Treatment of Acute Traumatic Knee Dislocations
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Knee Dislocations

- Wide spectrum of severity and associated injuries
- Often secondary to high-energy trauma
- Most commonly reported cause is MVA
- Athletic injuries are the second most common cause of knee dislocations
Knee Dislocations

• High-Energy
  – Usually MVA or fall from a height
  – Dashboard injury common
  – Forced Hyperextension athletic injury
  – Athletic injuries

• Low-Energy
  – Generally from a rotational component
  – Morbid obesity is a risk factor
Knee Dislocation Video
Knee Dislocation Classification

• Based upon the position of the tibia on the femur:
  – Anterior
  – Posterior
  – Lateral
  – Medial
  – Rotary
Anterior Knee Dislocations

- Most common dislocation (30-50%)
- Frequent arterial injury (intimal tear due to traction)
- Hyper-extension most common mechanism of injury
Posterior Dislocation

• Second Most common (25%)
• Due to axial load to flexed knee (dashboard injury)
• Highest rate of complete tear of popliteal artery
Presentation

• Symptoms:
  – History of major trauma with immediate deformity of knee
  – Knee pain and instability
  – In athletic competition: video review as possible
Presentation

• Appearance
  – No Obvious Deformity
    • 50% spontaneous reduce
    • Subtle signs of trauma (swelling and effusion)
  – Obvious Deformity
    • Immediate reduction
    • Monitor pulses
    • Dimple sign (irreducible posterolateral dislocation)
Reduction of Dislocations

• Do not x-ray obvious deformity!
• Immediate reduction
• Neurovascular injuries common
• Gentle inline traction
• Transport immediately after 2-3 attempts at reduction
Always check neurovascular status of the limb **before** and **after** any reduction attempts!
Physical Exam

• Deformity
• Stability
• Vascular Exam
  – Priority to rule out vascular injury
  – Present pulses does not indicate absence of arterial injury
  – Immediate exploration and surgical repair if pulses absent on NV exam
Vascular Exam

- Pulses Present
  - Does not rule out arterial injury
  - Monitor ABI
    - ABI > 0.9 – serial exams
    - ABI < 0.9 – duplex exam or CT arthrography

- Pulses Absent
  - Reduce knee/Re-examine/ABI
  - Immediate surgical exploration
    - >8 hours ischemia – 86% amputation rate
Diagnosis

- Complete and careful physical examination
- Serial neurovascular evaluations!!!!!
- AP and lateral XR
- +/- Arteriogram
- MRI
Imaging

- **RADIOGRAPHS**
  - May be normal if spontaneous reduction
  - Irregular joint space
  - Avulsion fractures
  - Osteochondral defects

- **MRI**
  - Required to define soft tissue injuries
Algorithm Summary

**FIGURE 1.** Recommended algorithm for the diagnosis of vascular injury following multiple ligament knee injuries. *Modified from the University of Washington/ Harborview Medical Center (Seattle, WA)."
Associated Injuries

- **Vascular**
  - 20-40% in all dislocations
  - 50-60% in AP dislocations
  - Due to tethering of the popliteal fossa

- **Nerve**
  - Usually common peroneal nerve (25%)
  - Tibial nerve less common

- **Fractures**
  - Present in 60%
  - Tibia and Femur most common
Popliteal Artery Injuries

- Occurs in 20-40% of dislocations
  - Can be as high as 50%
- Anterior dislocations cause delayed thrombosis
- Posterior dislocations cause direct intimal fracture or transection of the vessel with immediate thrombosis
Peroneal Nerve Injury

- Less common than vascular injury
- Hyperesthesia at first web space and loss of dorsiflexion of the foot
- Poor prognosis of recovery
- Medial knee dislocations cause traction injuries to the nerve
- Rotational injuries have high incidence of nerve transection
Treatment

• Closed Reduction:
  – Orthopedic emergency
  – On the field reduction
  – Preference of controlled environment
  – Post reduction knee locked in brace at 15-30 degrees of flexion
  – Confirm NV status
Treatment

- Obtain and Maintain Reduction
Treatment

- Surgical Intervention:
  - Arteriogram in OR suite if absent pulses
  - Immediate versus delayed reconstructive procedures??
Treatment

• Emergent surgical intervention
  – Vascular injury repair
  – Open fracture/open dislocation
  – Irreducible dislocation
  – Compartment syndrome
Treatment: Knee Dislocation without Vascular Injury

• Operative repair should be done within 14 days of injury
  – Waiting leads to scarring and contractures and decreased ROM

• If Staging:
  – PLC first
  – PCL before ACL
  – ACL last

• Repair versus Reconstruction
Knee Dislocation
Case Presentation
Case Presentation

• 22 y.o. collegiate quarterback sustained an injury to his left knee during a game in early September 2013
• Locked posterolateral knee dislocation after direct blow to anterior aspect of left plant leg.
• Irreducible
Dislocation Video
What would you do?
What did we do?

• Could not be reduced on-the-field
• Neurovascular status intact
• Transported to ED for reduction under anesthesia
• CT arthrogram - negative
• Kept in hospital overnight for serial neurologic exams then transported home the next day
What did we do?

- Delayed (6 days) Simultaneous ACL/ PCL/PLC Reconstructions
- PLC Repair and augmented reconstruction using a semi-tendinosis allograft
- PCL – Achilles tendon allograft
- ACL – Semitendinosis and gracilis allograft
Surgical Technique

- ACL graft from patellar tendon
- PCL graft from Achilles tendon

25 mm
Surgical Technique

- Step cut PCL femoral tunnel
- PCL stump
- ACL tibial tunnel
- PCL proximal end of tibia
- ACL Tibial tunnels
Surgical Technique

ACL femoral tunnel
ACL tibial tunnel
PCL femoral tunnel
PCL tibial tunnel

Medial
PLC Augmented Reconstruction
PLC Augmented Reconstruction
PLC Augmented Reconstruction
PLC Augmented Reconstruction
ACL/PCL Video
Complications

- Arthrofibrosis (38%)
- Recurrent laxity and instability (37%)
- Peroneal Nerve injury (25%)
- Vascular Compromise
Conclusion

• All bones and joints susceptible to fracture/dislocation
• Awareness is the key
• Sideline diagnosis can be challenging
• Control the situation and calm the athlete
• On-field reduction is optimal in the appropriate hands
• Radiographic evaluation at facility if available
• Transport all fracture/dislocations as soon as possible
Conclusion

• Avoid Pitfalls
  – Compartment Syndrome
  – NV Injury
  – Missed Fractures

“It’s just a sprain. But let me put a cast on it so you won’t look like an idiot for screaming like a freakin’ schoolgirl.”
Thank You!