Isolated Grade II Posterior Cruciate Ligament Sprain in Collegiate Football Player

Dylan M. Taylor, Jason C. Craddock, Shawn D. Felton
Florida Gulf Coast University, Department of Physical Therapy, Fort Myers, FL, USA

Abstract
Background: Football athlete who was 82kg and 117cm reported from practice complaining of anterior right knee pain. Athlete reported falling on bent knees trying to catch a pass and noted that pain was exacerbated with knee flexion. Athlete denied any problems with running or cutting however complained of unpleasant sensation on the anterior portion of the knee. Athlete was point tenderness between the iliotibial band and the anterior pole of the patella. Athlete reported no history of knee pain or injuries. Athlete had full active range of motion of the right knee, as compared bilaterally. Athlete presented with 5/5 manual muscle tests with knee flexion and extension. Athlete has 2/10 on the pain analog scale, with pain localized over the patellar ligament. Orthopedic clinical examination included (-) anterior drawer and posterior drawer, and (-) McMurray test. On blow out injury athlete reported to athletic training room with an increase in right knee pain. Athlete denied any activity or mechanisms following initial evaluation to explain the increased pain. Upon re-evaluation, pain was 6/10 on the analog scale, and athlete could not actively flex the knee. Athlete denied that the pain increased with his attempts of flexion. Athlete had 90 degrees of passive knee range motion with full extension and pain. Athlete had 2/5 MMT with knee flexion and 3/5 with knee extension. Based on clinical evaluation athlete had a grade II PCL sprain.

Clinical Examination
Upon first evaluation : Athlete has full active range of motion of the right knee when compared to the left knee. Athlete also has 2/5 manual muscle tests with knee flexion and extension. Athlete has 2/10 on the pain analog scale, with most pain over the patellar ligament. Negative anterior drawer, posterior drawer, and McMurray tests. Upon second evaluation: Athlete has 60 degrees passive range of motion with knee flexion with exuberated pain but has full extension. Athlete has 2/5 manual muscle test with knee flexion and extension and 3/5 with knee extension. Athlete has negative Lachmans test, Thessaly test. Positive with Reverse Lachmans.

Differential Diagnosis
- PCL sprain
- Hamstring strain
- Patellar tendinitis
- Meniscus tear

Treatment
Athlete began conservative treatment for a grade 2 PCL sprain. Athlete referred to team physician who ordered an MRI, which confirmed diagnosis. Athlete started his conservative treatment with active assistive range of motion exercises to increase the athlete's overall right knee range of motion. Once athlete was back to full range of motion we began increasing rehabilitation interventions with quadriceps and hamstring exercises increasing based on the level of symptoms. At the time of full strength was acquired by means of manual muscle test the athlete was put through the jumping functional test and the anterior drawer test. The athlete was also fitted for a PCL brace that he must wear during football.

Rehabilitation plan
For the first week the primary focus was on ROM, decrease swelling, and pain management. He did 3 sets of 15 wall slides (AAROM) then he was put in the brace and had a combination of grade I and II strengthening. The next week then patient was placed in the Game Ready for 20 mins. at the closest setting. Once the patient had full ROM the patient began strengthening exercises. The first week consists of: He has 2 sets of 15 squats, 2 sets of 30 leg lifts all 4 ways, and 2 sets of contractions of the quad holding for 5 seconds, after all this relaxed on the bike for 10 minutes. Focus on isometric, isokinetic exercises, and the rehabilitation of the quadriceps muscle of the right knee. We reevaluate him Monday and either decrease, increase, or keep the workouts or reps the same. While also allowing the patient to fill out the patient related outcome measures to allow us to see how the patient is feeling and also to see the progress, these are shown below. This is dependent on how the week went with the workouts, the patient relays to us before starting every day to report his soreness level from a scale from 0 to 10, 0 being not sore at all, 10 being too sore to even walk. To increase the sets or exercises the patient must complete the new workouts with the reports of soreness below a 2 for both consecutive days. Any soreness reported of 7 or higher he is given a day off and the reps and sets will be decreased to what they were before. First to be increased is reps to 30, then sets to 3 and then weight added by 5 lb increments, and if the patient is mastering the exercises we will add new exercises last. The patient increased the exercises all the way to this work out before being released by the doctor, the patient is warming up on the bike for 15 minutes then doing 3 sets of 30 squats with 30 lb., 3 sets of 30 side lunges, 3 sets of 30 front lunges, 3 sets of 30 elevated lunges, 3 sets of 30 tape pick ups, 3 sets of 30 RDL’s with 8 lb., 3 sets of 30 leg press using the power machine set at “26”, and 3 sets of 30 single leg press using the power machine set at “26”. The patient now will do the above exercises with the athlete taking in the additional repetition to help the muscle with strength but mostly endurance. When patient was demonstrating the same strength in both legs when measured with MMT he began plyometric workouts.

Functional Tests
Moving from the rehabilitation plan that includes functional movements for a specific patient, with a functional test at the end. An additional point that much of the research stated is to begin strengthening both legs with the exercises near the end of rehabilitation. The functional test for the athlete in this study was the BioDex. One thing to remember during functional testing is how certain motions can have the ability to compensate for others. However, it is important especially in functional tests, for example, functional test which allow the patient objective measures that are not as expensive as the BioDex. Functional tests allow one to ascertain if the knee is ready for functional activity. The importance of functional testing, none of the athletes returning to play reprimed the PCL with a 5-year range. Once passing the functional tests that are in place (Bio Dexe, jumping test, and star test) with the affected leg being at least 85% strength when compared to the unaffected leg has a low risk for long-term strengthening by doing cutting drills and sprinting, and since one of the athletes goals was to have the same 40 yard dash time we spent time doing some ladder drills as well.

Uniqueness
This case when first assessed presented with full strength, range of motion, and negative posterior draw test, mostly showing signs of patellar tendinitis, with pain between the iliotibial band and the inferior pole of the patella. After applying the patella strap he had a subluxation in pain, after his practice saying he had “no pain.” However, pain increased and ROM decreased within 24 hours. Also the occurrence rate of PCL injuries is much lower than any other injuries in sports. This highlighted the importance of the PCL ligament. A realization was the key differences in each study that pleaded for one paper bringing all the information together to create a better understanding of the processes, which have been proven with evidence-based practices and tests. Although rare, rehabilitation is the most common route for the recovery and safe return to activity for the patient from a PCL strain. The rarity of the injury also hinders the ability to conduct research on the process.

Discussion and Summary
The importance of research is always needed especially when looking into the health care professions. However, as shown in the research that was looked upon, it is difficult to be strong with the knee at the time of injury can assist in deciding between these two possibilities.

References
Surgery, & Research, 93(4), 213-222. doi:10.1016/j.clinbiomech.2009.11.003
Orthopedics & Traumatology: Surgery & Research, 93(4), 213-222. doi:10.1016/j.clinbiomech.2009.11.003