CHICAGO SPORTS MEDICINE SYMPOSIUM 2018
WORLD SERIES OF SURGERY

FOWLER KENNEDY stay active

LCL/PLC

How to evaluate and how to fix

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Schulich Western

Overview

FOWLER KENNEDY stay active

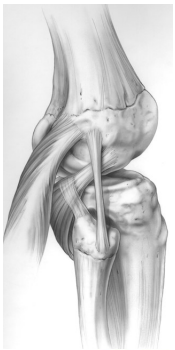
- Lateral stabilizers of the knee
- Diagnosis
  - Clinical examination
  - Imaging
- Decision making
  - Evidence based where possib
  - Surgical Technique

Schulich Western

Posterolateral Corner

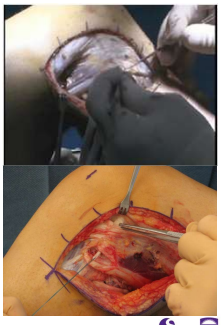
FOWLER KENNEDY stay active

- PLC Biomechanics
  - FCL = main varus restraint
  - Popliteus, PFL = ER stabilizers
  - PLC critically interacts with ACL/PCL
  - Grade 3 PLC injuries rarely heal



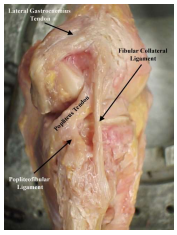
Fibular Collateral Ligament (LaPrade, 2003)

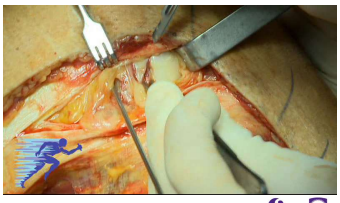
- Femoral attachment
  - Proximal / posterior to lateral epicondyle
- Fibular attachment
  - Midway along fibular head
- Average length 71 mm
- Approach through biceps bursa



Popliteus Tendon (LaPrade, 2003)

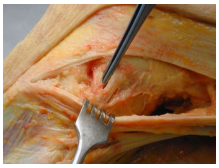
- Popliteus attachment on Femur
  - Attaches on anterior fifth of popliteal sulcus
  - Average length 60 mm

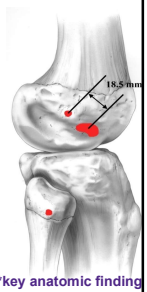




Popliteus – Femoral Attachment Relationships (LaPrade, 2003)

- Spatial Relationships
  - Average 18.5 mm distance between FCL and PLT
  - Important to recognize this relationship for repair and reconstruction procedures

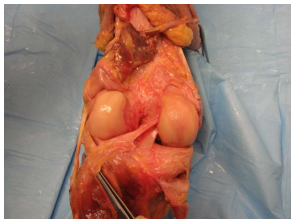




*key anatomic finding

Popliteofibular Ligament

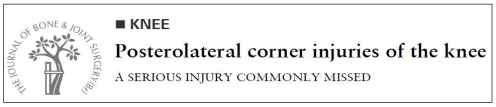
- Originates at musculo-tendinous junction
- Assists PLT to provide static stability ER, varus



Making the Diagnosis

- Athletic trauma, falls and MVAs
- Direct blow to medial knee causing varus stress
- Hyperextension with varus moment
- Isolated PLC are uncommon <2% (DeLee, AJSM 1983)
  - PLC with ACL or PCL 43-80% of the time

Commonly Missed



- Pacheco et al – RR 68pts with PLC
  - 51 (75%) presented within 24hrs
  - 49 (72%) PLC diagnosis not initially made
  - Mean delay of PLC dx of 30 months (12mo excluding 4 outliers)
  - 34 (50%) correct diagnosis at time of referral to knee clinic

Symptoms

- Pain/tenderness in ligament distribution or associated with concomitant bone bruise
- Instability with cutting or pivoting movements
  - Sport specific
- Ask about paraesthesias or weakness – 13% PLC injury have common peroneal injury (LaPrade and Terry, AJSM 1997)

Clinical Examination & Examination Under Anesthetic

- Requires high index of suspicion
- Complete neurovascular exam
  - ABI
- Gait – alignment, varus thrust
- Hyperextension, external rotation

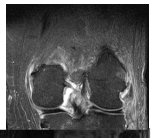
Clinical Examination & Examination Under Anesthetic

Clinical Examination & Examination Under Anesthetic

- Dial Test
  - Assessment of external rotation laxity
  - Can be PLC or AMRL

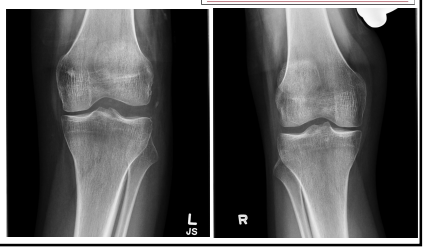
Utilization of Imaging

- Plain Radiographs
  - AP/Lat/Rosenberg
  - Stress Radiographs
  - Hip to ankle alignment views (chronic)
- MRI
  - High signal in tissue in acute phase
  - Sometimes not that useful in chronic ligament cases
  - Will not tell you degree of laxity
- CT
  - Evaluation of fracture

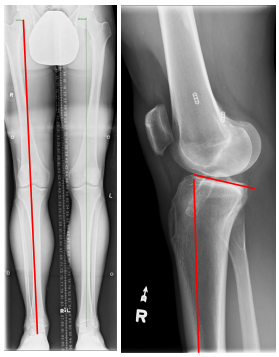


Dynamic Imaging: Varus Stress Radiography

- FCL
  - 2.7mm
- PLC
  - 4mm



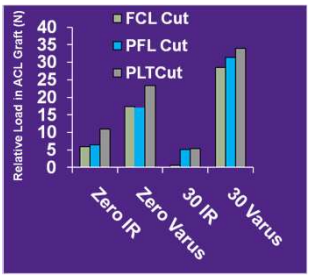
Alignment Views



- Hip to Ankle
  - Coronal plane
- Monopedal weight bearing in extension
  - Sagittal plane
  - Anterior subluxation
  - Tibial slope

Why do we need to address the lateral side?

- Effect of PLC Injuries on ACL Reconstructions (LaPrade, AJSM, 1999)
  - Varus significantly loads ACL grafts
  - Repair / reconstruct PLC injuries at time of ACLR to reduce risk of ACLR failure



Coronal Alignment - Effect on Collaterals and Cruciates

Varus Alignment Leads to Increased Forces in the Anterior Cruciate Ligament

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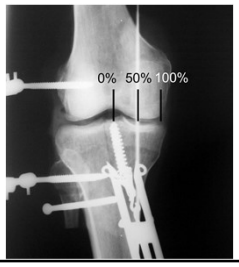
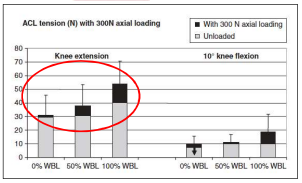
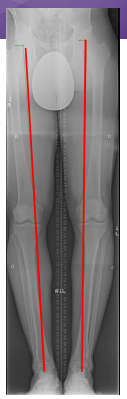




My Approach to the ACL + Lateral Side

Acute (< 3 weeks)

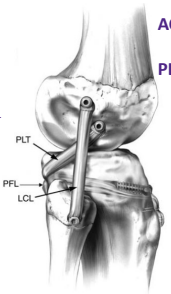
- Use of history, clinical exam, X-ray, MRI
- Grade I
  - ACLR alone when knee quiet
- Grade II
  - Initial non-op management in brace
  - Reassess at 8 weeks and treat as per chronic injury
- Grade III complete lateral side
  - ACLR + FCL/PLC repair with graft augmentation
- Consider alignment in significant physiological varus
  - May dictate operative management
  - Possible HTO



My Approach to the ACL + Lateral Side

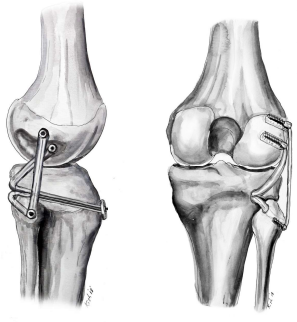
Chronic (> 3 weeks)

- History/examination/XR/MRI/Stress radiographs
- Varus stress < 3mm, normal rotation
  - ACLR alone
- Varus stress < 3mm BUT increased PLRL +/- hyperextension
  - ACLR + Popliteus recon
- Varus stress > 3mm, normal rotation
  - ACLR + FCL recon
- Varus stress > 3mm + rotational laxity
  - ACLR plus full PLC recon
- Will always assess coronal alignment
  - HTO where possible as staged or concomitant procedure



ACL
BTB autograft
PLC
Bilateral SemiT autograft

Modified LaPrade Anatomic PLC Reconstruction



- Single Semi T autograft
- Loop in tibia
- Fixed and tensioned with adjustable loop (Ultra-button)

Postoperative Rehabilitation

- Associated injuries often dictate rehab
- Rehab Goals
1. Protect graft in early phase
   - Cyclic loading
   - Gravity
2. Prevent stiffness
3. Neuromuscular rehab

- 0-2 weeks
  - Swelling control/wound care
  - Hinged brace locked in extension when ambulating
  - TWB
  - 0-90 ROM
  - No active hamstring
- 2-6 weeks
  - Ossur PCL Rebound Brace
  - PWB
  - Safe ROM arc
  - No active hamstring
- 6-12 weeks
  - Ossur PCL Rebound Brace
  - FWB
  - Full ROM
  - No active hamstring
- 3-6 months
  - Ossur PCL Rebound Brace
  - Neuromuscular training
- 6-9 months
  - Running activities
- 9-12 months
  - Sport specific training

19 Yr old girl, ACL deficient, Positive Dial Test

19 Yr old girl, ACL deficient, Positive Dial Test

- Hyperextension recurvatum
- Grade 3+ Pivot
- Grade 3 Lachman
- Reverse Pivot

- = ACL + PLC + ALC

BTB ACL, LET + PLC Recon

Take home messages

- Presentation
  - Look for associated patholaxities in ACL deficient knee
  - Mechanism of injury is a strong clue
  - Careful clinical exam will illicit most
- Imaging
  - MRI may not be that helpful in determining severity of injury
  - Stress radiography useful adjunct to guide diagnosis, treatment and outcome
  - 3mm magic number
- PLC Reconstruction
  - Unaddressed PLC deficiency increases strain on ACL reconstruction
  - Pay attention to alignment – varus thrust will always undo your best soft tissue reconstruction

Thank you!