Tibial Shaft Tricks and New Techniques

- Bill Rosenblum, MD
- Augusta University

Principles of nailing

Objectives
- Indications
- Principles
- Techniques
- Avoiding Complications
Indications

- Diaphyseal fractures of long bones
- Some long bone metaphyseal fractures

Principles

- All modern nails are essentially the same
  - Stainless or titanium
  - Humerus, femur or tibia
- Diaphyseal fixation
- Load sharing
- Proximal and distal interlocking

Techniques

- Start point
- Open the canal
- Ream the canal
- Place the nail
- Lock the nail
Advantages of IM Nail

- Less malunion and shortening
- Earlier weight bearing
- Early ankle and knee motion
- Reduced time to union

- Shannon, J. Trauma 2002

Reamed vs. Nonreamed Nails

- Reamings (osteogenic)
- Larger Nails (& locking bolts)
  - Hardware failure rare w/ newer nail designs
- Damage to endosteal blood supply?
  - Clinically proven safe even in open fx

- Finkemeier, et.al. JOT 2000
- Forster, et.al. Injury Mar 2005
- Bhandari, et.al., JOT 2000

Unreamed IM Nail

- Laboratory benefit of improved cortical perfusion
- Good results
  - 9% delayed union
  - 5% deep infection in Type III fractures

- Schemitsch, J. Trauma 1998
- Gaebler, JOT 2001
Reamed Tibial Nailing

- Good results in Open Fx
  - time to union 26wks
  - deep infection rate 3.5%
- Complications increased with Type IIIB fractures
  - time to union 50 weeks
  - infection rate 23%*

-Court-Brown JBJS 1991

Reamed vs. Nonreamed Nails

<table>
<thead>
<tr>
<th></th>
<th>Reamed</th>
<th>Non-Reamed</th>
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<tbody>
<tr>
<td># pts.</td>
<td>73</td>
<td>63</td>
</tr>
<tr>
<td>Nonunion</td>
<td>4%</td>
<td>11%</td>
</tr>
<tr>
<td>Malunion</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Broken Bolts</td>
<td>3%</td>
<td>16%</td>
</tr>
</tbody>
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Blachut JBJS 79A

Complications

- Infection 1-5%
- Union >90%
- Knee Pain 56%
  w/ kneeling 90%
  w/ running 56%
  at rest 33%

Court-Brown, JOT 1996
Expanded Indications

• Proximal 1/3 fractures
  • Beware Valgus and Procurvatum

• Distal 1/3 fractures
  • Beware Varus or Valgus
  • Beware of intraarticular extension

Proximal Tibia Fracture

• Entry site is critical

• Reference
  – Lateral Tibial Spine

Too Low!
Too Medial!

Procurvatum
Valgus
Semiextended Position

- Neutralize quadriceps pull on proximal fragment
- Medial parapatellar approach
  - subluxate patella laterally
- Use handheld awls to gently ream through the trochlear groove

Tornetta CORR '96

Hyperextended position

- Pulls patella proximally to allow straight starting angle
- Universal distractor

Beuhler JOT '97

Blocking (Poller) Screws

- Functionally narrows IM canal
  - Increases strength and rigidity of fixation
  - Place on concave side of deformity

- 21 patients
  - All healed within 3-12 months
  - Mean alignment 1° valgus, 2° procurvatum

Krettek JBJS '99
Technique

- Screws placed on concave side of deformity
- Proximal or distal fractures

Distal Tibial Fractures

- Reduction before reaming
- Distractor
- Fibula plate/nail
- Joy Stick
- Calcaneal Traction
Outcomes of IM Nailing

- 859 closed tibia fractures
- 92.5% union rate
- 18.5 weeks to union
- 1.9% infection rate
- 4.4% aseptic nonunion

“Reamed intramedullary nailing will probably continue to be the best method of treating tibial diaphyseal fractures.”

Court-Brown JOT ’04

Problematic Fracture

Surgical Techniques for Complex Proximal Tibial Fractures
Jason A. Lowe, MD; Nirmal Tejwani, MD; Brad Yoo, MD; Philip Wolinsky, MD
Unicortical Plating

Suprapatellar nailing

Supplemental Schanz Pin
• Prevent Complications by:
  – Careful pre-op planning
  – Attention to detail
  – Understanding of mechanical limits of fixation
  – Team work
Summary

• All nails are the same
• Careful attention to detail generally results in excellent outcomes