Tibial Plateau Fractures Split
Depressed Lateral – Tips and Tricks

Trauma 101
Fracture Care for the Community Orthopedist
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Goals – Rules of Thumb
◆ Anatomic Reduction of joint
◆ Restoration of mechanical axis
◆ Stable Fixation
◆ Preservation of Blood Supply
◆ Early Mobilization and Return to Function
Anatomy

Mechanism Of Injury Varies

Primarily valgus force +/- axial load
Compressive and shearing forces
Bone quality, rate, direction, magnitude of force
Determine ultimate fracture pattern

Physical Examination

Presence of distal pulses
Neurological status – peroneal nerve
Color and temperature of skin
ABI
Physical Examination

Ankle-Brachial Index

Doppler systolic pressure in injured L/E

Doppler systolic pressure in uninjured U/E

Tip #1 Surgical Emergencies

◆ Vascular Injury
◆ Compartment Syndrome
◆ Open Fractures

Physical Examination

◆ Swelling/compartment syndrome
◆ Abrasions
◆ Open wounds
◆ Limb alignment
Physical Examination
Compartment Syndrome

Rare in split depression fractures
More common higher energy fractures (Approx. 15% in bicondylar injuries)
Can occur in open fractures!
Continue to monitor

Physical Examination
Neurological exam

Peroneal nerve at risk with valgus and/or varus forces
Look for injury to fibular head/neck
Examine!

Tip #2 – Understand the fracture pattern!

- AP
- Lateral
- Obliques
- Plateau View
  - Beam parallel tibial slope
- Full length tibia/fibula
Fracture Classification - 41

Relevant Anatomy

- Medial plateau
- Lateral plateau
- Tibial spines & tubercle
- Condylar width
- Fibula
- Femoral condyles

Anatomy

- Alignment
  - Medial Proximal Tibial Angle = 87°
  - Varus
  - Proximal Posterior Tibial Angle = 10°

Medial & lateral plateau slopes are not necessarily co-linear

CT
- Axial
- Coronal Reformat
- Sagittal Reformat
- 3-D little help here

MRI
- Improved ability to identify soft tissue injury
  - meniscal, cruciate, collateral
- Current role?
- Split depression (from valgus forces) high percentage of meniscal injuries


Tibial Plateau Fracture Management
- Patient Factors
- Fracture patterns
- Surgeon experiences
Tip #3 – Not all Fractures Need Surgery!

- Bad soft tissue!
- Co-morbidities
- Age

Non-Operative Indications

- Stable knee joint in full extension
- Less than 5mm articular incongruence
- Normal mechanical axis (up to 10 degrees of valgus)
- Lower demand pt.

Non-Operative Treatment

- Hinged Knee Brace
  - Prevents further displacement
- Early ROM
- Limited weight-bearing until union (6-12 wks)

Good/Excellent results

- Lansinger - 90%
- Duwelius - 89%
- DeCosters - 61%
Surgical Indications

- Instability in extension
  - >10º in coronal plane

- Articular Incongruity
  - >3-5 mm in young, active
  - >5-8 mm in older low demand?

- Most displaced medial plateau fractures

Treatment Options - Surgical

- ORIF
  - Staged vs immediate

- External Fixation
  - Standard ex fix
  - Hybrid fixation
  - Limited Internal fixation

- Percutaneous Fixation

- Arthroscopy

Tip #4 - Respect Soft Tissue!!
Surgical Approach

Dictated by:

- Fracture Pattern
- Soft tissue envelope
- Anterolateral
- Posteromedial
- Midline?

Temporary spanning external fixator

Obtain adequate imaging to plan for surgery

Be patient with soft tissue!

Don’t Try At Night!

Tip #5 - Why things don’t turn out?

Understand Your Equipment!
Pre-op plan!
Pre-Op Planning

- Consider transfer after external fixation
- No hurry to fix – 10-20 day delay until soft tissue allows

Operative Steps

- Positioning
- Surgical Approach
- Reduction
- Fixation
- Closure

Approach

- Lateral parapatellar approach
- Leg extended
  - Incision starts over distal head of vastus lateralis
  - Continues just lateral to patella and patellar tendon
Reduction

“Put things back where you found them!”

Set Up in OR

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

Tip #6 - Traction for Visibility of Reduction

- Radiolucent table
- Femoral distractor
- 2 pin fixator (traveling traction)
- Alternative External Fixator
Approach

- Complex Fractures
  - Long, straight anterior midline incision
- Bridge knee with distractor or ex-fix
  - Apply moderate distraction to stabilize soft tissues

Split Depressed Lateral Plateau Fracture

Incision
Skin and soft tissue to IT Band and Anterior fascia

Tip #6 - Use of Distraction

Use of head lamp
Indirect/Direct Reduction
Look into joint with scope versus direct look versus C-arm
Tip # 7 - Alternative Window for Elevation

Lateral Plateau
Tip #8 – Pins or Screws Above Plate

1. Less pain at the fracture site compared with nothing
2. Decreased risk of loss of fracture reduction (esp in plateau fx)
3. Potential for improved functional outcome likely because of the above?

Bone Voids Associated With Fracture

1. Less pain at the fracture site compared with nothing
2. Decreased risk of loss of fracture reduction (esp in plateau fx)
3. Potential for improved functional outcome likely because of the above?

Screw Placement - Unicondylar

- Lag articular surface
  - Utilize intact articular column
  - Subchondral screw placement
  - Narrow plateau width
  - Favor 3.5 mm screws

- Repair meniscus, when injured
Tip # 9 - Locking versus Nonlocking Plates

Unicondylar Fractures NOT NEEDED!

Final Images
Tip #10 Closure
Often this is the time to repair meniscus!

Tip #11 - Take Your Time!
- It isn’t a race
- 10 extra minutes spent doing a good job will be 10 minutes well spent

Doing it right is better than doing it fast

(from Adam Starr)
Summary

- Do not miss compartment syndrome
- Be Patient! Soft tissue problems and infection are bad
- The surgeon achieves the reduction of the joint surface and alignment of the bone
- A poor reduction will yield a poor result regardless of what implant is used
- Bone graft or substitute controversial

Thank You