

Learning the LaPrade Technique for Reconstruction of the Posterolateral Corner of the Knee

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I have always been interested in research on multiligamentous knee injuries, as these are challenging problems for both patients and orthopaedic surgeons alike. My Chief Choice Grand Rounds this year was focused on reconstruction of the posterolateral corner (PLC) of the knee. Because of the complex anatomy and variable injury patterns of the PLC, a number of anatomical and nonanatomical reconstruction techniques have been proposed.

These methods include biceps tenodesis, fibula-based reconstruction, combined tibia- and fibula-based reconstruction, and reconstruction of all or some of the posterolateral structures (the fibular collateral ligament [FCL], popliteus tendon [PLT], and popliteofibular ligament [PFL]). Previous studies compared the reconstruction procedures of biceps tenodesis with PFL,¹ combined tibia and fibula with only fibula,² Arciero with Larson type,³ and Arciero with another three-structure reconstruction⁴ (notably different from the technique described by LaPrade et al⁵).

Two of the most common procedures used for posterolateral knee reconstruction with good clinical outcomes are the LaPrade and Arciero techniques. In 2003, LaPrade et al⁶ described a landmark study about the anatomy of the knee PLC and, in 2004,⁵ they reported the biomechanical results of FCL, PLT, and PFL anatomical reconstruction using a two-graft technique. In 2005, Arciero⁷ described FCL and PFL reconstruction using free soft-tissue grafting through a transfibular tunnel and a dual femoral socket technique. Notably, the PLT was not reconstructed.

No biomechanical studies have evaluated the LaPrade and Arciero techniques in a head-to-head comparison. We at the University of New Mexico (UNM) Department of Orthopaedics & Rehabilitation proposed biomechanical testing on intact and sectioned human cadaveric knees that were reconstructed with use of the Arciero or LaPrade technique for PLC reconstruction. To make the study robust and help ensure data accuracy, we contacted Dr. Robert F. LaPrade to discuss reconstruction design variables and technique tips. Dr. LaPrade was kind enough to invite me to Vail, Colorado, to observe a day of surgery and participate in a cadaveric dissection and reconstruction of the PLC of the knee. With full support from the UNM orthopaedics

department, and most notably, Dr. Schenck, who helped arrange this amazing opportunity, I graciously accepted the invitation.

In January 2015, I left Albuquerque on a snowy morning for my drive to Vail. I arrived in the town that evening and stayed next door to the Vail Valley Medical Center. The following morning, I met one of the sports fellows and a surgical assistant/athletic trainer for a quick orientation on the 3rd floor of the Steadman Clinic, where the walls were adorned with jerseys and memorabilia from athlete-patients who had received superb care there. I then met with Dr. LaPrade and had time for a brief visit before a busy operating day that began at 7:00 AM. Five surgical procedures were scheduled: a knee arthroscopy with anterior cruciate ligament (ACL) cyst decompression; two revision ACL reconstructions; a multiligamentous ACL and medial collateral/posterior oblique ligament reconstruction with lateral meniscus repair; and a medial patellofemoral ligament repair. Because of an ability to move quickly between two operating rooms and the efficiency of the staff, the operations were completed by 2:00 PM.

In the operating room, I was impressed with the team that Dr. LaPrade had set up. A fellow, surgical assistant, and an athletic trainer regularly scrubbed into surgery with him. I was able to observe . . . but was not alone. Also observing was another athletic trainer and a visiting physician from Chile who was spending 2 months in Vail working with Dr. LaPrade and had, interestingly, visited the UNM orthopaedics department as a Latin American Society of Knee Arthroscopy and Sports Medicine fellow in 2006.

I learned four things about Dr. LaPrade's technique: he uses a bone-patellar tendon-bone autograft for most ACL reconstructions (even in elderly patients because of the high physical activity levels in Colorado's older population); he performs most revision ACL reconstructions as staged procedures with bone grafting and returns 6 months later for reconstruction; he regularly uses a posteromedial portal for knee arthroscopy; and he prefers double-bundle technique for posterior cruciate ligament reconstruction.

A talk with Dr. LaPrade and his staff revealed that the clinic setup was ideal. For the past 24 years, questionnaires

(now viewable on Apple iPads [Cupertino, CA]) have been given to each patient who presented to the clinic, making data collection for research much easier. Because of the mountain setting and scope of the practice, most patients are either referrals or have acute injuries. Patients with acute injuries can be examined, sent downstairs the same day for magnetic resonance imaging, and scheduled for a surgical procedure for the next day, if needed (as happened with one of the operations I observed, which was performed on a patient who, a day earlier, had been injured while snowboarding).

The next morning, time was set aside for a cadaveric dissection of the PLC of the knee. I met the team on the ground level of the Steadman Philippon Research Institute and had the opportunity to see the exceptional research facilities and resources. Dr. LaPrade expertly dissected the PLC structures while I peppered him with questions about the procedure and our proposed biomechanical study (Figure 1). He showed me how to properly perform a full release of the peroneal nerve by incising the peroneus longus muscle overlying the nerve distally, and he dissected out the anatomical femoral origins of the FCL and PLT (Figure 2).



Figure 1. Dr. Robert F. LaPrade dissecting the posterolateral corner of the knee.

Dr. LaPrade and I discussed testing protocols, potting of specimens, and avoiding overconstraint of the PLC by securing the FCL graft at 20°/neutral rotation/slight valgus and the PFL/PLT grafts at 60°/neutral rotation. Although we often think that structures eventually become lax after a multiligamentous reconstruction, he recalled one patient who had an overconstrained knee and difficulty walking for 10 years after PLC reconstruction done elsewhere. Thus, Dr. LaPrade stressed the importance of appropriate positioning for tensioning grafts and avoiding internal rotation to avoid overconstraint and other problems.

This was a phenomenal learning and research opportunity for me. I know it will help me in my professional development and help our research team with the biomechanical study. Finally, I would be remiss if I did not mention Vail Ski Resort—what an awesome mountain to ski on before I returned to Albuquerque!

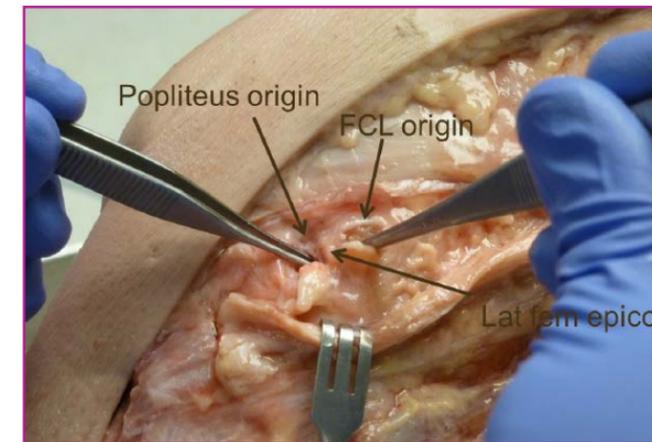


Figure 2. Exposing the fibular collateral ligament (FCL) origin (sulcus proximal and posterior to the lateral femoral epicondyle) and popliteus tendon origin on the popliteal saddle (18.5 mm obliquely distal and anterior to FCL origin).

References

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