



Clinical and Arthroscopic Evaluation of Posterior Cruciate Ligament and Posterolateral Corner Injuries of the Knee

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Posterior cruciate ligament (PCL) and posterolateral corner (PLC) knee injuries are relatively rare but can lead to significant instability, dysfunction, and chronic knee pathologies. Recent trends in the literature suggest that the best clinical outcomes are obtained through the early identification and timely management of PCL and PLC injuries. Appropriate use of physical examination tests and imaging studies is a crucial part of the initial assessment, allowing identification of all associated injuries and accurate preoperative planning. In this article, we present an evidence-based approach for the assessment of PCL and PLC injuries by focusing on the physical examination, relevant imaging studies, and diagnostic arthroscopy. *Oper Tech Sports Med* 23:269-277 © 2015 Elsevier Inc. All rights reserved.

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Introduction

The precise prevalence of posterior cruciate ligament (PCL) or posterolateral corner (PLC) injuries is unknown, presumably owing to a large number of injuries remaining undiagnosed and differences in the study of polytrauma and athletic populations.¹⁻³ Despite numerous clinical tests for assessing the integrity of the PCL and PLC, many of these injuries are missed initially, and present late as a chronic problem.⁴ It is imperative to know the detailed history and perform a thorough physical examination, with the supplemental use of appropriate investigations, to achieve an accurate diagnosis and formulate a management plan.

PCL and PLC injuries may occur in isolation, together, or in conjunction with a more severe multiligamentous knee injury or dislocation. These injuries may also be associated with

significant vascular or neurologic injury. Isolated PLC injuries are rare,⁵ and a greater degree of instability is typically noted with combined injuries. In the acute setting, patients often present with an effusion, limp (if ambulatory), and posterior or diffuse knee pain. They may complain of instability, symptomatic hyperextension when standing, or difficulty with kneeling or deceleration.⁶ Patients with chronic PCL deficiency may report more disability than instability, describing symptoms consistent with secondary patellofemoral or medial compartment arthritis.⁷

A thorough history is important to determine the mechanism of injury, position of the leg at the time of the impact, and the applied vectors. This information helps formulate an understanding of the possible structures that may be at risk. Both the PCL and PLC may be damaged because of low- or high-energy mechanisms. PCL injuries typically occur owing to an anterior to posterior directed force on the tibia. The classically described mechanism is that of a dashboard striking the anterior tibia with the knee in 90° of flexion during a motor vehicle collision. In athletics, PCL injuries more commonly occur following a fall onto a flexed knee with the foot in plantar flexion.³ Sudden hyperextension or hyperflexion of the knee may also lead to PCL injuries. Unlike anterior cruciate ligament

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(ACL) ruptures, patients sustaining an isolated PCL injury typically do not describe feeling a “pop” or a “tear,” and may report more vague symptoms such as unsteadiness or discomfort.^{8,9} Injury to the PLC is often associated with a knee in near full extension that is subjected to varus recurvatum or tibial external rotation forces.⁵

PCL and PLC injuries may be classified based on the interval time from injury (acute or chronic), in reference to the presence of any associated injuries (isolated or combined), or recognized injury patterns (multiligamentous knee injuries).

Physical Examination

As in all musculoskeletal assessments, when evaluating PCL and PLC injuries, we follow the protocol—*look, feel, move, stability, special tests, and neurovascular examination*.

Look

Soft tissue swelling, abrasions, and ecchymosis around the knee are soft visual signs that may help identify the type of underlying knee injury. Anterior tibial soft tissue damage may allude to the dashboard mechanism of injury. Bruising in the popliteal fossa may indicate damage to the well-vascularized posterior structures.⁶ Interposition of soft tissue or bony fragments within the joint may manifest itself clinically as a visible lack of knee extension. Excessive varus or valgus angulation of the knee should also be noted. Color asymmetry between the two feet may suggest an associated vascular injury. With the patient supine, observing the knee in 90° of flexion from the side may reveal a posterior tibial sag, most notable when compared with the contralateral uninjured limb, signifying a PCL injury. The tibial tubercles are useful visual landmarks for comparison.

When able, standing lower extremity alignment and gait should be carefully assessed. Patients with primary varus alignment are presumed to be more susceptible to PLC injuries. Genu varum or a varus thrust may be present in the chronic situation.

Feel

In a conscious patient, knee palpation is useful in pinpointing the location of tenderness and any subtle injuries that may not be obvious on inspection. Anatomically directed palpation should include evaluation of the extensor mechanism, the medial collateral ligament (MCL), the lateral collateral ligament

(LCL), the fibular head, the iliotibial band, Gerdy's tubercle, and the medial and lateral joint lines.

With the knees in 90° of flexion in the supine position, the anterior joint line is carefully palpated to evaluate for a decrease in prominence of the tibial plateau in relation to the distal femur that occurs with posterior tibial sag. This is often referred to as the tibial “stepoff test” or “thumb sign.”¹⁰ The tibia normally lies 1 cm anterior to the distal femur in the flexed, resting position, and the uninjured knee may be used for comparison.⁸ PCL injuries can be classified based on the amount of posterior subluxation of the tibia relative to the femoral condyles (Table 1). When the anterior aspect of the tibial plateau lies posterior to the femoral condyles, combined PCL and PLC damage should be suspected.⁸

Move

In the acute setting, knee range of motion may be difficult to assess owing to pain unless the patient is sedated or unconscious. When able, active and passive knee range of motion should be measured. Any clear block to flexion-extension should alert the examiner to the possibility of an intra-articular bony fragment or associated soft tissue pathology (eg, a displaced meniscal tear). Occasionally, an in-folding of tissue may occur from a collateral ligament disruption, causing a block to motion. This is more common with medial-side injuries.

Stability

With pain as the major limiting factor, assessment of ligamentous stability can be challenging in acute injuries around the knee. Associated injuries in the same limb can also add to the difficulty. A complete physical examination should include dedicated stability assessments of the ACL, PCL, MCL, LCL, PLC, and posteromedial corner. Varus or valgus laxity with the knee in full extension indicates a PCL injury in addition to LCL or MCL disruption.¹¹ Any gross instability during examination requires immediate splinting of the limb to minimize further damage to the surrounding structures.

The posterior drawer test is commonly performed to identify a PCL injury. Similar to the anterior drawer test for ACL sufficiency, the knee is flexed to 90° and the foot is stabilized on the examination table with the patient in the supine position. With a posteriorly directed force on the proximal tibia, the change in position of the tibia relative to the femur is compared to that of the uninjured side, noting the quality of the end point (Fig. 1). It is imperative to ensure that the test is performed with the tibia in the normal starting

Table 1 Severity Classification of Posterior Cruciate Ligament (PCL) Tears

	Position of the Tibial Plateau Relative to the Femur in 90° of Flexion	Posterior Tibial Translation with Posterior Drawer Test
Grade 1 (partial tear)	0-1 cm anterior	1-5 mm
Grade 2 (complete tear, isolated PCL)	Same plane	6-10 mm
Grade 3 (combined injury, associated ACL or PLC tear likely)	Posterior	> 10 mm

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