ASSESSING THE INCIDENCE OF “PCL PLUS POPLITEUS” INJURIES

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DISCLOSURES

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Posterior cruciate ligament (PCL) injuries account for about 38% of all acute knee injuries. Roughly 56% of those occur in the setting of poly-trauma and 30% occur in the face of a sports related injury. In the setting of trauma, the injury classically occurs when the proximal tibia is translated posteriorly and externally rotated relative to the femur as in the setting of a deceleration motor vehicle accident when the knee hits the dashboard. In athletes, the injury most commonly occurs secondary to a direct blow to the tibial tubercle causing the tibia to translate posteriorly or due to a fall on the knee while the foot is in plantar flexion. It is well known that PCL injuries do not primarily occur in isolation, and has been reported that other ligamentous structures may be involved in up to 95% of PCL injuries. The most commonly associated ligamentous and soft tissue injuries include the anterior cruciate ligament (ACL), the posterolateral corner (PLC), and the medial cruciate ligament (MCL). However, isolated PCL tears with no other ligamentous injury seen on imaging have continued to fail after reconstruction. The specific incidence of popliteal injuries in the setting of PCL rupture has not previously been reported. This lack of understanding of the incidence and role of the popliteus in PCL injuries could be one the main reasons PCL reconstructions fail.
The PCL is the primary restraint to posterior tibial translation. Its femoral insertion is a broad, vertically oriented footprint at the anterolateral aspect of the medial femoral condyle. The PCL runs posterolaterally toward the central posterior aspect of the tibia, inserting on its own fovea approximately 1 cm distal to the joint line, just posterior to the posterior horn of the medial meniscus.

The popliteus muscle is a thin, flat, triangular muscle that forms part of the floor of the popliteal space. The popliteus has a wide attachment on the posteromedial tibial surface proximal to the soleal line, forming the floor of the popliteal fossa. It continues superiorly and laterally, forming a long and strong tendon that enters the knee through the popliteal hiatus. The tendon inserts in a depression on the outer side of the lateral condyle of the femur. The tendinous attachment lies anteroinferior to the proximal attachment of the lateral collateral ligament on the lateral epicondyle.

**Figure 1: Anatomy of the Posterior Knee and Popliteus/PCL Relationship**
METHODS

• 38 patients treated in Grand Rapids, MI from 1/1/2005 - 12/31/2014

• Data prospectively gathered and retrospectively reviewed from a multi-ligamentous knee injury database and electronic medical record

• PCL tears were graded on the current grading scale in the literature:
  • **Grade I:** 0-5 mm of posterior translation of the tibia in relation to the femur
  • **Grade II:** 6-10 mm of posterior translation
  • **Grade III:** 11 mm or more of posterior translation
METHODS CONT.

- **Inclusion Criteria:**
  - Patients must have undergone a PCL repair associated with a multi-ligament injured knee at a Spectrum Health or Metro Health facility by the senior author
  - 1 year of follow-up minimum

- **Exclusion Criteria:**
  - ACL injury
  - Insufficient documentation
RESULTS

38 patients and knees met inclusion criteria. All patients demonstrated grade III laxity on pre-operative posterior drawer testing. 35 patients underwent PCL operative reconstruction with allograft, 3 patients underwent operative repair. 89.5% (n=34) of knees had an associated popliteus injury defined during surgery. No ACL injuries were encountered in this population. Of the four knees that did not have a popliteus injury all had a medial meniscal injury.

Figure 2: Frequency of concurrent injuries
RESULTS CONT.

MRI findings were reviewed with respect to the popliteus and of those with an MRI (n=24), 63% of the MRIs obtained either neglected to comment on the injury or incorrectly stated the popliteus was intact. At latest follow-up, 16 months on average, posterior drawer testing was classified as 28.9% (n=11) with stable, 31.6%(n=12) with Grade I, 36.8%(n=14) with Grade II, and 2.6% (n=1) with Grade III laxity.

Figure 3: Mid-substance PCL rupture and popliteus muscle partial tear

Figure 4: Post-surgical stability
COMPLICATIONS

A complication rate of (n=3) was seen with return to the OR. These complications consisted of one patient with a deep wound infection, leading to irrigation and debridement and subsequently a PCL reconstruction resulting in grade III laxity, one PCL failure leading to PCL reconstruction, and one case of heterotopic ossification.
CONCLUSION

In the setting of grade III PCL injury there is a high incidence of popliteus injury that is commonly missed on imaging and evaluation. The clinician must have a high suspicion for this injury pattern to ensure optimal outcomes for patients with PCL injuries. This has not been previously described in the literature, and thus further evaluation of this concomitant injury is necessary. Missing a popliteus injury could lead to sub-optimal long-term outcomes in patients that present with a PCL injury. Further prospective studies are warranted.
REFERENCES


Thank You!