



## Ep 27- Tibia Shaft Fractures w/ Dr. Githens Notes-

### History/Physical

- Mechanism, ATLS protocol, etc.
- Hx of injury, infection, tumor, or surgery to affected limb.
- Hx of diabetic neuropathy, spinal radiculopathy, pr PVD.
- Skin-puckering or tenting. Conversion of closed to open fx
- Wound- size, location, degree of contamination.
- Vascular- pulses
- Motor/Sensation
- Eval compartments

### ASSOCIATED INJURIES

- Compartment syndrome 1.5-11%
- Ankle injuries
- Floating knee
- Plateau fx
- Knee ligament injury
- Prox tib/fib joint dislocation

### Imaging

- AP and Lateral Radiographs of the Tib/fib, knee, ankle
- Lipohearthrosis on knee xray- may warrant CT
- Some ppl get CT scans for distal 1/4 fx



## Classification

- AO/OTA (A/B/C- simple, wedge, complex)
- Tscherne Classification for closed fx (235)
- Gustilo classification for open fx (92-93)- both really help define the soft tissues

## Anatomy

- Osteology
  - Tibia- carries 80% load
  - Distal tibia externally rotated 20 degrees compared to proximal articular surface
- Vascularity
  - 25% blood periosteum
  - Main nutrient artery is branch of posterior tibial a- enters bone proximal 1/3
  - W/ reaming- loss of medullary arterial system- simulates periosteum and reverses blood flow direction thru anastomoses btwn vascular systems.
- Compartments
  - 4 (superficial compartments- gastroc/soleus + plantaris)

## Treatment

- Non-op ( Not commonly done in adult fractures)
  - Good alignment
  - **Closed tibia fx w/o fibula fx tend to fall into varus**
  - Acceptable alignment- less than 5 degrees of varus, valgus. 5-10 of AP, 5-10 of rotation, 10-12mm of shortening
  - *Technique*
    - LLS or cast. Initial alignment must be good.> 4 weeks, switch to a function brace or patellar tendon bearing cast
  - *Outcomes* of non-op
    - No randomized study as favored non-op management over IM nailing



## OPERATIVE TX OF TIBIA/FIBULA SHAFT FX

- Pre-op planning
  - CT scans for distal 1/3 fx (Looking for posterior malleolus fxs)
  - Ensure you will have a good size nail for canal
  - Make sure about pre-existing knee stiffness, or previous tibia fx that may have obliterated the medullary canal
- Setup for nailing
  - Knee over triangle.. or bone foam
  - Tourniquets can cause thermal necrosis with reaming
- **Approaches**
  - Medial parapatellar
    - Too medial starting point can result in valgus deformity
  - Patella splitting
    - If the wire is angled too posteriorly- can create an apex anterior deformity
  - Suprapatellar
    - Advantages - ease of obtaining AP images w/ knee less flexed, ease of reduction.
    - Disadvantage- PF joint damage.
    - Incision more proximal at superior pole of patella. Quad tendon split longitudinally. Special tracers protect knee
- **Technique**
  - **Starting point is just medial to lateral tibial spine**
    - Make sure its a true AP- fibula bisected by lateral tibia at joint
  - On lateral starting point is between joint line and tibial tubercle
    - If going too posterior, can use curved hand reamer or awl to correct trajectory
    - **For more proximal patterns- should have multiple interlocking screws to prevent loss of reduction (at least 3 ideal for proximal patterns)**
    - **Distal interlocks w/ perfect circles. Distal fx 2+ interlocking screws to dec risk of reduction loss or nonunion**
    - If screw tip isn't going thru nail, can take off drill and mallet it thru



- Techniques to prevent malreduction
  - Use of percutaneous clamps, provisional plating w/ unicortical screws, use of ex fix
  - Blocking or poller screws can be used to help guide nail
  - Screw is placed on concave side of fx
  
- Techniques to prevent Distal fx malalignment
  - Make sure guide wire is center
  - Plating fibula may help provide alignment and length (66)... maybe
    - Ehlinger M, Adam P, Gabrion A, et al. Sofcot Distal quarter leg fractures fixation: The intramedullary nailing alone option. Orthop Traumatol Surg Res. 2010;96(6):674–682
  
- Post op care
  - Weight bearing determined by axial stability of fx pattern
  - F/u at 2,6,12,26, and 52 weeks. Its w/ proximal or distal fx pattern may benefit from 2 week mark to assess reduction early healing phase

#### Reaming?

- SPRINT trial- compared reamed and unreamed nailing
  - **Reamed has er outcomes, ok in open fx**
  - Predictor of reoperation in 1 year- high energy mechanism, presence of a fx gap, complex soft tissue reconstruction, and full WB after surgery

#### Peri-articular/segmental fx

- Satisfactory alignment can be achieved with- reducing prior to nail insertion, blocking screws, lateral starting point?, use of femoral distractor, semiextended position, and unicortical plating used (169)



## Open fx

- Caution against immediate IMN for severe 3B and 3C fx, 27% infection, 57% complications . Ex fix then nail

## PLATING

- Some ppl plate open fx
- Surgical approaches
  - Poor outcomes associated w/ too much soft tissue stripping and bone devitalization
  - Percutaneous techniques common now
  - Mid diaphyseal and distal tib fx can be plated- medially- anterolaterally- or posteriorly
    - Medial- advantage of direct exposure. No deep soft tissue to cover plate. Wound breakdown.
    - Lateral= may cover plate better. If wound breaks down, skin graft possible instead muscle flap
    - Posterolateral approach- pt prone or lateral. Interval between peroneals and fhI. Proximal exposure limited by vasculature. Excellent soft tissue envelope
    - Proximal fx- can be plated thru limited anterolateral incision
  - pitfalls
  - Devascularization of bone> infection/nonunion
    - Practice soft tissue preservation. Sub muscular plate insertion too
  - Simple fx pattern leading to nonunion
    - With perc plate and indirect reduction ,some may do a locking plate and bone gaps can remain
- Treating w/ ex fix
  - Pin tract infection, high nonunion



- Treating w/ amputation
  - W/ severe open fx, amputation may be an option
  - Don't close wound at time of amputation
  - To avoid flexion contracture- splint in extension
  - LEAP study showed no difference in functional outcomes between limb salvage and amputation

#### Complications

- Compartment syndrome
- Anterior knee pain (19/73%)
- Symptomatic hardware
- malunion
- Nonunion

#### Nailed It Ortho podcast episode

- Ig: [Naileditortho](#) -  
[Naileditortho@gmail.com](mailto:Naileditortho@gmail.com) -  
[www.naileditortho.com](http://www.naileditortho.com)

#### References: