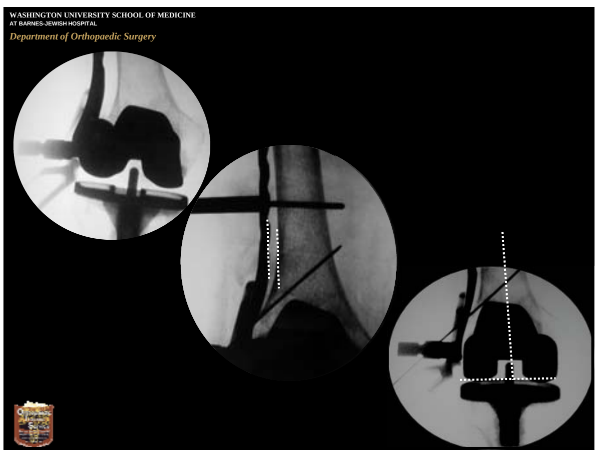
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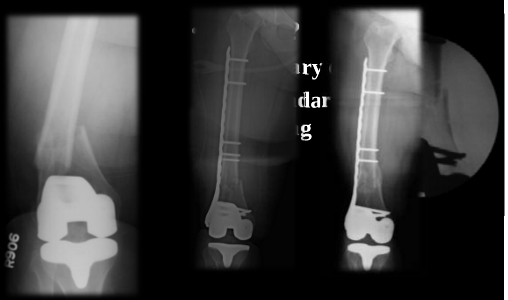
Optimize Not Maximize Stiffness



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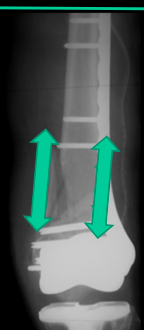
Dynamic Locked Plating

Variable strain



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Dynamic Locked Plating

THE JOURNAL OF BONE & JOINT SURGERY

J B&J S

This is an enhanced PDF from The Journal of Bone and Joint Surgery
The PDF of the article you requested follows this cover page.

Far Cortical Locking Can Improve Healing of Fractures Stabilized with Locking Plates

Michael Bottlang, Maren Lesser, Julia Koerber, Josef Doornink, Brigitte von Rechenberg, Peter Augat, Daniel C. Fitzpatrick, Steven M. Madey and J. Lawrence Marsh
J Bone Joint Surg Am. 2010;92:1652-1660. doi:10.2106/JBJS.I.01111

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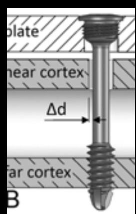
Dynamic Locked Plating



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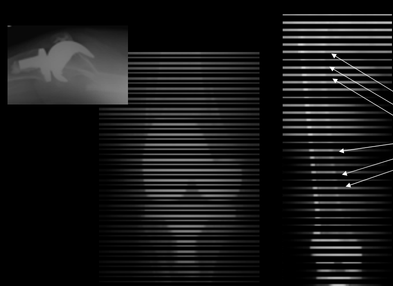
Dynamic Locked Plating



Dynamic
Screws

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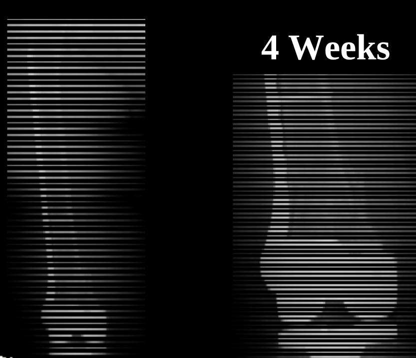
4 Weeks

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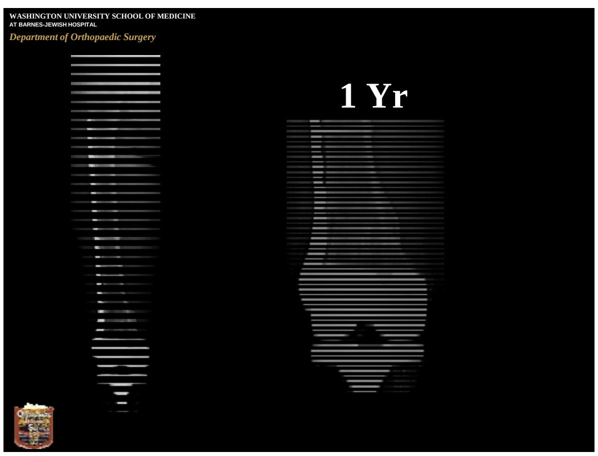
12 weeks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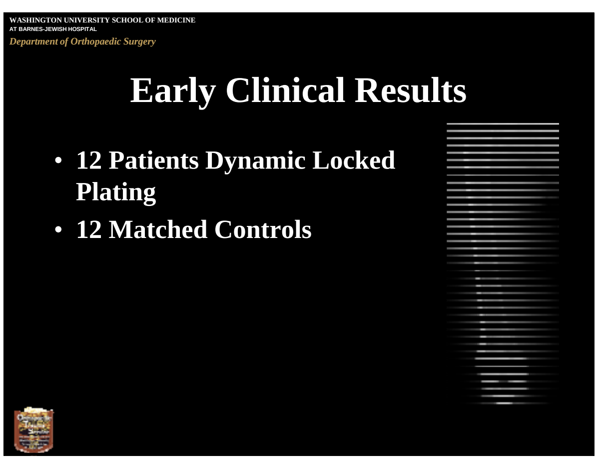
1 Yr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Early Clinical Results
• 12 Patients Dynamic Locked Plating
• 12 Matched Controls

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- **Callus Formation**
  - **0 – None**
  - **1 – Minimal**
  - **2 – Moderate**
  - **3 – Robust**
- **3 Blinded Observers**

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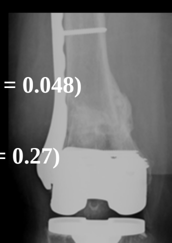
- **Agreement and Consistency between Observers (0.7)**
- **Dynamic Locked Plating**
  - **Greater Callus (2.0 vs 1.3, $p = 0.048$)**
- **Dynamic Locked Plating**
  - **Similar NU (1/12 vs 3/12, $p = 0.27$)**
- **Promising new Technique**



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Summary

- **ORIF**
  - **Indirect reduction techniques**
  - **Locked plates**
  - **8 holes proximal fragment**
    - **4-5 screws**
  - **Many locked screws distally**

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Summary

- IM Nail
  - Beware in osteoporotic bone
  - Be prepared to place blocking screws
  - At least two distal interlocks

OTA Membership

Why Join the OTA?

- Educational Opportunities
- Professional Development
- Research Opportunities
- Much More

Deadline: May 1st or November 1st

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Thank You