

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




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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



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Knee Dislocation Video

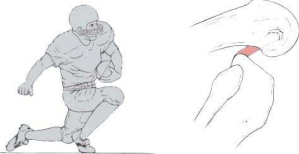


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Knee Dislocation Classification

- Based upon the position of the tibia on the femur:
 - Anterior
 - Posterior
 - Lateral
 - Medial
 - Rotary





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Anterior Knee Dislocations

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





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Posterior Dislocation

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



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Presentation

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




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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)




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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



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Always check neuro-vascular status of the limb **before** and **after** any reduction attempts!

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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

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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




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Diagnosis

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



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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

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).
Clin J Sports Med, Volume 19, Number 2, March 2009
Nicandri et al, page 127

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Associated Injuries

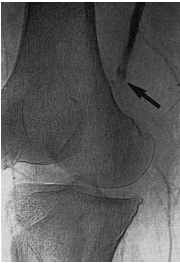
- **Vascular**
 - 20-40% in all dislocations
 - 50-60% in AP dislocations
 - Due to tethering of the popliteal fossa
- **Nerve**
 - Usually common peroneal nerve (25%)
 - Tibial nerve less common
- **Fractures**
 - Present in 60%
 - Tibia and Femur most common

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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

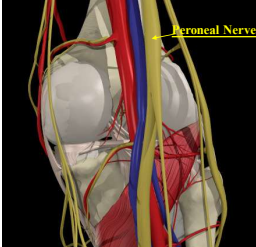


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Peroneal Nerve Injury

- 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




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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

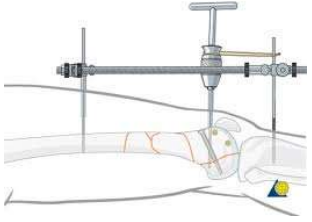


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Treatment

- Obtain and Maintain Reduction

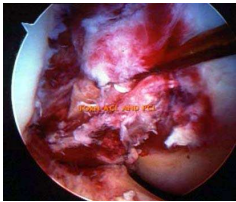


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Treatment

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



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Treatment


- Emergent surgical intervention
 - Vascular injury repair
 - Open fracture/open dislocation
 - Irreducible dislocation
 - Compartment syndrome

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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



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Knee Dislocation Case Presentation


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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




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Dislocation Video



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What would you do?



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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

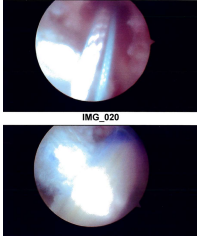
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What did we do?

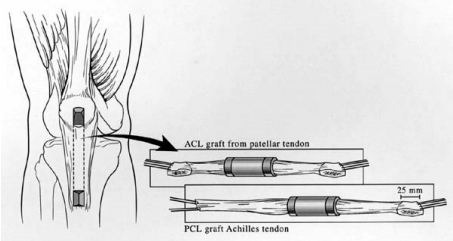
- Delayed (6 days) Simultaneous ACL/ PCL/PLC Reconstructions
- PLC Repair and augmented reconstruction using a semi-tendinosis allograft
- PCL – Achilles tendon allograft
- ACL – Semitendinosis and gracilis allograft



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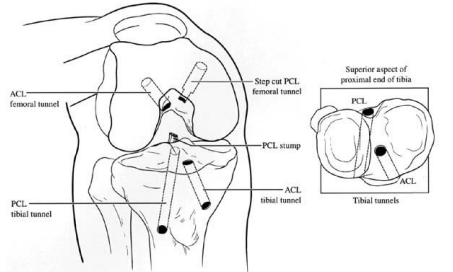
Surgical Technique



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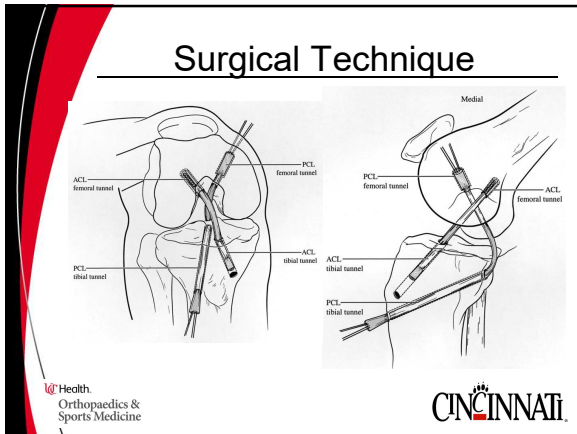
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Surgical Technique

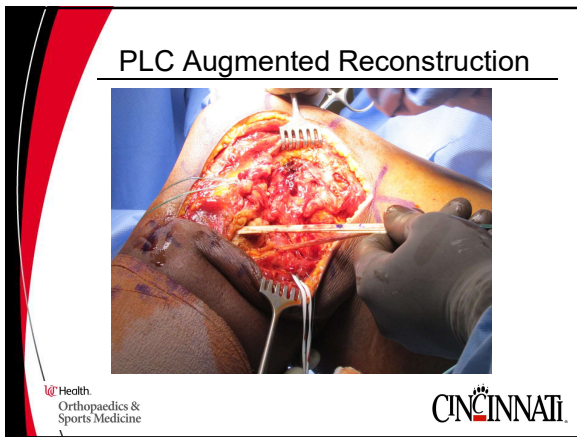


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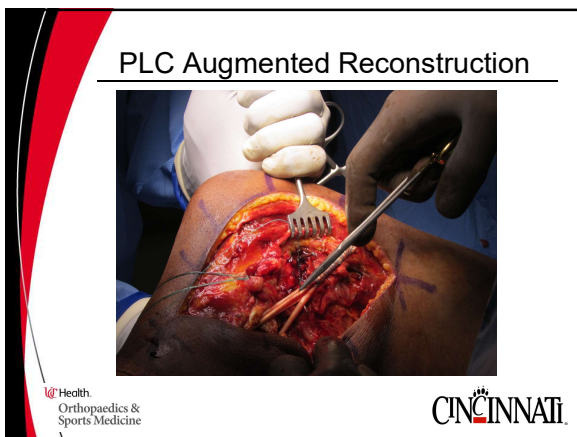
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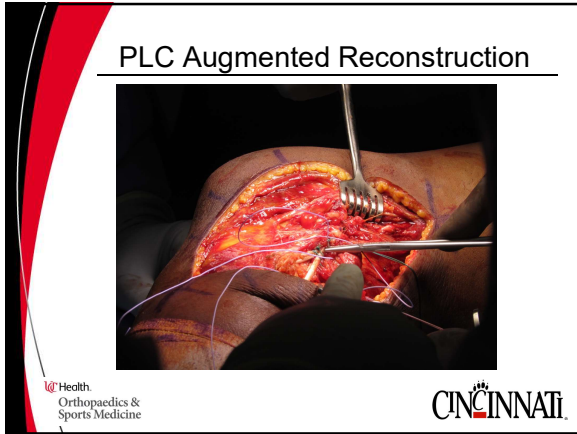
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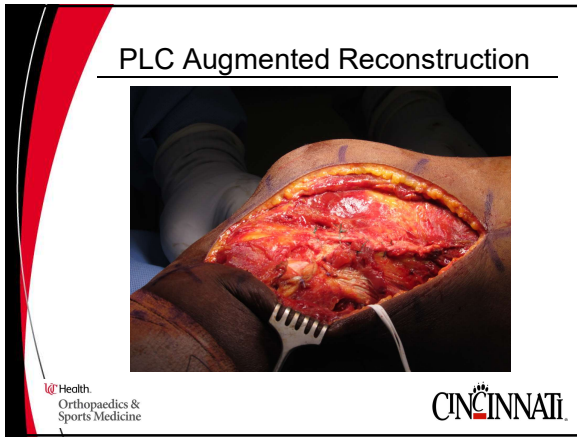
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Complications

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




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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




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Conclusion

- Avoid Pitfalls
 - Compartment Syndrome
 - NV Injury
 - Missed Fractures



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Thank You!



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