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

Lateral Dislocation
- 13% of knee dislocations
- Due to valgus force
- Highest rate of peroneal nerve injury
- Involves ACL and PCL tears
Medial Dislocations
- Varus force
- Usually disrupts PLC and PCL

Rotational Dislocation
- Posterolateral is most common rotational dislocation
- Usually irreducible

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

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Algorithm Summary

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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
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

Colosimo, Carroll, Heidt, Carlonas

• Presented at AANA, April 2000
• Retrospective study of 11 knee dislocations (7 acute, 4 chronic) with arthroscopically assisted ACL/PCL reconstruction
• 7 with BPTB autograft for the ACL and achilles tendon allograft for the PCL
• 3 patients with ipsilateral and contralateral BPTB autografts for both ACL and PCL
• 1 patient with BPTB allograft for the ACL and Achilles allograft for the PCL

Colosimo, Carroll, Heidt, Carlonas

• Results:
  – Average age – 29.3 years
  – Average Post-operative FU 28.4 months
  – Average Lysholm – 87.7
  – Average anterior active KT-1000 difference was 2.6
  – 10/11 returned to previous level of activity
Harner, et al. JBJS 2004

- 31 patients followed for 24 months
  - 9 (ACL, PCL, PLC)
  - 15 (ACL, PCL, MCL)
  - 7 (ACL, PCL treated only)
- 19/31 were treated in under 3 weeks
- 12/31 were treated chronically (>3 weeks)
- Lysholm scores, ADL scores and sports activity scores were all higher for patients treated acutely.
- Patient satisfaction scores were higher in the acutely treated group

Eranki, Bregg and Wallace 2010

- 20 Total knee dislocations, followed for 2 years
  - 6 with vascular injury
  - 6 with neurological injury
- Pts with initially lower pre-injury level of activity were able to return to their pre-injury status
- 22% of competitive athletes returned to competitive sports
- 38% of heavy level activity returned
- 67% of moderate level returned
- 68% of the 20 patients regularly had problems running at 2 years
- 70% had problems squatting
- 40% had persistent swelling
- 42% had problems with stairs
- Most patients had NO problems locking or giving way
- 80% of patients were satisfied
PLC Augmented Reconstruction

ACL/PCL Video

Complications
- Arthrofibrosis (38%)
- Recurrent laxity and instability (37%)
- Peroneal Nerve injury (25%)
- Vascular Compromise
Thank You!