The posterior cruciate ligament (PCL) complex is composed of the PCL proper and the meniscofemoral ligaments. Discussion of the PCL should also include the posterolateral complex, because its structures enhance posterior knee stability, and the presence or absence of injury to these structures greatly affects the natural history and outcome of PCL injuries.

**Anatomy**

The PCL is composed of two distinct anatomic components: the anterolateral (AL) and the posteromedial (PM) bundles (Girgis, Marshall, & Al Mona-

Figure 1 The posterior cruciate ligament (PCL) complex with the knee at 90° of flexion. The anterolateral (AL) and posteromedial (PM) components are labeled, along with the other component of the PCL complex, the meniscofemoral ligament (MFL). Reprinted with permission of Human Kinetics from Harner, C.D., Vogrin, T.M., & Woo, S.L-Y. (1999). Anatomical and biomechanical considerations of the PCL. Journal of Sport Rehabilitation, 8(4), 260-278.
posterior translation, along with contributions from secondary restraints.

The posterolateral complex is composed of the lateral collateral ligament, popliteus complex, arcuate ligament, fabellofibular ligament, and posterolateral capsule. The complex anatomy of the posterolateral complex is beyond the scope of this article, but an excellent description has been detailed by Seebacher, Inglis, Marshall, and Warren (1982). The posterolateral structures not only provide the main restraint to varus and external rotation but also play a role in resisting posterior translation in concert with the PCL.

**Pathomechanics—Acute**

Many mechanisms of injury to the PCL have been recognized. The examiner must keep in mind that the initial injury might seem mild, especially an isolated PCL injury. The patient might present with minimal effusion and pain.

There are two basic types of ligament injury that can result from these mechanisms. The type can often be inferred by the mechanism of injury and can influence the mode of surgical treatment. The first type is an avulsion injury, which can be a bony or ligamentous avulsion, in which the ligament avulses with the adjacent periosteum/perichondrium. This type of injury can be treated with direct repair with fairly predictable results. The second type is a midsubstance tear of the ligament that results in “mop ends” at the tear site and is not amenable to direct repair. If surgery is indicated, the PCL must be reconstructed.

A common mechanism of PCL injury is a posteriorly directed force applied to the anterior aspect of the flexed knee (the so-called dashboard injury). This type of injury usually results in a midsubstance rupture. A fall onto the flexed knee is another common mechanism of PCL injury. It has been postulated that if the foot is dorsiflexed at the time of injury, most of the force is directed to the patellofemoral joint, sparing the PCL. If the foot is plantar flexed, however, the posterior force is directed to the tibial tubercle, resulting in PCL injury. Fowler and Messieh (1987) have described hyperflexion alone as a mechanism that often results in avulsion of the proximal attachment from the femur. An anterior blow to the hyperextended knee while the foot is planted on the ground can also result in a PCL injury. This mechanism can also result in combined injury to the ACL, with the ACL failing first from the hyperextension. It can also cause combined injury to the PCL and posterolateral structures and often arises from a blow to the anteromedial aspect of the knee that drives the knee into hyperextension and varus. An uncommon mechanism described by Shelbourne and Rubinstein (1993) involves an athlete suddenly changing direction on a planted foot, resulting in internal rotation and anterior translation of the femur and a PCL injury.

The PCL is the main structure resisting posterior translation in the knee, but significant contributions to this resistance are also provided by the so-called secondary restraints including the meniscofemoral ligaments, the posterolateral structures, and, to a lesser extent, the medial collateral ligament. The PCL resists posterior translation throughout range of motion, with the AL band of the PCL taut when the knee is in flexion and the PM band taut when it is in extension. Although the surgical management of PCL injuries is beyond the scope of this article, you should note that this two-bundle characteristic is important in the execution of two-bundle PCL reconstruction.

Ligament-cutting studies by Gollehon, Torzilli, and Warren (1987) and Grood, Stowers, and Noyes (1988) provide insight into the implications of isolated and combined ligament injuries for knee stability. Isolated sectioning of the PCL results in an increase in posterior translation of 11 mm, with most of this increase occurring at higher degrees of flexion. Isolated sectioning of the posterolateral structures results in an increase in posterior translation of only 3 mm. When both the PCL and the posterolateral structures are sectioned, a dramatic increase in posterior translation of 25–30 mm is seen.

Isolated sectioning of the PCL results in minimal increases in varus rotation and external tibial rotation of the knee, whereas combined sectioning of the PCL and posterolateral structures results in up to 7° increased varus rotation and 14° increased external rotation.

Because the major influence of isolated PCL deficiency is on flexion and there is no significant increase in varus or external rotation, patients with this deficiency usually have minimal symptoms in extension.