Tibial Plateau Fractures

Resident Comprehensive Fracture Course

Objectives

- Identify and Classify the fractures
- Treatment Algorithm
  - Why, How, When to treat...
- Understand predictors of treatment success / failure

Classification

Primarily Low Energy Fractures

Schatzker I

- Solitary lateral condyle fracture line
- Lateral articular surface depression

Schatzker I

- Coronal plane stability
  - ~10 degrees of instability is significant
  - Strong relative surgical indication
- Articular Depression
  - 3 – 10mm

Schatzker II

Split and Depressed lateral unicentral fracture

CT Scan

- Condylar fracture orientation / location
- Depth of articular impaction
- Condylar Widening
  - 5mm
- Meniscal entrapment
Articular Fracture Assessment

Depression depth
Fracture location / orientation

Schatzker III
Isolated depression of the lateral plateau articular surface

- Metaphyseal void
- Intact cortical rim
  - Arthroscopic reduction assistance
  - Balloon-aided metaphyseal augmentation

Operative Tactic - Unicondylar

- Restore joint stability / mechanical alignment
- Visualize and reduce articular surface
- Support the articular reduction
  - Fill metaphyseal defect (autograft, allograft, bone void fillers)
  - Buttress support of cortical surface
  - Rafting screws for articular surface

Set Up in OR

- C arm opposite side
- Bump under knee
- Traction via external fixator/distractor

Incision
Use of Distraction

Articular Reduction

INDIRECT
Fluoroscopic assessment, percutaneous tamps

DIRECT
Submeniscal arthrotomy, arthroscopic assistance

Meta physeal Reduction

Fixation

ORIF: reduction needs to come before fixation

Rafting Screws

Bone Void Management

Autograft, Allograft, Bone void fillers
**Classification**

Primarily High Energy Fractures

**Treatment Algorithm**

Compartment Syndrome?
Vascular Injury?

**Schatzker IV**

• Never underestimate this injury
• High energy pattern
• Never just a “medial condyle fracture”
• Association with dislocation and vascular injury
• Never just “lag screw” fixation

**Bicondylar Fracture Evaluation**

• Lateral fracture
  – Articular impaction
  – Metaphyseal comminution
  – Meta-diaphyseal extension
• Tubercle Integrity
• Cortical Rim Continuity

**Bicondylar Fracture Evaluation**

• Medial Metaphyseal Medial Component
  – Apex location, comminution, displacement
  – CT Scan (after distraction)

**BEWARE: Coronal Plane Fracture Lines**
### Treatment Considerations

- **Screws:** uni or bi cortical
- **Locking?:**
- **One or two plates?:**
- **Soft tissue management?**
- **Surgical timing?**

### High Energy Fracture Considerations

- **Fasciotomies?**
- **Spanning External Fixator**
- **Distraction CT scan**
- **Surgical Planning**
  - Must wait until soft tissues stable

### Spanning Fixation

- Length and alignment restored → No hurry to fix
  - 10-20 day delay for soft tissue stabilization
  - Consider transfer to traumatologist

### 1 Plate or 2

- Apex reductions with medial fracture with
  - Direct cortical contact
  - Minimal comminution
- **Lateral locking plate only is OK**

### Distraction CT

### High Energy Fracture Considerations

- Surgical approach and fixation dictated by:
  - Fracture Pattern
  - Soft tissue envelope
  - Anterolateral
  - Posteromedial
  - Posterior
  - Midline?
Medial Surgical Fixation

- Posterior medial
- Direct posterior

GOAL: Place plate at apex of medial condyle fracture

Posterior Medial Approach

Direct Posterior

Plate Selection and Screw Position

- Orientation of Fracture Line
- Comminution of base
- Size of fragment
Understand the Fracture in All Planes

Will This Plate Hold This Fracture

Locking Plate Indications

- Poor bone quality
- Extensive articular comminution
- Meta-diaphyseal extension
- Bicondylar fracture pattern with undisplaced medial cortex

Careful Soft Tissue Handling

Closure

Often this is the time to repair meniscus

MRI?

Assess Meniscus and ACL

(ACL disrupted in ~25% of Shatzker VI fractures)
Summary

Make A Plan

- Timing
- Approach(es)
  - Considering fracture pattern and soft tissue envelope
- Reduction
  - Joint alignment #1
  - Articular #2
  - Only hardware reps benefit from OIF management
- Hardware
  - Bone void management

Predictors of Poor Outcomes

- Altered Joint line
  - 5 degree alteration of joint mechanical axis
- Ligamentous instability
- Meniscectomy

Restoration of joint stability is greatest predictor of long term outcome

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