Tibial Plateau Fractures – Initial Management Guidelines (especially for nighttime consults)

Classification
- Shatzker I – Lateral split (Figure 1)
- Shatzker II – Lateral split with associated articular depression (Figure 2)
- Shatzker III – Articular depression without split (Figure 3)
- Shatzker IV – Medial split, may have subluxation (Figure 4a)
  - Commonly associated with knee fracture-dislocation (Figure 4b)
- Shatzker V – Bicondylar fracture (Figure 5)
- Shatzker VI – Bicondylar fracture with metaphyseal/diaphyseal dissociation (Figure 6)

Initial Assessment
- Is a full trauma assessment necessary? Based upon:
  - Mechanism of injury
  - Loss of consciousness
  - Associated injuries
- Patient assessment:
  - Evaluation of soft tissue
    - Open injury
    - Amount of swelling
    - Any skin compromise present
    - Signs of compartment syndrome
      - Pain out of proportion or escalating pain not controlled with narcotics
      - Numbness or parasthesias (plantar, dorsal web space, dorsal foot)
      - Pain with passive stretch of toes
      - Decreased pulses/cap refill
      - Tight/non-compressible compartment
  - Neurovascular assessment
    - Neuro: SPN, DPN, Tibial, Saph, Sural
      - Peroneal nerve especially with valgus force
    - Vascular: palpable/dopplerable PT/DP, cap refill
      - Close attention with medial plateau fractures
      - Palpable pulses does not exclude popliteal injury
      - If vascular exam abnormal or different from contralateral side \(\rightarrow\) ABI/PVR
      - Abnormal ABI: ABI < 0.9
      - If ABI/PVR abnormal \(\rightarrow\) Needs vascular team involvement and urgent vascular imaging (CT angiography)
  - Thorough secondary survey for other injuries
• Imaging:
  ▪ AP and Lateral Xray of knee
  ▪ Internal rotation view: shows posterolateral fragment
  ▪ AP and Lateral Xray of tib/fib
  ▪ Traction views if needed
  ▪ Careful assessment of Xrays:
    • Assess overall alignment
    • Assess amount of shortening
    • Assess joint congruity
      ▪ Shatzker IV fractures may be equivalent to fracture/dislocation. Medial tibial condyle may displace with femur, but incongruity will exist on lateral side and lateral Xray
  ▪ CT scan
    • If plan for ORIF as definitive management → obtain pre-op
    • If plan for ex-fix initially → obtain after ex-fix.
    • Shatzker IV fracture/dislocations → may be managed with initial ORIF if soft tissues allow, so beneficial to obtain CT scan following closed reduction
      ▪ If significant soft tissue injury exists so that ORIF not possible, wait on CT until after ex-fix

Initial Management/Plan in ED
• Shatzker I, II and III fractures
  ▪ Normal alignment: well padded knee immobilizer, elevation, Ice
  ▪ Abnormal alignment: closed reduction, long leg splint, elevation, Ice
  ▪ Minimal soft tissue swelling
    ▪ Consider admission for formal ORIF
  ▪ Normal alignment, significant soft tissue swelling, no signs of compartment syndrome or skin compromise, NVI
    ▪ Consider ED discharge with close f/u, plan for ORIF when soft tissues amenable
  ▪ Abnormal alignment, concern for skin compromise
    ▪ Urgent ex-fix overnight
  ▪ Any fracture with concern for compartment syndrome should be admitted for observation
• Shatzker IV, V and VI fractures
  ▪ Normal alignment: long leg splint, elevation, Ice
  ▪ Abnormal alignment/dislocation: closed reduction, long leg splint, elevation, Ice
If closed reduction unsuccessful (especially in Shatzker IV fracture-dislocations, will need urgent OR for closed vs. open reduction and ex-fix vs. internal fixation)

- Plan for admission for NV checks (at minimum) of Shatzker IV, V and VI
- Acceptable alignment, minimal soft tissue swelling/injury (rare for high energy fracture patterns)
  - Consider ORIF acutely in the morning, although likely will need ex-fix given expected amount of swelling
- Acceptable alignment, significant swelling/injury
  - Plan for ex-fix in the morning
- Unacceptable alignment (following reduction)
  - Urgent ex-fix (should not wait for the morning)

- Open fractures
  - Irrigation in ED
  - Ancef for Grade I injuries
  - Ancef and Gent for Grade II and III injuries
  - Add PCN if soil contamination present
  - Tetanus
  - Grade I and II open fractures: At discretion of attending, may wait for the morning for formal I&D, only if acceptable fracture alignment obtained, compartments soft, NVI
  - Grade III injuries: Urgent formal I&D and ex-fix

- Compartment syndrome: Emergent fasciotomy and ex-fix

- Vascular injury
  - Emergent vascular team involvement (bypass vs. repair)
  - Emergent ex-fix
  - Emergent fasciotomy following re-vascularization

All admissions need close monitoring and serial examinations of compartments. Exam needs to be well documented
Figure 1: Shatzker I

Figure 2: Shatzker II
Figure 3: Shatzker III

Figure 4a: Shatzker IV with knee subluxation
Figure 4b: Shatzker IV with knee dislocation

Figure 5: Shatzker V
Figure 6: Shatzker IV