

It seems that many of the new ideas aimed at improving athletic training/sports medicine have to do with rehabilitation and treatment of injuries. Seldom do we see a *Tip from the Field* directed toward improving our evaluation techniques. According to the 1989 NATA Role Delineation study, athletic trainers spend 21% of their time evaluating injuries.<sup>3</sup> Based on this, a major focus of athletic trainers should be directed toward better evaluation techniques. Our purpose in writing this article is to help you improve your evaluation of knee injuries. We will introduce a test that may be used to rule out the false positive ACL injury diagnosis.

One of the most commonly injured entities in sports and recreation is the

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## A Test for Eliminating False Positive Anterior Cruciate Ligament Injury Diagnoses

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knee.<sup>1,2</sup> Several evaluation or field examination procedures for the knee are found in the literature and are used frequently by athletic trainers, physicians, and physical therapists. Still, with these many techniques available to us, incorrect diagnoses are often made. In a recent study,<sup>4</sup> physicians and physical therapists used the Lachman test to determine integrity of the anterior cruciate ligament (ACL) in 32 subjects with unilateral knee problems. Fifty-three percent of subjects who had torn ACLs were misdiagnosed as having negative tears.

Thirty percent of subjects with no ACL tear were told that the ACL was damaged.<sup>4</sup>

One difficulty in evaluating knee injuries has to do with the false positive test. This situation can occur when a posterior cruciate ligament (PCL) is damaged, causing the tibia to sag posteriorly on the femur (Fig 1a). Thus, when an athletic trainer is performing the *anterior drawer* or the *Lachman* tests, the tibia gives the impression of moving forward on the femur with an associated instability in the anterior direction (Fig 1b).

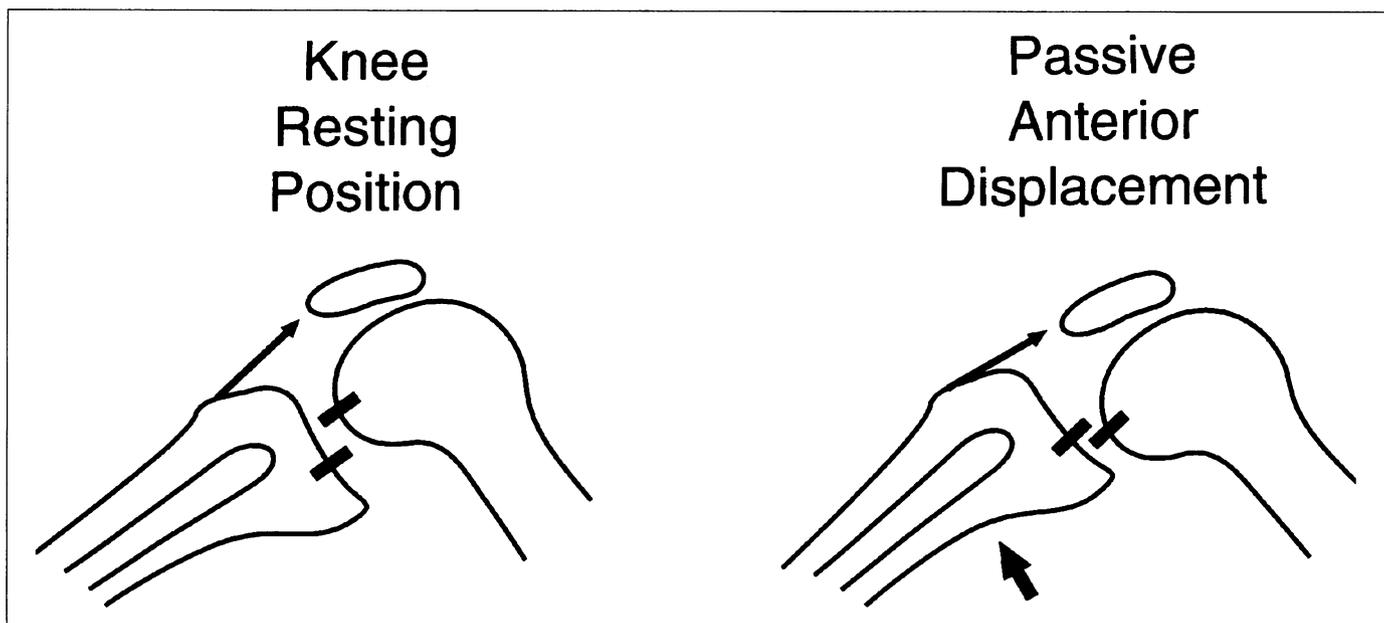


Fig 1.—(a) When the posterior cruciate ligament is torn, gravity causes the tibia to sag posteriorly on the femur. (b) The false positive ACL diagnosis. Note: the vertical lines on the tibia and femur represent the amount of movement in a PCL-deficient knee, not the PCL itself.

An athlete in my care was once given conflicting diagnoses by two orthopedists. One physician diagnosed the injury as a torn PCL, while the other diagnosed it as a torn ACL and recommended ACL reconstruction. Arthroscopic evaluation revealed that the athlete had suffered a rupture of the PCL. The one physician gave the incorrect diagnosis due to this false positive phenomenon obtained while performing the anterior drawer and Lachman tests. If the physician would have performed the test described below, he may have given the correct diagnosis.

### Description

The name of this test is the alternate Lachman, and it is normally used to help diagnose ACL injuries.<sup>6,8</sup> The athlete lies on the examining table in a prone position. The knee is flexed to 30° and supported by the examiner's knee or thigh under the patient's ankle. The examiner palpates the anterior joint margin of the knee by placing one finger on either side of the

patellar tendon. The examiner's free hand applies a downward and forward pressure to the posterior aspect of the proximal tibia. If excessive translation (>6 mm bilateral difference) of the tibia on the femur is detected through palpation, the individual probably has an ACL lesion (Fig 2). If there is little or no bilateral difference when performing this test, the ACL is considered intact. Hence, any anterior movement of the tibia on the femur that was experienced during the anterior drawer and Lachman tests would be due to a torn PCL.

Daniel and Stone<sup>5</sup> have developed a technique for testing PCL instability with the aid of the KT-1000. This is accomplished using a contraction of the quadriceps with the knee flexed approximately 90°. At 90° of knee flexion, the patellar tendon in a normal knee is directed slightly posteriorly. Contraction of the quadriceps at this angle produces either no movement or minimal posterior movement of the tibia. In the PCL-deficient knee, the tibia sags posteriorly; thus, the patellar

tendon is directed anteriorly. Contraction of the quadriceps of a PCL deficient knee will result in 4 to 6 mm of anterior translation. We used this technique to validate the alternate Lachman test as beneficial in eliminating the false positive ACL tear.

### Discussion

Müller,<sup>7</sup> has stated the importance of examining the knee in a prone position. He suggests that acutely injured knees should include roentgenographic evaluation, possibly under stress. Along with the traditional lateral and anterior-posterior views, he employs tunnel and patella axial sunrise views while the patient is prone.

Part of the problem associated with false positive ACL injury diagnoses has to do with the supine positioning of the athlete during the anterior drawer and Lachman functional tests. In this position, if the PCL is torn, gravity may cause the tibia to slide back on the femur. When the examiner performs these two tests, the excessive sliding felt during the test may be mis-

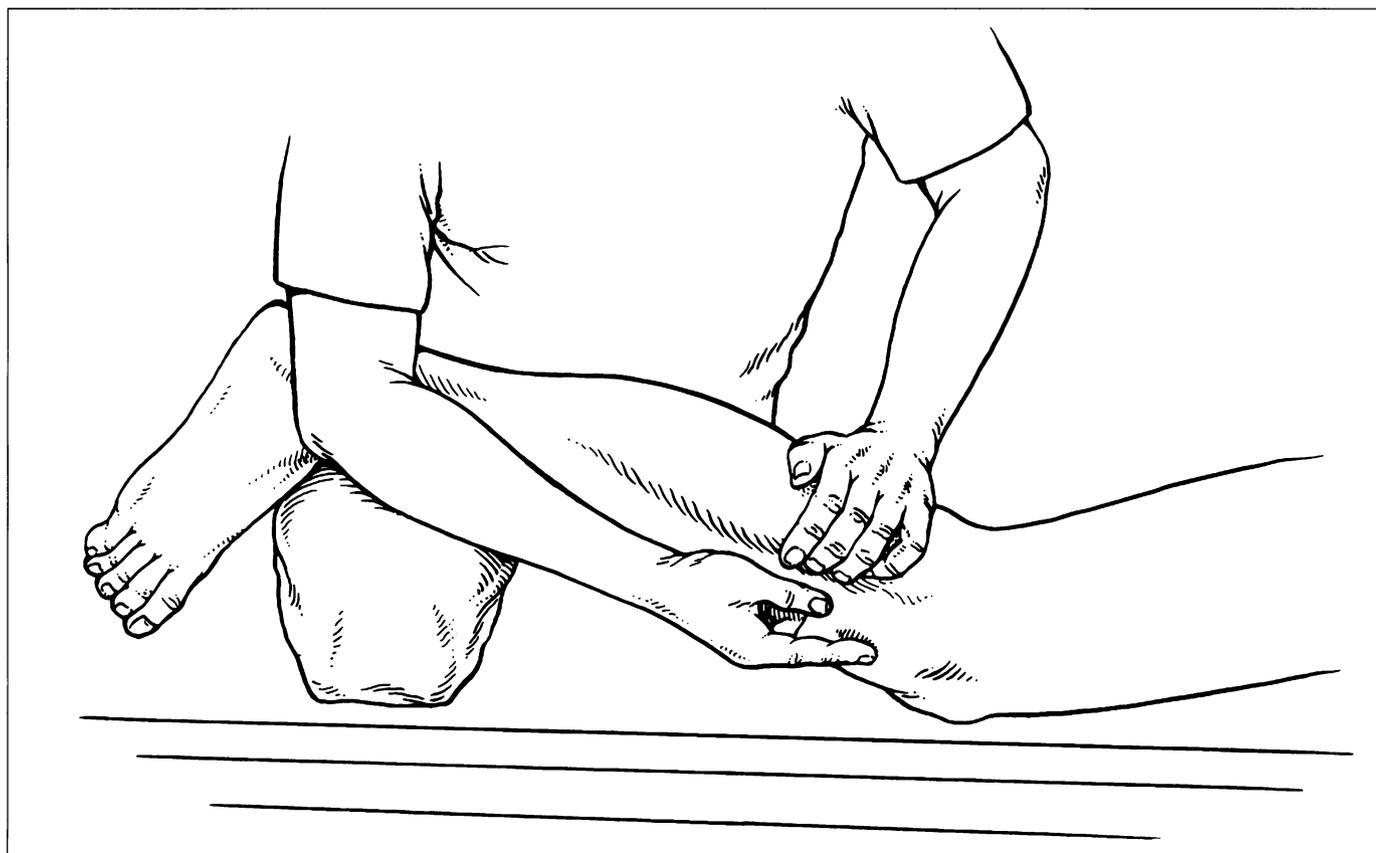


Fig 2.—The Alternate Lachman test rules out false positive ACL injury diagnoses (©Wm. P. Hamilton).

taken as an ACL injury. One strength of the alternate Lachman test is that it is performed with the athlete prone, and gravity will cause the tibia to remain in its normal position even if the PCL is torn. Another strength is that the joint line is palpated during the entire test so that the quality and direction of an end feel is more easily detected. Hence, any forward translation of the tibia on the femur must be due to a torn ACL. If there is no movement during this test, yet there was during the anterior drawer and Lachman tests, a disruption of the PCL may be at fault. The examiner should then use the *posterior sag* and *posterior drawer* tests to confirm the PCL lesion diagnosis.

While conducting a research study aimed at improving ACL field examination tests, we discovered the viability of this test in ruling out false positive ACL injury diagnoses. During this research project, we performed the anterior drawer, Lachman, and alternate Lachman tests on both knees of subjects. We recorded which knee we felt was less stable with respect to ACL translation observed during each test. Our findings were then compared with the results obtained during KT-1000 tests on each subject.

Three subjects exhibited considerable laxity of one knee during the anterior drawer and Lachman tests, yet showed no laxity during the alternate Lachman test. The KT-1000 showed no difference in anterior translation of the tibia on the femur, yet considerable differences (>6 mm) in posterior translation in all three subjects. Two of the subjects underwent arthroscopic examination, and the physician diagnosed each as PCL tears. In these two cases, both the KT-1000 and arthroscopic examination revealed the alternate Lachman to be a viable way to eliminate the false positive ACL injury diagnosis sometimes obtained from the anterior drawer and Lachman tests. The third subject chose not to have arthroscopic surgery, but his KT-1000 on the suspected knee showed >10 mm of laxity compared to his other knee. A laxity differential of >10 mm is considered a severe instability

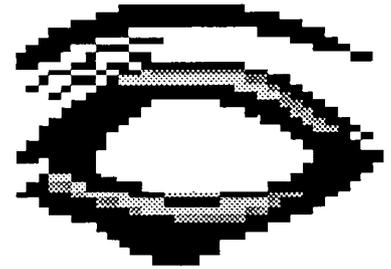
and is highly suggestive of a ligament tear.<sup>7,9</sup>

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