

Case conference



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20110505

Patient Information

- 28y/o male, suffered from T.A, polytrauma
- Right sacral fracture, zone I
- Right pubic superior ramus fracture
- L4 compression fracture with fracture-distraction injury
- Suspected left PCL avulsion fracture
- Left lower extremity weakness, R/O lumbosacral plexus injury
- Right pneumothorax s/p chest tube insertion
- Left hemothorax s/p pigtail insertion

Physical Examination

Muscle power

	Right	Left
Hip flexion	3	1-2
Knee extension	4	1-2
Ankle dorsiflexion	5	5
Toe dorsiflexion	5	5
Ankle plantarflexion	5	5

Self voiding and defecation: intact

DTR



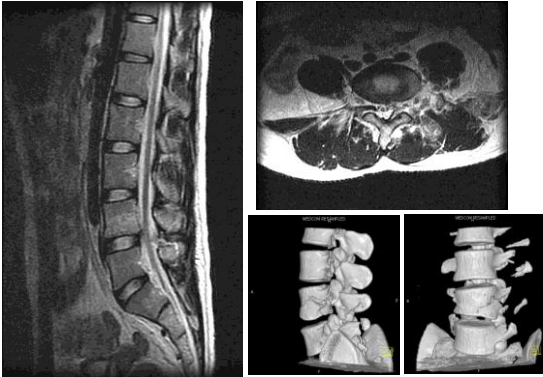
Severe back pain and tenderness

Physical Examination

Left lower extremity

- Mild ROM limited due to pain
- Anterior drawer test: negative
- Posterior drawer test: positive
- Unable to check due to pain





Operation Note 4/13

- **Pre-Op:**
right sacral fracture
- **Post-Op:**
right sacral fracture
- **OP method:**
Closed reduction and internal fixation with iliosacral screw

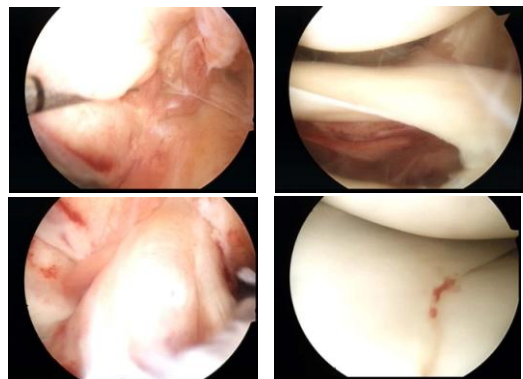
Operation Note 4/19

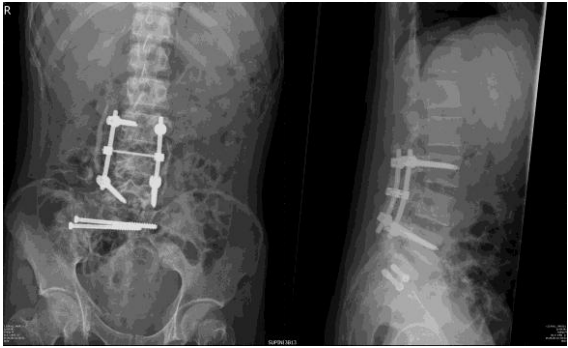
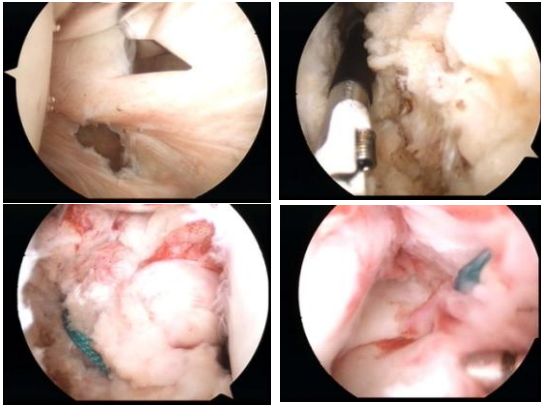
- **Pre-Op:**
L4 compression fracture with fracture-distraction injury
- **Post-Op:**
L4 compression fracture with fracture-distraction injury
- **OP method:**
 1. Open reduction with TPS, smartloc, L3-5
 2. lateral fusion with Genex

Operation Note 4/27

- **Pre-Op:**
 1. Left knee posterior cruciate ligament displaced avulsion fracture
 2. Left knee Second fracture with posterolateral complex capsule rupture
- **Post-Op:**
 1. Left knee posterior cruciate ligament displaced avulsion fracture
 2. Left knee Second fracture with posterolateral complex capsule rupture
- **OP method:**
 1. Lt knee arthroscopic PCL avulsion **pullout suture fixation** using No 5 Ethylbone + No 1 PDS
 2. ORIF with Staple+ Washers fixation for Second fracture and post-lat capsule repair

Intact MM/LM/ACL/popliteal tendon/PFC

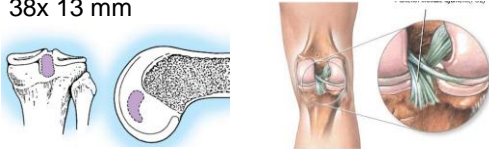




Posterior Cruciate Ligament Injury

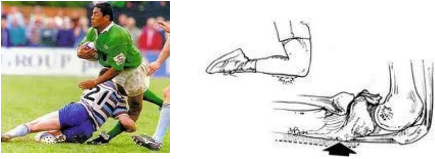
PCL anatomy

- Origin- broad crescent-shaped area anterolaterally on the medial femoral condyle
- Insertion- tibial sulcus below the articular surface
- Anterolateral and posteromedial bundle
- 38x 13 mm



The mechanism of PCL injury

- Dashboard injury
- Hyperflexion
- Hyperextension
- Posterior rotation injury of the knee



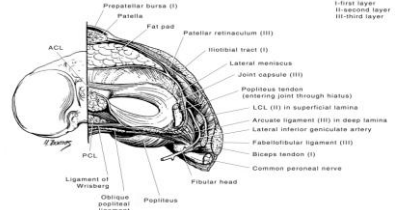
Classified

- Grade I (partial) ~ grade III (complete)
- Isolated or combined
- Isolated PCL disruption most commonly occurs as avulsion at its tibial insertion (40%–55%)

Hunter JC AJR 1995

Associated injury

- Medial collateral ligament
- Posterolateral complex



Posterolateral complex

- **Lateral collateral ligament**
- **Popliteal tendon**
- **Popliteofibular ligament**
- Iliotibial band
- Arcuate ligament
- Lateral capsule
- Biceps



Diagnosis

- History
- mechanism
- Physical examination
- Image



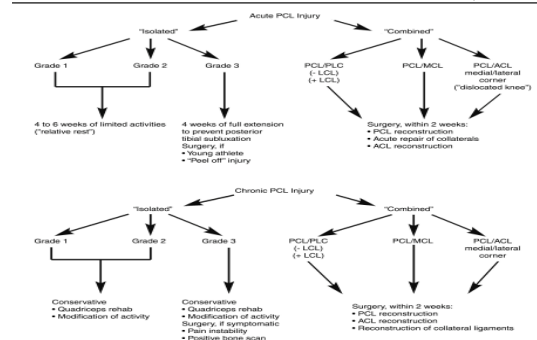
Physical examination

- Posterior drawer test
- Tibial sag
- Dial test
- External rotation recurvatum
- Reversed pivot
- Varus/valgus stress



Treatment

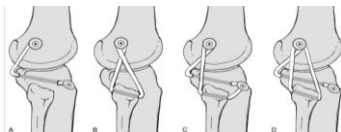
Harner CD Am J Sports Med 1998



PLC treatment

- Acute repair combined with reconstruction is advocated
- A failure rate of 45% with repair compared to 4% with reconstruction
- Principally the LCL, popliteofibular ligament and popliteus

Levy BA, Am J Sports Med 2010



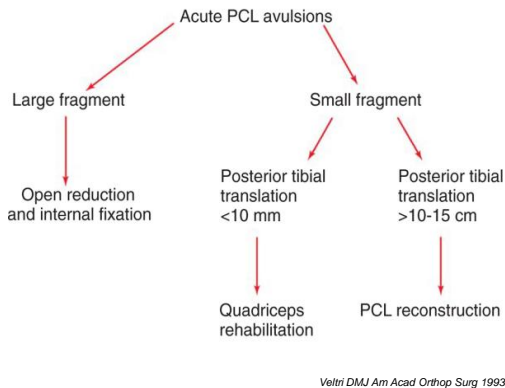
Miller MD, Review of sports medicine and arthroscopy, 2nd ed

PCL avulsion fracture

- Non-displaced
- Displacement



Meyers MH JBJS A 1970



Veltri DMJ Am Acad Orthop Surg 1993

Treatment option

- Non-displaced fragment -- Casting
- Displaced fragment -- ORIF: high morbidities and disadvantage -- ARIF: current preferred treatment

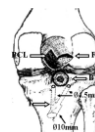


Surgical option

- *small bone fragment (<10 mm) with comminution* -- fixed with use of multiple sutures
- *small bone fragment without comminution* -- fixed with 23-gauge wires
- *medium-sized fragment (10 to 20 mm)* -- fixed with Kirschner wire
- *large single fragment of bone (>20 mm) that involved the condyles* -- fixed with one or two cannulated screws

Sung-Jae Kim JBJS A 2001

- **Jinzhong Zhao Arthroscopy 2006** -- suture fixation through Y-shaped bone tunnel

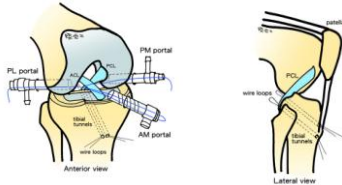


- **Jianchao Gui Arthroscopy 2009** -- single tunnel suture fixation of PCL avulsion fracture



Ours

- No fragment size limitation
- 2 tibial tunnels below PCL stump
- Four-strand NO.5 Ethibond



Second fracture

- Avulsion fractures of the lateral aspect of the proximal tibia below the articular surface



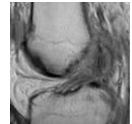
Mechanism

- excessive varus force and internal rotation applied to the lower leg



Associated Injury

- Tear of the anterior cruciate ligament (75-100%).
- Injuries of the medial and lateral menisci (66-70%).
- Avulsion fracture of the fibular head.
- Avulsion fracture of the Gerdy tubercle.



Lateral Capsular Sign Associated With Posterior Cruciate Ligament Tear

- 38y/o struck by a car across the lateral aspect of right knee
- Valgus laxity noted and
- Suggestive of ACL injury
- Under anaesthesia
 - Valgus laxity
 - Normal Lachman test
 - no Varus laxity
- **Second fracture with PCL and MCL and MM injuries**



PCL injury treatment goal

- Identify the associated injuries
- Restore the anatomic position and functional stability
- Early intervention for high grade isolated and combined PCL injuries

Thanks!!