

# Treatment of Acute Traumatic Knee Dislocations

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# Knee Dislocations

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- 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

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- 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



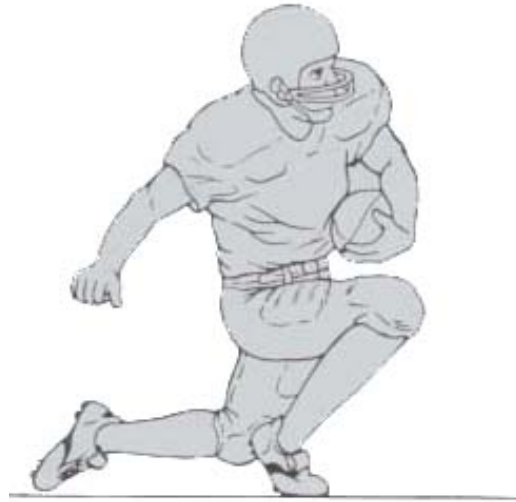
# Knee Dislocation Video



# Knee Dislocation Classification

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- 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

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- 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

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- 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

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- Do not x-ray obvious deformity!
- Immediate reduction
- Neurovascular injuries common
- Gentle inline traction
- Transport immediately after 2-3 attempts at reduction



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

# Physical Exam

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- 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

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- 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

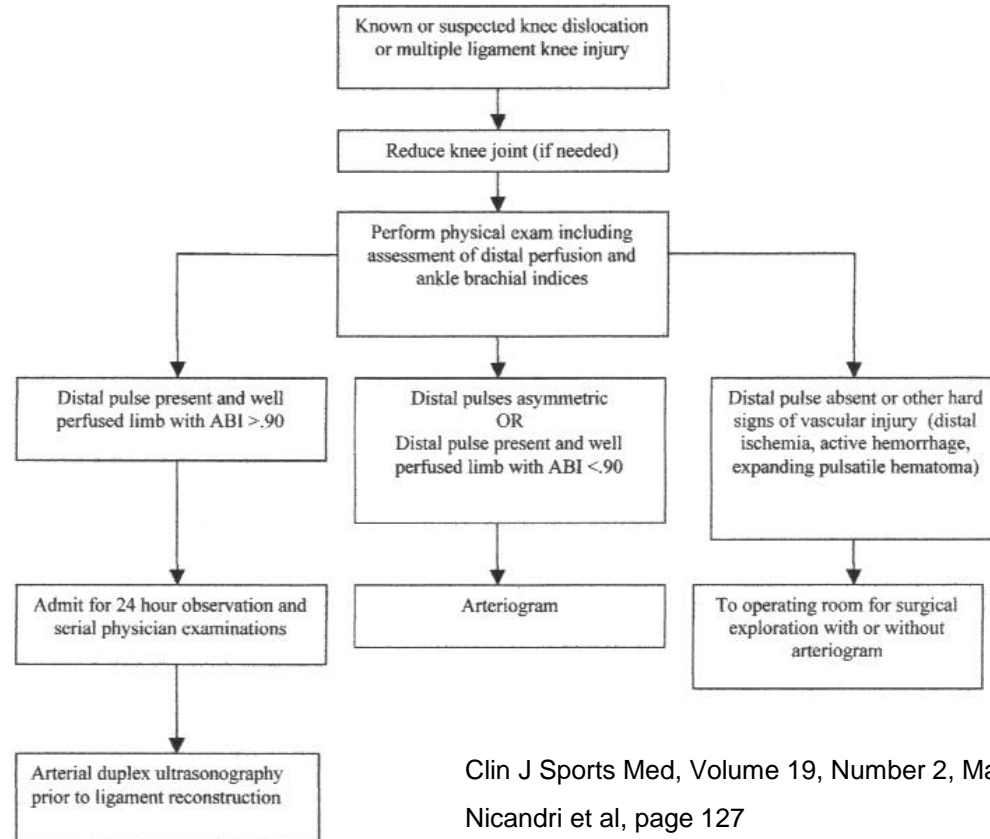


# Imaging

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- **RADIOGRAPHS**
  - May be normal if spontaneous reduction
  - Irregular joint space
  - Avulsion fractures
  - Osteochondral defects
- **MRI**
  - Required to define soft tissue injuries

# Algorithm Summary

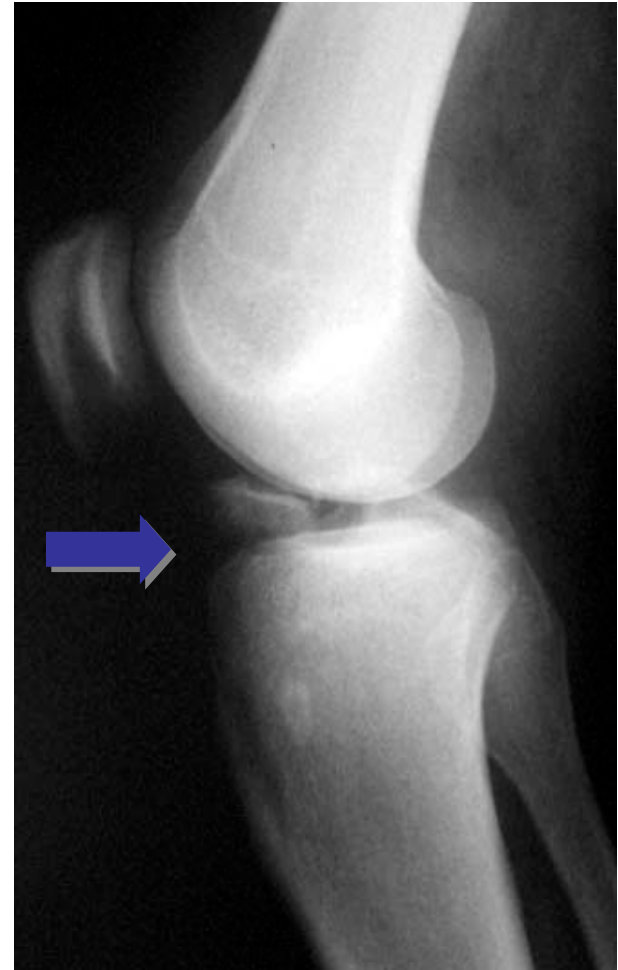


**FIGURE 1.** Recommended algorithm for the diagnosis of vascular injury following multiple ligament knee injuries. \*Modified from the University of Washington/Harborview Medical Center (Seattle, WA).

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

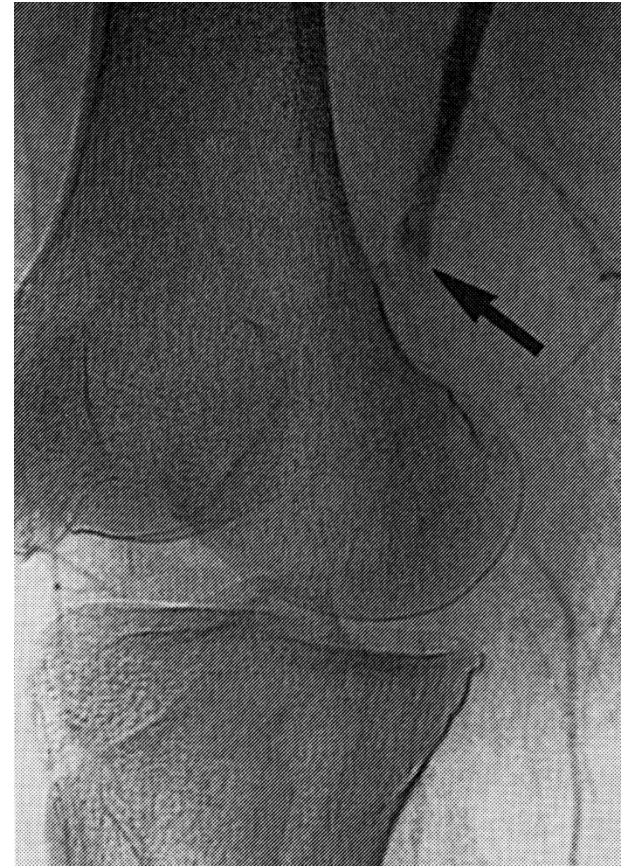
# Associated Injuries

- 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



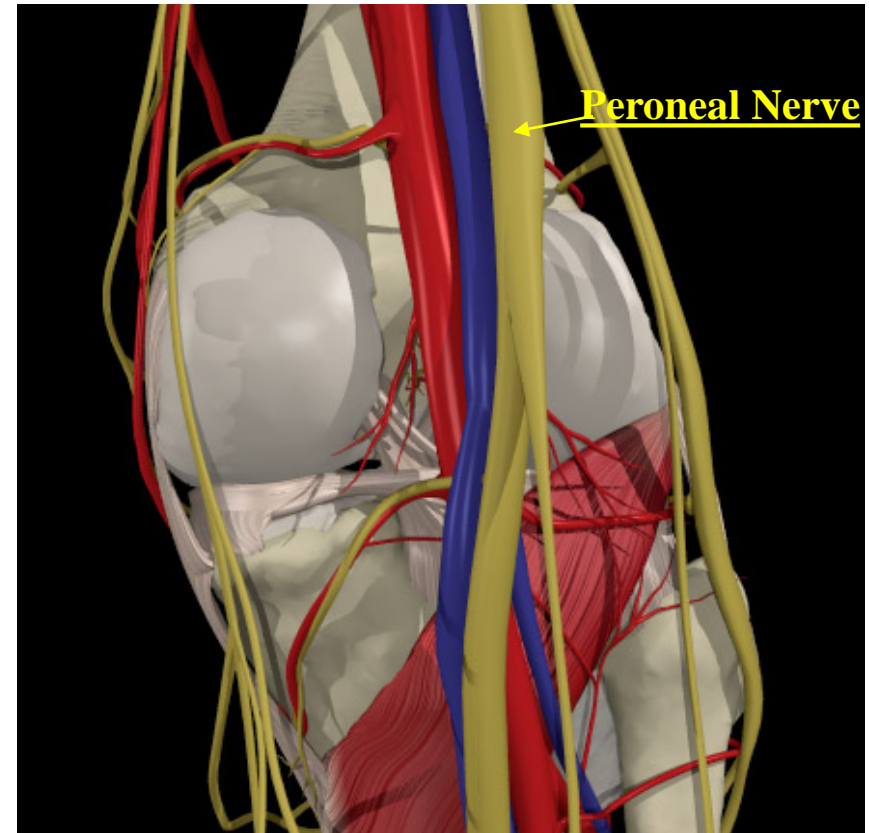
# Popliteal Artery Injuries

- 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
- Hypersthesia 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

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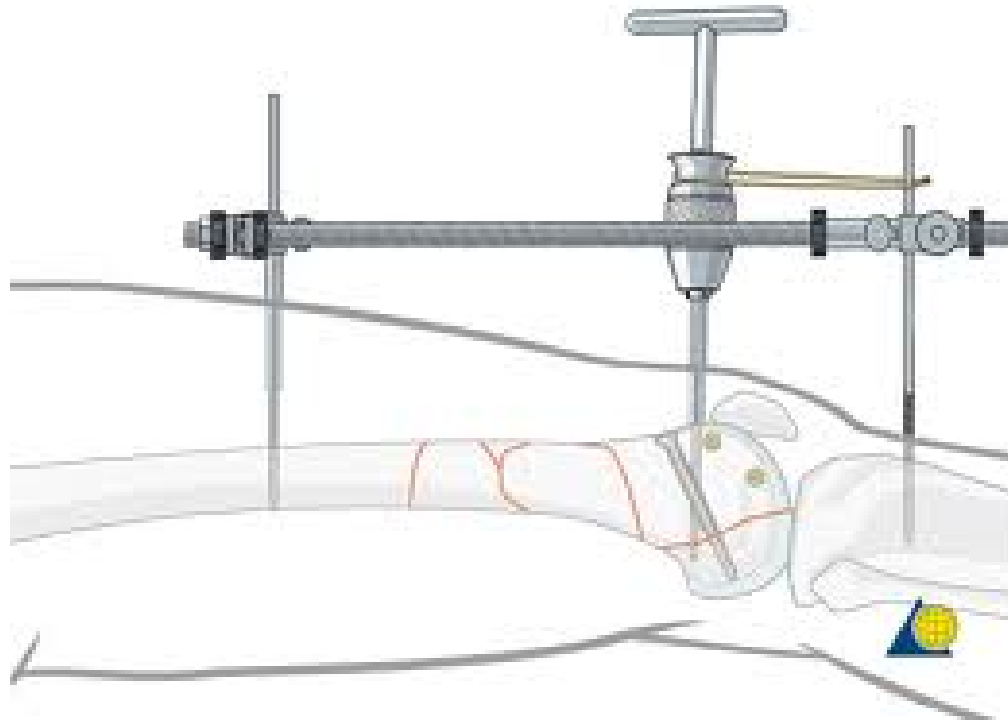
- Closed Reduction:
  - Orthopedic emergency
  - On the field reduction
  - Preference of controlled environment
  - Post reduction knee locked in brace at 15-30 degrees of flexion
  - Confirm NV status



# Treatment

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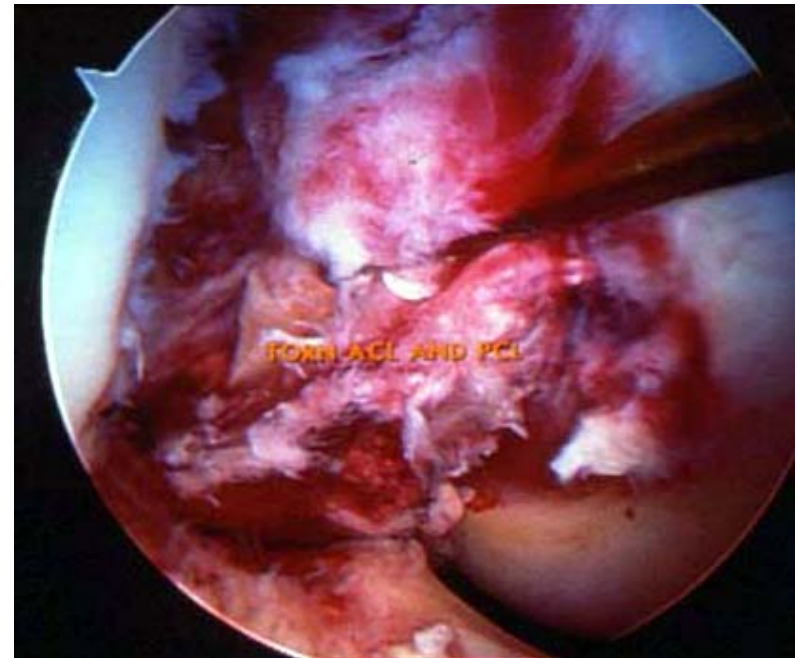
- Obtain and Maintain Reduction



# Treatment

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



# Treatment

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

# Treatment: Knee Dislocation without Vascular Injury

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- 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

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- 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?

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# What did we do?

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- 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

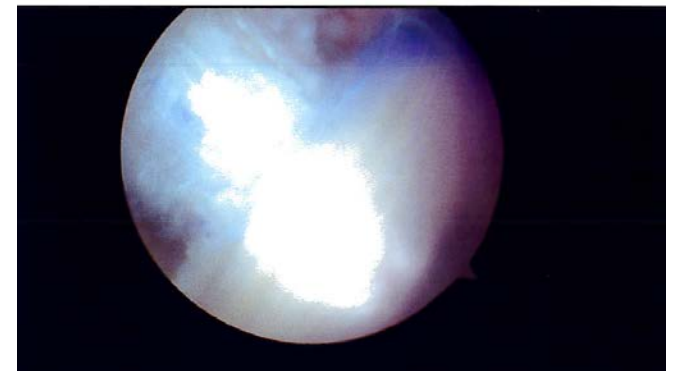
# What did we do?

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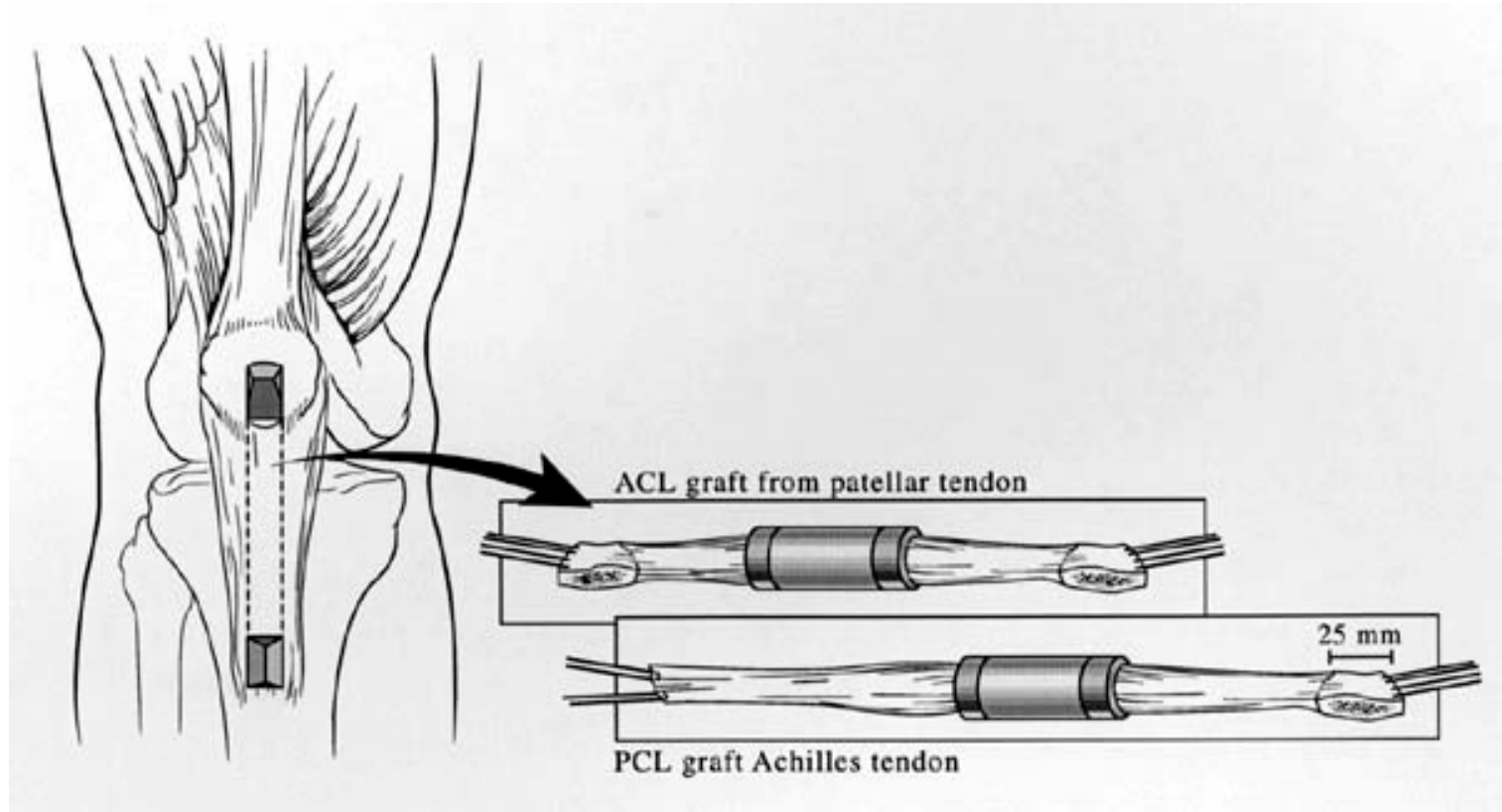
- Delayed (6 days)  
Simultaneous ACL/  
PCL/PLC Reconstructions
- PLC Repair and  
augmented reconstruction  
using a semi-tendinosis  
allograft
- PCL – Achilles tendon  
allograft
- ACL – Semitendinosis  
and gracilis allograft



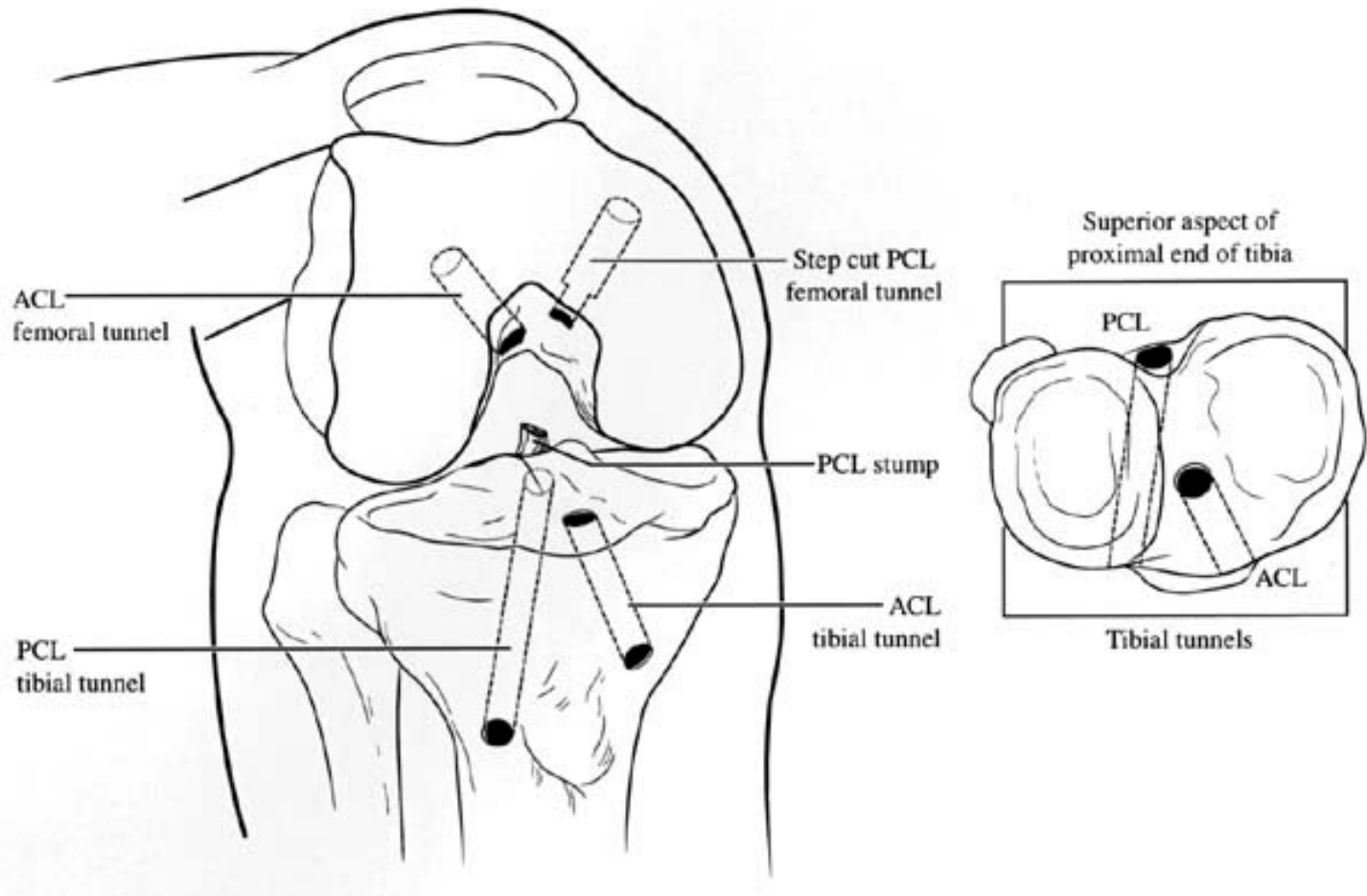
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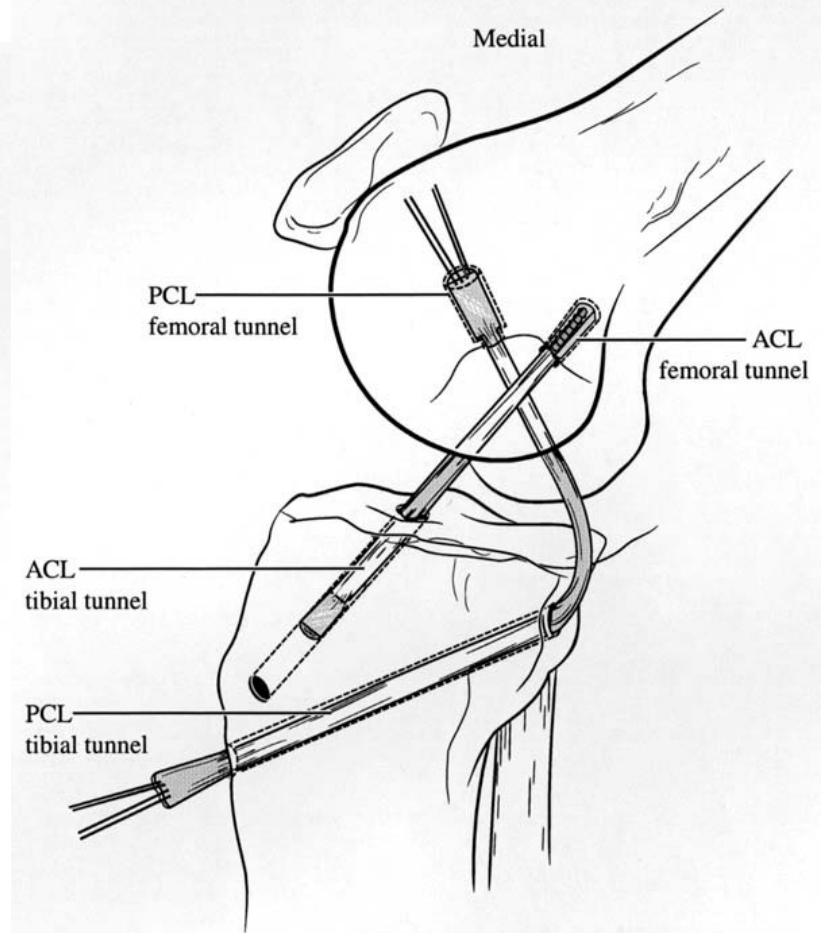
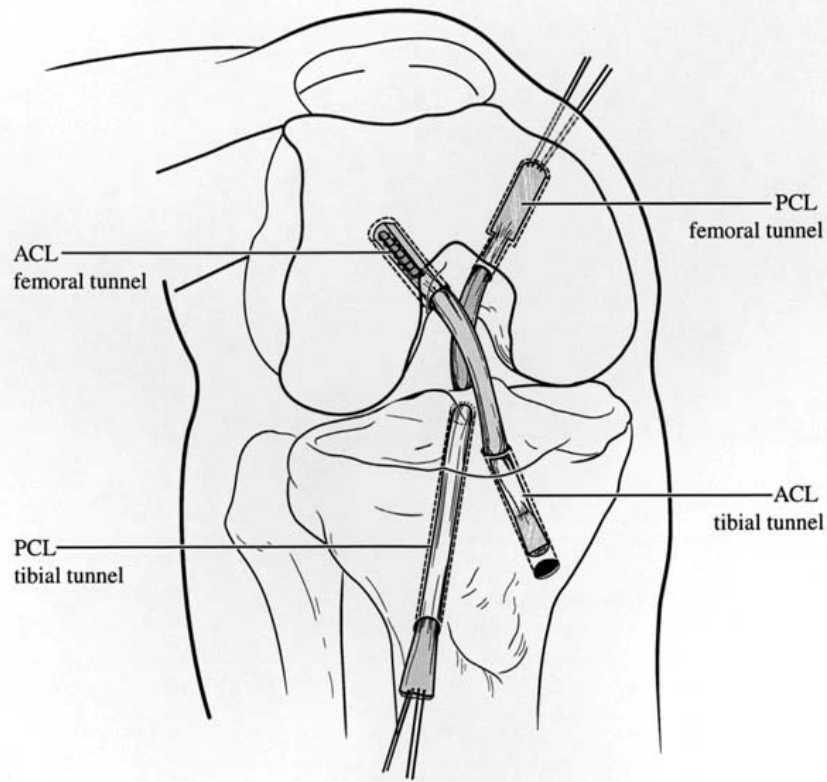
# Surgical Technique



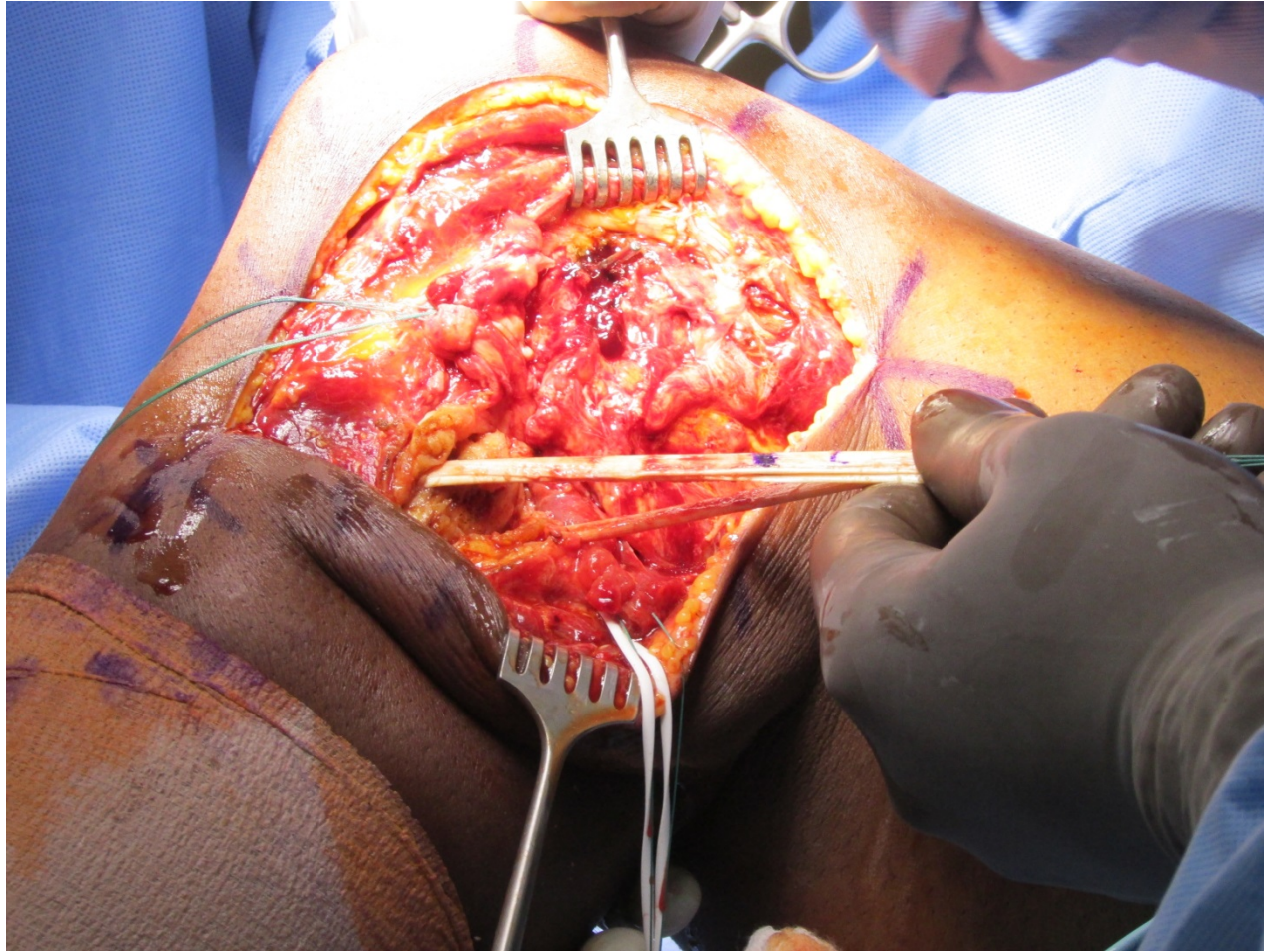
# Surgical Technique



# Surgical Technique

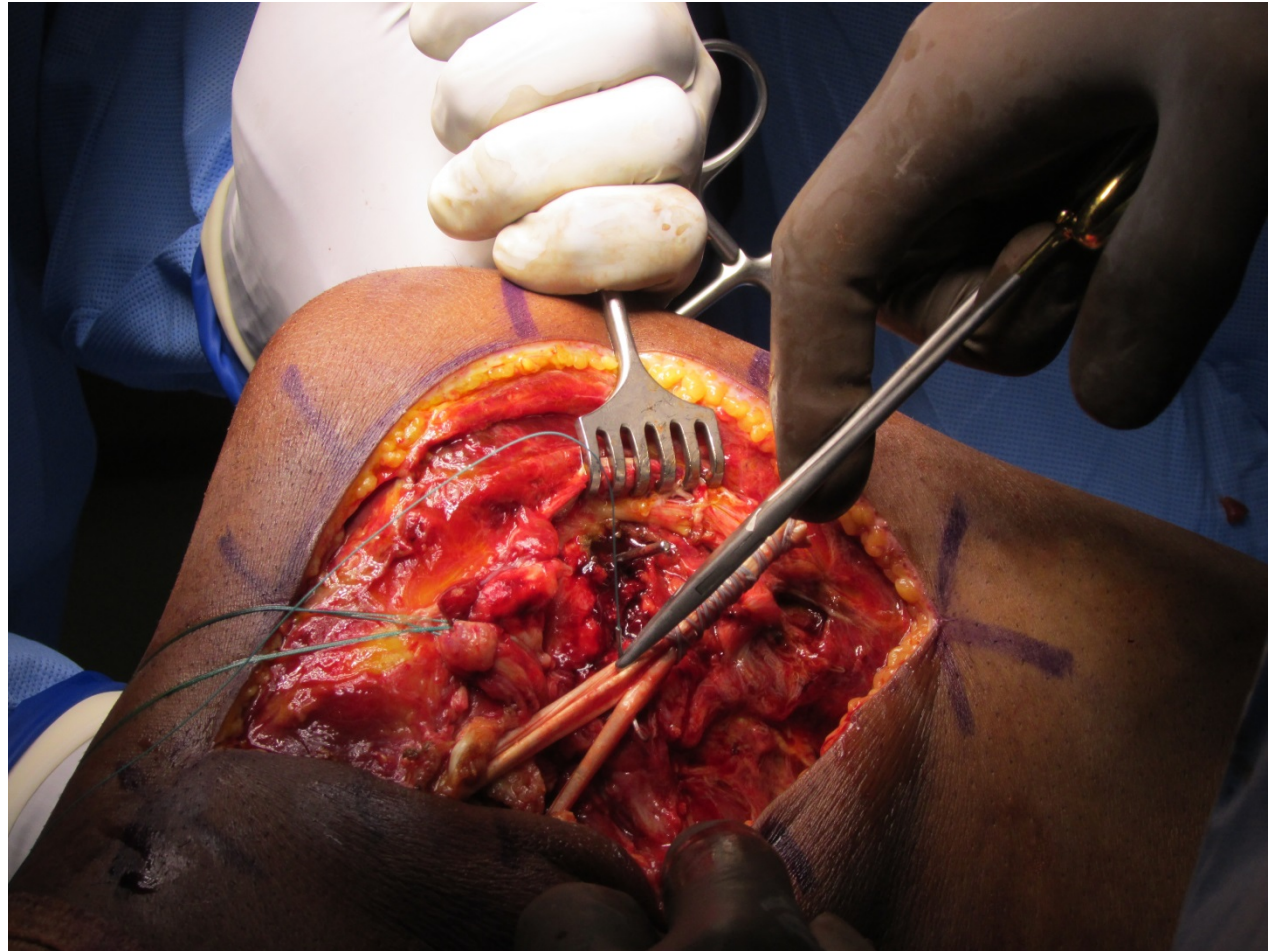


# PLC Augmented Reconstruction



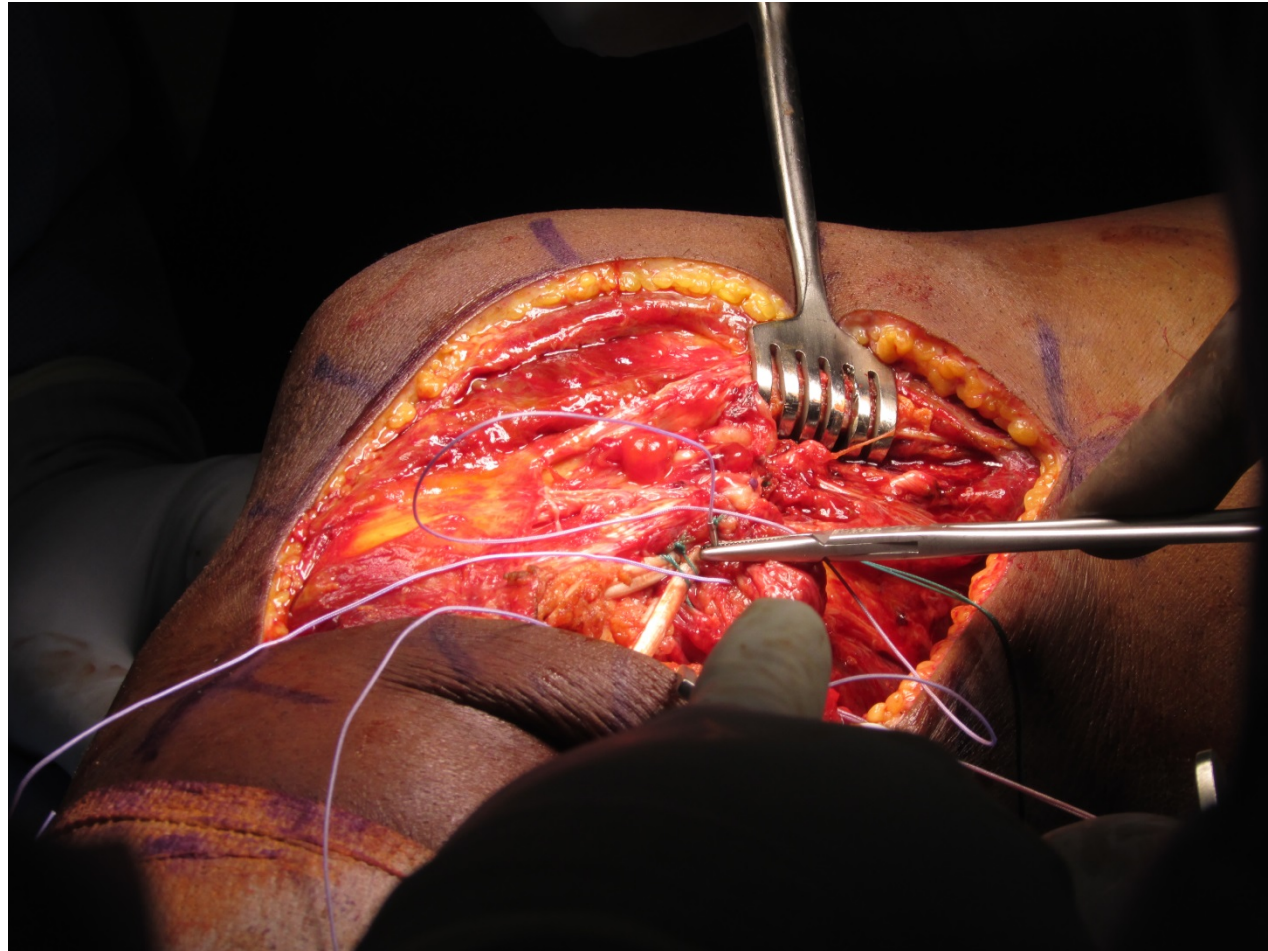
# PLC Augmented Reconstruction

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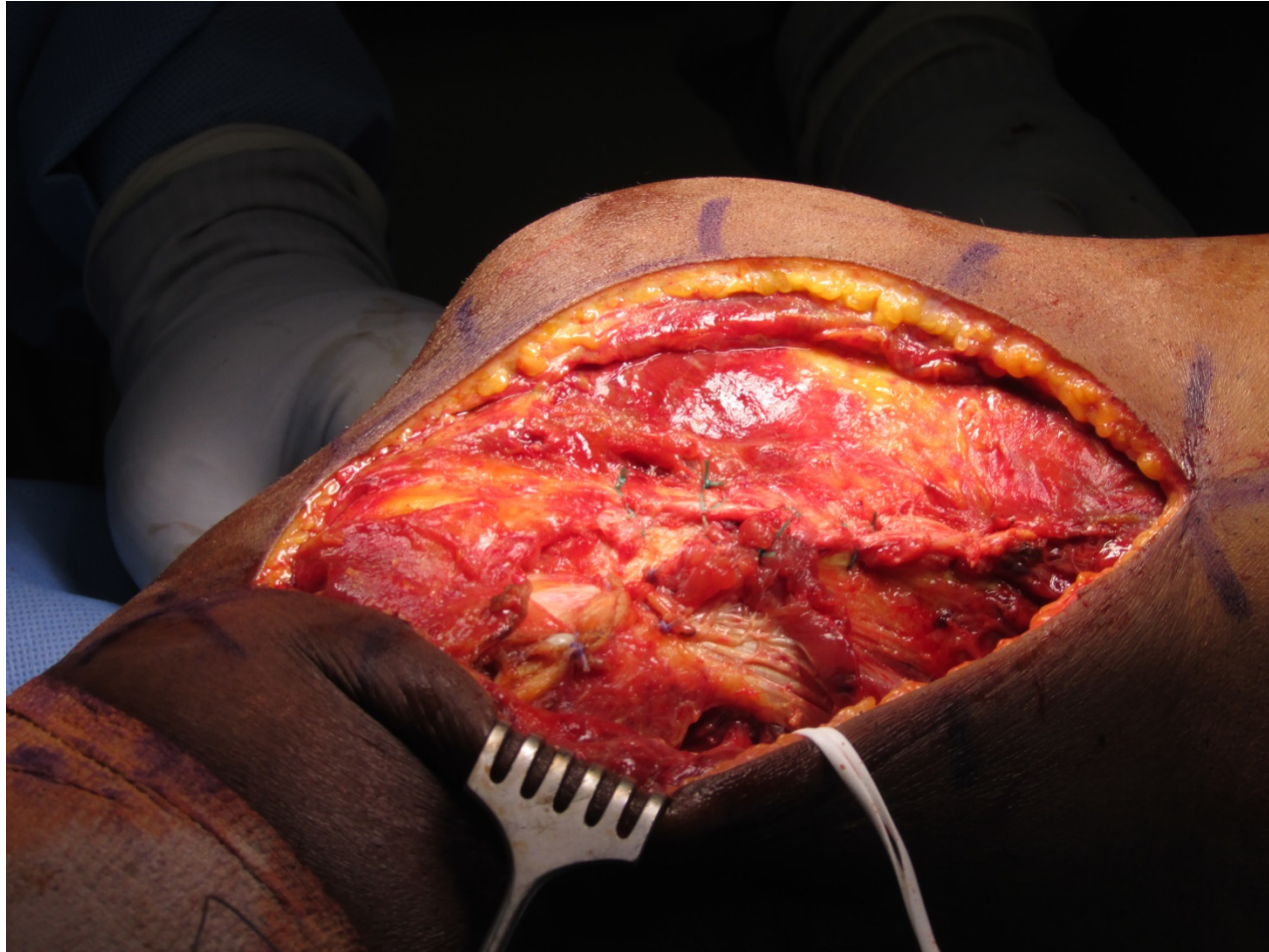
# PLC Augmented Reconstruction

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# PLC Augmented Reconstruction

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# ACL/PCL Video

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# Complications

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- 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



# Thank You!

