

Knee Dislocation: The Ottawa Approach

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Knee dislocation is uncommon, but can be devastating and can include limb loss. The diagnosis of the multiligament injury may be missed entirely or mistaken for an isolated injury. The physical examination and magnetic resonance imaging primarily make the diagnosis. Based on the clinical examination, a classification such as Schenck may be made to develop the treatment plan.

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The hallmark clinical test of injury to the posterior cruciate ligament is the determination of anteroposterior laxity with the knee at 30° and 90°. The clinical staging is made with the posterior drawer test. When the tibia is subluxed behind the femoral condyle, this is a grade 3 injury and is usually associated with injury to the posterolateral or posteromedial corner of the knee. Assessment of the collateral ligaments must be performed to detect both varus and valgus laxity as well as rotational laxity. The accurate assessment of the neurovascular status with repeated clinical examinations and the ankle brachial index is important not to overlook injury to the popliteal artery and peroneal nerve. Computed tomography (CT) angiography is the current best evaluation of injury to the artery. Magnetic resonance imaging (MRI) is helpful to assess other injuries in the knee. The grade 3 posterior cruciate ligament (PCL) injury is generally considered an indication for surgical intervention. Our technique of reconstruction is transtibial with inside-out drilling of the femur and an Achilles tendon allograft. In most cases, the posterolateral corner is reconstructed with an allograft fibular head sling. If there is severe external rotation and hyperextension, then an anatomic reconstruction of the posterolateral corner should be considered. The grade 2 posteromedial laxity is treated with plication of the ligament. In the grade 3 medial collateral ligament (MCL) laxity associated with a pos-

teromedial spin, an allograft is used to reconstruct the MCL. The rehabilitation is slow, with immobilization and non-weight bearing for the first 4 to 6 weeks. Gradually, range of motion and strengthening exercises are instituted according to the individual patient's response.

Mechanism of Injury

The high-velocity motor vehicle injury producing either hyperextension or a direct blow to the anterior aspect of the knee is the most common mechanism. Uncommonly, a low-velocity sports injury or the morbidly obese with extremely low-velocity mechanism may produce a knee dislocation. Figure 1 shows the initial plain x-ray in the external rotation (ER) of a posterior knee dislocation.

Clinical Examination

The initial evaluation is the clinical examination, paying special attention to diagnosing any associated collateral ligament injury. The most common association with the PCL is an injury to the anterior cruciate ligament (ACL) and then the posterolateral corner. One of the early classifications described the position of the tibia relative to the femur (see posterior knee dislocation described earlier). The Schenck classification, because it describes the ligaments injured, helps to establish a plan of treatment. Classification is as follows: KD 1, cruciates are intact; KD 2, ACL and PCL torn; KD 3, ACL/PCL torn with medial KD 111 M or lateral torn KD 111 L; KD 4, ACL/PCL with both corners; and KD 5, knee dislocation with fracture.

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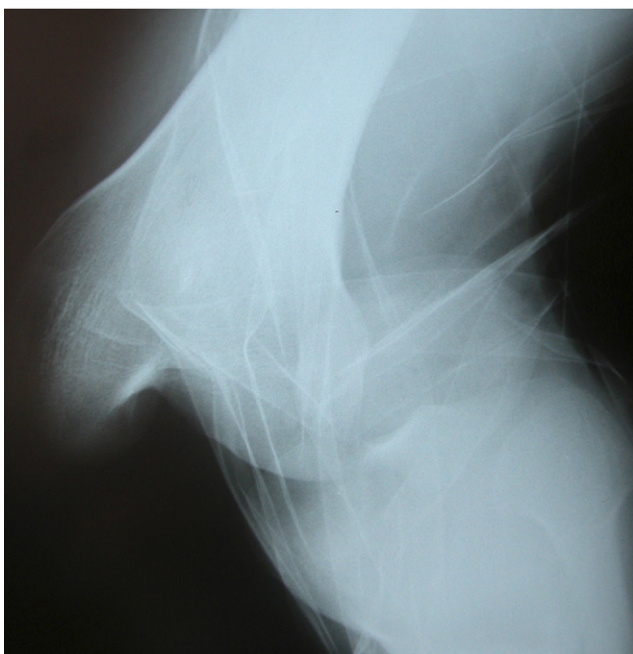


Figure 1 Posterior knee dislocation.

Posterior Cruciate Examination

The posterior drawer test is performed by pushing the tibia posteriorly with the knee flexed at 90° (Fig 2). A grade 1 injury is 0 to 5 mm of posterior displacement when performing the posterior drawer test at 90°. A grade 2 injury is 5 to 10 mm of posterior displacement with a good endpoint. The point of reference is when the tibial plateau is flush with the femoral condyle; this is 10 mm of posterior displacement. Most grade 1 and 2 injuries may be treated conservatively. If the knee is immobilized in extension, a posterior tibial pad may keep the tibia in a normal reduced position. A grade 2 injury will often heal up a grade with immobilization in the neutral position. The grade 3 injury is diagnosed when the tibia is subluxed behind the femoral condyle at 90° of knee flexion. This is usually associated with an injury to one of the corners of the knee. A grade 3 injury is usually considered for surgical intervention because it is associated with injury to the corners of the knee.



Figure 2 A grade 3 posterior drawer test.



Figure 3 A varus stress is used to assess the integrity of the lateral collateral ligament at full extension and 30° of flexion.

Collateral Ligament Examination

The collateral ligaments are assessed by stressing the knee into the varus or valgus position and documenting the laxity. Grade 1 is no laxity. Grade 2 is 5 to 10 mm with an endpoint. Grade 3 is >10 mm with no endpoint.

Posterolateral and Posteromedial Corner Examination

The posterolateral corner is assessed by several tests. First, the integrity of the lateral collateral ligament is assessed by applying a varus stress with the knee flexed at 30° and at full extension. No laxity is grade 1, 5 mm with a firm endpoint is a grade 2, and gross laxity without an endpoint is grade 3. To assess rotation, the dial test is performed at 90° (Figs 3 and 4) and at 30° of knee flexion (Figs 4 and 5). In the chronic setting, the easiest assessment is performed with the patient in the prone lying position, and the external and internal rotation is assessed (Fig 6). Another technique is to sit in front of the patient, with the knee flexed to 90°, and to evaluate the external spin of the tibia (Fig 7). It is also important to assess for any increased hyperextension because this indicates a more severe injury (Fig 8). In this situation, an anatomic



Figure 4 The dial test performed at 90° of knee flexion.

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