



Improved diagnostic accuracy of combined anterior cruciate ligament/fibular collateral ligament injuries utilizing a simple physical exam measure

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Diagnosing injuries to the posterolateral corner are often challenging for the clinician, especially in the acute setting (1). Physical examination and imaging such as magnetic resonance imaging (MRI) has led to improved diagnostic strategies and treatments for anterior cruciate ligament (ACL) injuries. However, in the event of concomitant ACL and fibular collateral ligament (FCL) injuries, FCL injuries may be missed or go undiagnosed due to lack of diagnostic sensitivity with MRI and potential for patient guarding during the clinical exam. This is particularly important in combined ACL and FCL injured patients, because unaddressed FCL tears have been shown to increase force on the ACL reconstruction graft (2). Therefore, identifying common injury patterns that may help increase the diagnostic accuracy of such combined injuries is warranted.

Our group sought to evaluate the exact side-to-side difference (SSD) in heel height that was associated with combined ACL and FCL tears compared to patients with isolated ACL tears. In this study, a positive heel height test was considered when ≥ 3 cm of heel height increase was measured compared to the contralateral uninjured knee and was evaluated in 158 isolated ACL tear patients and 117 ACL/FCL tear patients (3). The results indicated that a 3 cm or greater SSD was found in 8.2% of patients with isolated ACL tears compared to 72% in patients with combined ACL and FCL tears. We performed a receiver operator characteristic (ROC) curve analysis and a cut-off point of 2.5 cm of SSD in heel height was identified for having the greatest sensitivity (72%) and specificity (92%) for a combined ACL and FCL tear ($P < 0.0001$). Furthermore,

we found that this test was significantly more accurate for diagnosing FCL tears than an MRI scan (sensitivity 48%, specificity 88%). Thus, we believe that the clinical utilization of this test will allow sports medicine physicians and staff to improve their diagnostic ability through this simple physical examination and avoid not treating a concomitant ligament tear that could lead to an ACL reconstruction graft failure (3).

The story behind the story in this study was that when my practice moved to a ski town, we found that we were seeing more isolated FCL tears than I had seen in the past. In particular, we found that ski injuries with complete grade 3 posterolateral corner injuries were quite rare and most of the injuries were combined ACL and FCL tears. Because we were seeing large numbers of these patients acutely, we noticed that they had an increase in heel height compared to patients who had an isolated ACL tear. We were relying on bilateral varus stress X-rays at that time as our definitive and gold standard way to diagnose FCL tears (1,4). Varus stress radiographs have demonstrated high inter- and intra-observer reliability in diagnosing FCL tears and full posterolateral corner injuries (5,6). However, we usually only order this additional imaging if the physical examination or MRI suggests a potential lateral sided injury. Thus, identifying an increase in heel height compared to the contralateral limb can serve as a precursor for ordering additional imaging such as varus stress radiographs and to allow the clinician to rule out an FCL injury.

Once our team started discussing these findings with staff, our athletic training residents started picking up combined ACL and FCL tears simply by measuring their

difference in heel height. They all became pretty proud about being able to diagnose this relative complex pathology with a simple test. After a couple of years of noticing this, we decided to proceed with this study and review our clinical records to determine the difference in heel heights between isolated ACL tears and ACL tears that occurred with combined FCL tears. We have always been consistent in measuring heel heights on patients with a ruler during their clinical exam and also measuring their overall knee flexion, so we have objective data to compare to for their postoperative visits. This led to the current study, which documented the clinical utility of the heel height test in the assessment of patients with combined ACL and FCL tears.

We are not sure we would have noticed this association if we had not seen so many patients in a ski town with combined ACL and FCL tears. However, it has become part of our clinical armamentarium to assess this in all of our patients that have an ACL tear to determine if there is a high likelihood of a combined FCL tear, even before we do any varus stress clinical testing or varus stress radiograph testing. We have found this test to be highly accurate and would recommend it as a simple tool for anyone working in the sports medicine field to evaluate their patients for this potential combined pathology and avoid missed injuries that are known to compromise surgical outcomes.

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Footnote

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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