

## TEACHING TECHNIQUES

# Prolotherapy Technique on Injecting the Anterior Cruciate Ligament

Rodney S. Van Pelt, MD

## ABSTRACT

*Anterior Cruciate Ligament (ACL) injuries are very common in any sports medicine practice. Incomplete tears and sprains are the most common injury to the ACL. In the author's experience, if an ACL sprain or incomplete tear does not heal on its own, it will most likely remain chronic, unless Prolotherapy is done. The technique of Prolotherapy for stimulating ACL healing is shown.*

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**KEYWORDS:** anterior cruciate ligament, injection technique, Prolotherapy.

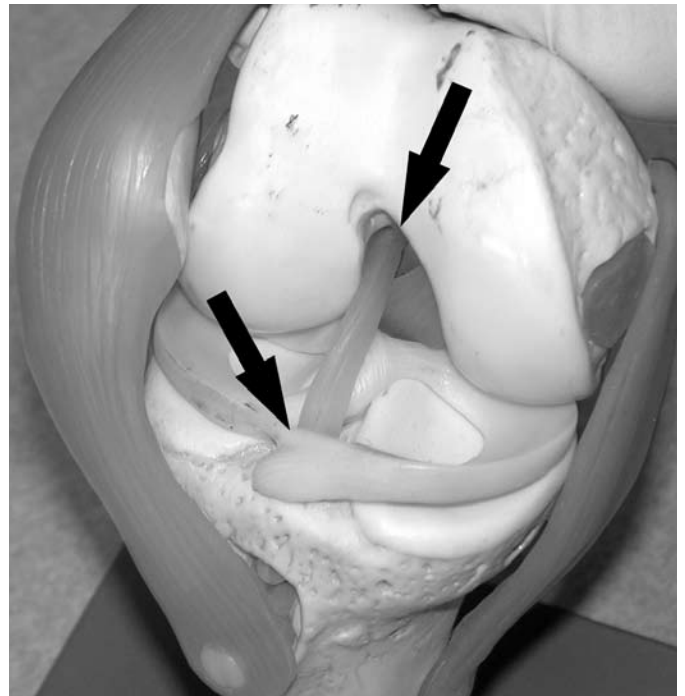
**H**ere he is. O.T. has just walked into your office. He is a 69 year-old paving company owner, complaining that his right knee hurts and has been gradually getting worse over the last two years. He complains of pain with descending a slope and prolonged walking. He has a history of twisting of his knee with an unexpected step into a hole at the work site. On exam he has a mild effusion of the right knee and positive anterior drawer test. The rest of the exam is negative. He has a partially torn Anterior Cruciate Ligament (ACL).

This orthopedic condition brings the skilled Prolotherapist special challenges. The cruciate ligaments are almost two inches long. They are located in the center of the knee, rather than on the outside. Also they are intra-capsular but extra-synovial.

We all know that we see more ACL than Posterior Cruciate Ligament (PCL) injuries. This is for two main reasons. First, the ACL stabilizes the knee in multiple places. This means it is vulnerable to injury from traumatic forces from several directions. Secondly, the blood supply to the PCL is more generous than the supply to the ACL. This leaves the ACL more vulnerable to injury and less able to heal after injury.

Since the cruciate ligaments are not in the synovial fluid, simple Prolotherapy intra-articular injections will not lead to strengthening of the cruciates. We must therefore identify the anterior and posterior insertion sites, and carefully inject the proliferant there.

Let's review the ACL anatomy. The proximal end (posterior portion) of the ligament is located posteriorly on the medial superior aspect of the lateral condyle of the femur. From there the ligament runs distally, slightly medially and anterior to its attachment (anterior portion) on the tibia. It attaches on the tibial plateau between the tibial eminences just anterior to the coronal midline and slightly medial to the sagittal midline. The origin is about 20mm by 10mm. The insertion is about 10mm by 30mm, with the long axis running anterior/posterior. (See Figure 1.)



**Figure 1. Anterior view of a right knee.** The arrows show the attachments of the ACL.

To inject the ACL, cleanse the skin with some type of antibiotic solution. Use a 22G 3-inch needle and a 10cc syringe of 15% dextrose. I do not recommend using strong proliferants for treating the cruciates due to the possibility of causing an intense capsulitis. It is possible to reach the insertion of the ACL using a smaller needle but the ligament is too dense to inject into it with a smaller gauge.

With patient seated, legs hanging over the edge of the table bent at 90 degrees, or with the patient lying supine with the knee bent at 90 degrees, insert the needle slightly lateral to midline near the inferior edge of the patella. (See Figure 2.) Angle the needle inferior, posterior, and slightly medially to touch the tibial plateau between the tibial eminences. You will feel the needle enter the dense ligament and feel substantial resistance when injecting. Inject 0.5cc, withdraw the needle partially, insert again and inject another 0.5cc. Repeat this “peppering” technique over the extent of the insertion, using 5cc of proliferant.



**Figure 2. Injection technique of the anterior portion of the left knee ACL.**

We generally do not give Prolotherapy in the back of the knee, in part because of the blood vessels and nerve running there. In this case we cannot access the origin (posterior portion) of the ACL or the insertion of the PCL from the front of the knee.

When it is decided to inject the origin of the ACL, you do so by positioning the patient face down with a roll under the ankle to leave the knee slightly bent. This relieves tension on the posterior structures of the knee, making it easier to push them aside to safely give the injection.

Before inserting the needle you will use your non-needle hand to push the neuro-vascular bundle laterally. Do not push it down. Our goal is to clear the needle path so that our needle passes safely, first beside, then beneath, the femoral nerve, artery, and vein. (See Figure 3.)



**Figure 3. Prolotherapy injection technique of the posterior portion of the left knee ACL.**

After cleansing the skin, insert the needle at the level of the joint line at the lateral aspect of the medial condyle. Exercising proper caution, you will advance the needle. Angle the needle toward the inner side of the lateral condyle, near the roof of the intercondylar notch. This is about 45 degrees anterior, 45 degrees cephalad, and 45 degrees lateral. You will feel the needle touch the femur. As you begin to inject, you should feel the resistance of the substance of the ligament. (See Figure 4.) When the needle tip is not at the origin site, the proliferant will flow with very little resistance into the joint space. This will not harm, but it is not our target. After proper insertion, use the “peppering” technique previously described to pepper the origin site with proliferant at the fibro-osseous junction.

In my opinion, Prolotherapy is extremely safe. It has a tiny fraction of the risk of surgery and a small fraction of the risk of cortisone injection. Treatment of the cruciates



**Figure 4. Posterior view of a right knee model.** To inject the ACL from the posterior approach the needle is positioned directly posterior to the joint line at the lateral edge of the medial condyle, aiming the needle cephalad, medial and anterior.

introduces a special risk due to the approach from the back of the knee with its proximity to the femoral nerve, artery, and vein. There is a possibility of nicking or puncturing the femoral artery, and touching the femoral nerve with the needle. This technique requires careful training and knowledge of the anatomy of the knee. In more than 700 treatments, I have never had a complication with the posterior approach using the precautions previously described. Do not attempt this posterior approach without sufficient training.

Due to the cruciate ligaments being nearly two inches long, the desired shortening of the ligaments is often substantial. In some cases this can reach a couple of millimeters. Patients experience just mild to moderate soreness of their knees following the treatment, and are routinely able to drive themselves home or back to their employment. The success rate is about 85 to 90 percent. You can expect results in all but complete tears of the cruciates in about six to eight treatments.

We have just reviewed treating partially torn cruciate ligaments with Prolotherapy. It takes special skill and precaution. With proper training, it is safe and very effective. Next time you are presented with cruciate ligament injury, consider using Prolotherapy to save your patient from the risk, debilitation, and expense of surgery.

#### EDITOR'S COMMENT

I have seen Dr. Van Pelt successfully treat many patients with ACL injuries using the described technique. I would just add that it is possible to inject portions of the posterior part of the ACL from the anterior approach. (See Figure 5.) If this anterior approach does not induce enough ACL repair then I would also do Prolotherapy posteriorly as Dr. Van Pelt has described. In the next issue, Dr. Van Pelt will discuss and illustrate his Prolotherapy technique for injecting the posterior cruciate ligament. ■



**Figure 5. Injection of the posterior portion of the right knee ACL via the anterior approach.**