Advantages of the Prone Lachman Test

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Numerous clinical examination techniques can be used in the evaluation of knee injuries, with a number of these specifically designed to assess the integrity of the anterior cruciate ligament (ACL). Some of the more common tests for ACL injury are the anterior drawer test, the Lachman test, the pivot shift test, the anterior rotary drawer test, Hughston’s jerk test, the Slocum anterolateral rotatory instability test, and the Noyes flexion rotation drawer test (Magee, 1997). The two tests used most often are the anterior drawer and Lachman tests.

Key Points

Factors involved in the accurate performance of the Lachman test and its interpretation are numerous and include examiner hand size, individual knee size, examiner psychomotor skill, relaxation, and examiner appreciation of anterior translation and end feel.

The prone Lachman test has been shown to be an acceptable alternative in determination of ACL disruption and might have numerous advantages over the standard Lachman test.

Key Words: anterior cruciate ligament, knee evaluation, clinical examination techniques

Anterior Drawer Test

The anterior drawer test is performed with the patient supine and the knee flexed to 90° (Figure 1). The examiner applies an anterior translatory force to the tibia in order to assess the integrity of the ACL. Torg, Conrad, and Kalen (1976) reported three main problems in the performance of the anterior drawer test resulting in false negative results. (a) After acute injury, the knee might be unable to flex to 90° as a result of hemarthrosis and inflammation, and therefore the test cannot be performed, and (b) resultant hamstring spasm often accompanies injury to the knee. This protective mechanism produces a force vector in direct opposition to anterior tibial translation, and (c) in the 90° position, the medial meniscus also prevents forward and anterior tibial translation.

In addition, given the fact that ACL tears are often accompanied by meniscal injury, there is some concern that the pain and potential mechanical blocking associated with these injuries might further inhibit anterior tibial translation (see the sidebar). It is for these reasons that the Lachman test has become the primary test used in assessing potential ACL disruption.

Factors That Inhibit Anterior Tibial Translation During the Anterior Drawer Test

• Hemarthrosis and inflammation
• Direct opposition to anterior tibial translation by hamstring spasm
• Medial meniscus
• Pain and mechanical blocking from concomitant meniscal injury

Figure 1  Anterior drawer test.
**Lachman Test**

The Lachman test is performed with the individual lying supine and the examiner standing next to the involved side. The examiner holds the extremity between 10 and 30° of knee flexion and stabilizes the distal femur with the proximal hand while applying firm pressure to the posterior aspect of the proximal tibia with the distal hand, in an attempt to translate it anteriorly (Figure 2). A positive test occurs when the examiner feels or sees abnormal or excessive anterior tibial translation in relation to the femur and there is a “soft” or “empty” end feel. This is compared with the uninvolved joint, which should have a distinct “hard” and “firm” end feel with less translation (Torg et al., 1976). It is important to note that because of normal anatomical variance, it is recommended to repeatedly perform the Lachman test at varying degrees within the recommended range of knee flexion.

**Problems With Clinical Evaluation of ACL Injury**

Use of the Lachman test has increased the accuracy and sensitivity of clinical testing for ACL laxity, and the test is considered to be the best for determining ACL integrity. Despite overwhelming agreement in the literature over the Lachman test’s accuracy in assessing ACL injury, however, precise determination of injury continues to be difficult for some examiners (Adler, Hoekman, & Beach, 1995; Draper, 1990; Frank & Gravel, 1995). One problem appears to be the difference between the size of the examiner’s hands and the patient’s knee. Examiners with small hands more often have difficulty in performing the Lachman test, and individuals with large, bulky, muscular lower extremities tend to be difficult for many to assess. Controlling for rotation and flexion of the leg during the examination can also be difficult. The Lachman test also requires the examiner to be strong enough to support the limb, stress the joint, and maintain the appropriate joint angle (i.e., limit motion of the femur). Several other difficulties include

- The possibility of false positives resulting from posterior-cruciate-ligament (PCL) injury
- Reliance on visual estimation of anterior translation because the hands are placed a distance from the joint line
- Pain when the distal quadriceps are compressed
- Lack of patient relaxation
- Hamstring spasm

**Challenges in Performing the Standard Lachman Test**

- Small hand size of the examiner
- Large, bulky, muscular lower extremities of athletes
- Inadequate examiner strength and psychomotor coordination to support the limb, stress the joint, and maintain the appropriate joint angle
- The possibility of false positives as a result of PCL injury
- Reliance on visual estimation of anterior translation
- Pain when the distal quadriceps is compressed
- Lack of patient relaxation

The Lachman test, as well as other manual examination techniques, can also be difficult as a result of the hamstring spasm that usually accompanies knee injuries (see the sidebar; Adler et al., 1995; Draper, 1990; Frank & Gravel, 1995). These difficulties have led to the development of modifications in the performance of the Lachman test.

**Prone Lachman Test**

In 1988, Rebman proposed the prone Lachman test. This test is performed with the patient prone and with the knee flexed to approximately 10–30°. The lower leg is supported by the examiner’s knee and/or thigh, (Figure 3), or it can be cradled in the examiner’s forearm (Figure 4). One hand (distal) palpates the anterior joint margin with a finger on either side of the

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*Figure 2 Lachman test.*

*Figure 3 Prone Lachman test.*