Examination of Posterolateral Corner Injuries

Mitchell W. Larsen, MD
Alison Toth, MD

INTRODUCTION

Injuries to the posterolateral corner of the knee are relatively rare, accounting for 2% of all acute ligamentous knee injuries. The injuries result from participation in sports injuries 40% to 70% of the time. Posterolateral corner injuries are often high-energy injuries and are associated with other ligament injuries. A thorough examination is essential to identify all injured structures. In acute posterolateral corner injuries, the incidence of multiple ligament injuries has been reported to range from 59% to 65%. With chronic posterolateral rotatory instability, the incidence of multiple ligament injuries, particularly the anterior cruciate ligament (ACL) and posterior cruciate ligament (PCL), increases to 80%. In addition, a complete neurological examination is required with posterolateral corner injuries as the incidence of associated peroneal nerve trauma ranges from 12% to 29%.

POSTERIOR CRUCIATE LIGAMENT TESTS

Distinguishing tears of the PCL versus the posterolateral corner is important. The most common PCL examination is the posterior drawer test. In the posterior drawer test, the knee is flexed 90° and the amount of anterior tibial stepoff is assessed and compared with the contralateral leg (Figure 1). With a torn PCL, the loss of normal stepoff is greatest at 90°. With isolated posterolateral corner injuries, posterior tibial translation is increased at 30° but not at 90°. With combined posterolateral corner and PCL injuries, posterior translation is increased at both 30° and 90°. In chronic injuries, a lateral stress radiograph of the knee may be performed with anterior force placed on the tibia. This will verify that the tibia can be reduced and is not fixed in a posterior position. If the tibia cannot be reduced, this must be addressed before any reconstruction.

Figure 1. The posterior drawer test grades posterior cruciate ligament injuries by determining the amount of stepoff between the anterior tibial plateau and the femoral condyles, and is compared to the patient’s contralateral knee. In grade I, a palpable stepoff is present (0.5 cm) but is less than the contralateral knee. In grade II, the normal anterior tibial stepoff is eliminated and the medial femoral condyle and medial tibial plateau are flush. In grade III, the medial tibial plateau is displaced posterior to the medial femoral condyle and there is a reverse stepoff. With grade III injuries, the possibility of posterolateral corner or medial injuries should be assessed. (Illustration by Stan Coffman.)
Another helpful test for diagnosing PCL tears is the quadriceps active test. In this test, the patient is supine and flexes the knee 90° to fire the quadriceps muscles. The activation of the quadriceps reduces the subluxated tibia from posterior to anterior (Figure 2).

**VARUS INSTABILITY**

The varus stress test is performed to determine the status of the LCL. The knee should be given varus stress test at 0° and 30° of knee flexion. Varus instability indicating damage to the LCL is commonly associated with posterolateral corner injuries. However, varus laxity is not essential to the diagnosis of posterolateral corner instability. The amount of normal varus laxity averages 7° but is quite variable, so comparison to the uninjured side is essential. If varus laxity is present with the knee fully extended, there is an LCL tear and likely a cruciate injury. Varus instability with the knee flexed 30° indicates injury to the LCL. Injury to the popliteus tendon, popliteofibular ligament, and other structures will lead to progressively larger degrees of varus instability.

Examining the lower extremities for varus alignment is essential and can change treatment. It is believed that patients with varus alignment place more tensile stress on lateral reconstructions, which chronically can stretch out the tissue and damage the reconstruction. In addition, gait should be evaluated to check for varus thrust. Noyes et al described “triple varus knee” syndrome, which refers to increasing severity of knee varus. Primary varus refers to anatomic tibiofemoral varus as seen on standing full-length lower extremity radiographs. Double varus indicates that in addition to tibiofemoral varus, lateral joint opening is demonstrated during the stance phase of gait. Triple varus or hyperextension varus thrust demonstrates varus recurvatum in addition to the anatomical and lateral joint opening. (Figure 3. Gait should be assessed for varus thrust. Primary varus refers to anatomical varus between the femoral and tibial shafts. Double varus is indicated by separation of the lateral femoral condyle and lateral tibial plateau during the stance phase of gait. Triple varus or hyperextension varus thrust demonstrates varus recurvatum in addition to the anatomical and lateral joint opening. (Lat j= lateral joint, LCL= lateral collateral ligament, ITB= iliobibial band, PLC= posterolateral corner, ACL= anterior cruciate ligament, and PCL= posterior cruciate ligament.) (Illustration by Stan Coffman.)

Figure 2. In the quadriceps active test, the patient is supine and flexes the knee 90° to fire the quadriceps muscles. The activation of the quadriceps reduces the subluxated tibia from posterior to anterior. (Illustration by Stan Coffman.)

Figure 3. Gait should be assessed for varus thrust. Primary varus refers to anatomical varus between the femoral and tibial shafts. Double varus is indicated by separation of the lateral femoral condyle and lateral tibial plateau during the stance phase of gait. Triple varus or hyperextension varus thrust demonstrates varus recurvatum in addition to the anatomical and lateral joint opening. (Lat j= lateral joint, LCL= lateral collateral ligament, ITB= iliobibial band, PLC= posterolateral corner, ACL= anterior cruciate ligament, and PCL= posterior cruciate ligament.) (Illustration by Stan Coffman.)
The dial test assesses for increased external rotation of the tibia and foot with the knee flexed 30°, which is the most important physical finding indicating an injury to the posterolateral corner of the knee. The dial test is performed with the patient either prone or supine (Figure 4). The patient’s knees are flexed 30° while an assistant stabilizes the femurs. External rotation stress is placed on the foot with the foot dorsiflexed, and the thigh-foot angle is measured. Increased external rotation of 10° compared to the contralateral side is abnormal.\(^\text{13,14}\) The test is repeated with the knee flexed 90°. If external rotation also is increased in this position, then injury to the PCL should be suspected.\(^\text{13,14}\)

**EXTERNAL ROTATION RECURVATUM TEST**

For this test, the patient is supine on the examining table and encouraged to relax. The great toe of each foot is grasped and used to elevate the foot off of the bed (Figure 5). The injured knee is evaluated for increased hyperextension and varus compared with the uninjured knee. Patients with posterolateral rotatory instability will demonstrate relative external rotation of the tibial tubercle. The sensitivity of this test ranges between 33% and 94%.\(^\text{4,9}\)
REVERSE PIVOT SHIFT TEST

There are several ways to perform the reverse pivot shift test. Most commonly, the test begins with the knee in flexion. As the knee is slowly extended, valgus and axial loads are placed on the knee. In the starting position, the tibia is subluxated posteriorly on the femur (Figure 6). As the knee extends to 30° of flexion, there is a sudden reduction of the tibia onto the femur by the iliotibial band. Care must be taken to differentiate this reduction from a positive pivot shift test associated with an ACL tear. The specificity of the reverse pivot shift test is low, as 35% of normal knees demonstrate a reverse pivot shift under anesthesia.²,⁸

POSTEROLATERAL DRAWER TEST

This test, first described by Hughston and Norwood, examines the amount of posterior tibial translation and tibial external rotation in relation to the lateral femoral condyle (Figure 7). The knee is flexed 80° with the hip flexed 45°. The posterior drawer is performed with the tibia in neutral, internal, and external rotation. Differences in subluxation and rotation are measured by noting the prominence.
Table

<table>
<thead>
<tr>
<th>Isolated PLC Sectioning</th>
<th>PLC + PCL Sectioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posterior translation</td>
<td>Increased posterior translation at lesser degrees of flexion (maximum at 30°)</td>
</tr>
<tr>
<td>Varus rotation</td>
<td>Increased from 0° to 30°</td>
</tr>
<tr>
<td>External rotation</td>
<td>Increased at lesser degrees of flexion (maximum at 30°)</td>
</tr>
<tr>
<td>Intra-articular pressures</td>
<td>Increased in ACL-internal rotation</td>
</tr>
<tr>
<td>Stresses on cruciate ligaments</td>
<td>Increased in PCL-external rotation</td>
</tr>
</tbody>
</table>

Abbreviations: PLC=posterolateral corner, PCL=posterior cruciate ligament, and ACL=anterior cruciate ligament.

of the condyles. An injury to the PCL usually is indicated by a positive drawer test in neutral and internal rotation. In patients with posterolateral rotatory instability, increased external rotation of the lateral tibial plateau relative to the lateral femoral condyle is detected. This is easiest to detect with the foot externally rotated 15°. In addition, posterior translation is greatest with the tibia in external rotation, in contrast to an isolated PCL injury.7

STANDING APPREHENSION TEST

The standing apprehension test was described by Ferrari et al in 1988. With this test, patients stand with the knee of affected leg slightly bent and then internally rotate their torso. This produces an internal rotation force of the femur on the stabilized tibia. If the posterolateral corner is insufficient, patients will feel apprehension or instability. The authors believed this test was 100% sensitive.

SUMMARY

Physical examination of patients with a suspected posterolateral corner injury must be comprehensive. Mechanical alignment, gait, and any hyperextension or varus thrust should all be evaluated. The status of all ligaments of the knee also must be thoroughly assessed. Detecting the presence or absence of a PCL can be difficult but is essential (Table). The dial test is easy to perform and is the most standard and accepted test to assess and follow posterolateral rotatory instability of the knee.

REFERENCES


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