

Editorial Commentary: Small Incisions Can Make Big Mistakes: Knee Lateral Collateral Ligament Reconstruction Is All About the Anatomy!



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Abstract: It is becoming increasingly recognized that isolated lateral collateral ligament (LCL) tears are more common than have been previously recognized and that anatomic-based LCL reconstructions have the best outcomes. Although it was believed that posterolateral corner injuries were often missed or mistreated and were given the pneumonic of "the dark side of the knee," we are getting to the point where most of these more severe injuries are being recognized, and it is the isolated LCL injuries that are still less well recognized. Failure to treat LCL tears at the same time as a cruciate ligament reconstruction is a well-known cause of both anterior cruciate ligament and posterior cruciate ligament reconstruction graft failure. Therefore, either having the required clinical experience or knowledge, or using a radiographic backup method when one is not sure about the anatomic placement, is essential to correctly perform an LCL reconstruction.

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We have read with interest the article by Pfeiffer, Herbst, Kanakamedala, Naendrup, Debski, and Musahl¹ titled "The Use of Fluoroscopy Leads to Improved Identification of the Femoral Lateral Collateral Ligament Origin Site When Compared With Traditional Tactile Techniques." We commend the authors for bringing this topic to higher levels of discussion because it has become increasingly recognized that we as a profession are underdiagnosing lateral collateral ligament (LCL) tears and that this leads to both patient functional limitations and a higher rate of cruciate ligament reconstruction graft failures. This article was a well-designed laboratory study to determine if orthopaedic residents could isolate the anatomic attachment site of the LCL by direct palpation. The premise behind this was that those who rely on small incisions to approach the posterolateral corner of the knee (perhaps

foolishly) may be placing their reconstruction grafts in the wrong location when they rely on direct palpation; the authors went on to validate that radiographs may be more accurate than direct palpation (for orthopaedic residents at least).

For the past 5 years, 1 of us (R.F.L.) has averaged 54 LCL and complete posterolateral corner reconstructions per year in practice in Vail, Colorado, and the other (L.E.) has similar surgical numbers among the surgeons at the University of Oslo. A great majority of these are referral cases, and it is very disheartening in spite of our multiple published works on the posterolateral corner of the knee²⁻¹⁵ that many of these referral cases have malposition of both their femoral or fibular head tunnels.

We have built a career based on quantification of the anatomic attachment sites around the knee^{4,5,14,16-23} and have gone on to further redefine the biomechanics of the knee based on these newly defined anatomic descriptions, through which we have gone on to test multiple pilot techniques and then refine anatomic-based reconstructions of these important knee stabilizers.^{2,6,24-26} Ultimately, we have validated all of our anatomic knee reconstruction procedures with prospective clinical outcome studies. In all of these cases, our clinical outcome studies of our novel anatomic-based reconstructions have helped to redefine the ceiling levels of what is expected for both clinical and objective outcomes.^{3,8,9,12,27-29}

Vail, Colorado (R.F.L.) and University of Oslo (L.E.).

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Our biggest concern is that, although we totally recognize the importance of minimizing a surgical approach, patients want to obtain a successful surgical outcome. In almost every case around the knee where small incisions are used, we have seen big mistakes with placement of ligament reconstruction tunnels or repairs. To have a successful anatomic-based reconstruction procedure, which appears to be the standard of care and the ultimate in restoring stability to the knee, one needs to restore the anatomy correctly. Palpation of an anatomic landmark is basically the first and basic step for an anatomic-based reconstruction. Reference to other palpable landmarks, direct measurements in reference to other landmarks, and then directly looking for a specific anatomic shape of the osseous structure, and possibly some remnant ligament, are essential parts of an anatomic-based reconstruction. This article demonstrates that residents, who cannot realistically be expected to know much about the intricacies of this complex part of the knee, are not very accurate in defining the attachment site by palpation. We would propose that most people are not able to define the anatomic attachment site by palpation alone; relying on direct measurements and knowledge of the osseous structures is essential. We actually published on the radiographic landmarks of the posterolateral corner of the knee before the referenced study in this article; therefore, we propose that it be called "The Pietrini Point."¹³ However, in our practice, we use intraoperative radiographic landmark measurements for revision cases only or in those cases that have a significant amount of heterotopic ossification with a chronic injury. Although we concur that clinical experience in this topic does matter, one can greatly accelerate the learning curve by reading the literature and being prepared ahead of time for LCL or posterolateral knee surgery.

One essential component of recognizing LCL injuries is to back up the subjective clinical examination with objective bilateral varus stress radiographs. Although we have published that a 2.7-mm side-to-side difference is consistent with an isolated LCL tear, and a complete posterolateral corner injury has a 4.0-mm side-to-side difference,⁷ others have published that 2.0 mm may be the magic number as well.³⁰ In any event, we should quietly retire the American Medical Association classification guidelines, which were established in 1966 and based solely on subjective palpation of joint line gapping, because they are inaccurate for any assessment of knee laxity resulting from collateral ligament injury. Although the numbers found on varus stress radiographs may seem small, one must recognize that a grade 3 Lachman test is present with 3 mm of anterior tibial translation with an anterior cruciate ligament tear. Thus, putting this into perspective, a 2.7- to 4-mm difference for a grade III lateral collateral ligament or posterolateral corner injury on

objective measurements with varus stress radiographs⁷ fits exactly within that same range.

When performing a LCL reconstruction, we have found that there is almost always a remnant of the native tissue present when one enters the biceps bursa, which is located just above the fibular head.¹¹ A horizontal incision into this bursa can be made in almost all posterolateral corner injuries, even when the biceps femoris has been torn off the fibular head and styloid, and a tag stitch placed in the remnant and used to apply traction when one is palpating directly over the LCL femoral attachment point. This important surgical pearl allows one to hone down to within 1 to 2 mm of the exact attachment site. By reconstructing the LCL with a hamstring graft, which is of the proper length to reconstruct the native LCL (which has an average length of approximately 70 mm),^{4,5} we have found that patients have a high restoration of function and that almost all have objective documentation on the varus stress radiographs of a restoration of objective stability. Our first prospective outcomes paper on LCL reconstructions, on 20 patients, found that the International Knee Documentation Committee subjective postoperative outcome scores averaged 88.1 and the bilateral varus stress radiographs at an average of 2 years postoperatively were -0.4 mm.⁹ Further follow-up on a case series of 43 patients found similar outcomes, with a mean Lysholm score of 84.¹² Finally, because of the encouraging objective outcomes found in these patients, we have recently performed a prospective Level I study on 36 patients with either a standard nonweightbearing or early weightbearing protocol, and found that early partial weightbearing immediately after surgery did not result in any objective differences in the varus stress radiographs.¹⁵ In addition, the early partial weightbearing patients had improved early outcomes with fewer effusions and improved quadriceps strength.

Thus, in closing, we commend the authors for pointing out the fallacy that palpation alone can be used to identify landmarks for anatomic-based reconstructions of the LCL. We feel that our anatomic-based LCL reconstruction technique is 1 of the more successful surgeries that we perform around the knee and agree with these authors that one should not rely on palpation alone to identify these landmarks. It is truly "all about the anatomy," and knowledge of anatomy can improve our patients' outcomes and significantly decrease operative time because of improved surgical efficiency, which equates to early improved patient satisfaction and fewer complications.

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