

Abstract

Background: Athlete is a 21-year-old male NCAA football defensive tackle. The athlete has a history of R ACL reconstruction in 2016. Athlete was blocked low during a game resulting in a force placed onto the R knee while in flexion resulting in posterior translation and internal rotation of the R tibiofemoral joint. The athlete felt P! and instability along with swelling. Evaluation revealed swelling as well as ROM deficits in R knee flexion and extension due to pain and the swelling. Special tests revealed (+) anterior drawer, (+) varus test (+ at 0° for pain, - at 30°), (+) valgus test (- at 0° , + at 30° for laxity), (+) Lachman's test, (+) dial test. Athlete was sent for imaging the next day.

Differential Diagnosis: ACL Tear, MCL tear / sprain, PLC injury, meniscus tear.

Treatment: Athlete was pulled from all future activity until imaging was performed. The athlete was placed in a knee brace locked in extension until imaging was performed. An MRI was performed on the area. MRI revealed an ACL rupture, Grade 2 MCL strain, and PLC tear. Athlete was further treated with conservative treatment with use of therapeutic exercise while limiting knee flexion to allow MCL to scar before performing ACL reconstruction and PLC repair.

Uniqueness: Posterolateral Corner injuries are one of the more rare injuries when looking at knee pathologies. Cases that involve injury to the PLC occur for around 16% of knee ligament injuries. This injury typically occurs with combinations with other ligament injuries. This area provides a combination of static and dynamic stabilization of the patellofemoral joint and injury typically occurs from both varus forces and hyperextension of the knee. **Conclusions:** This case highlights the diagnosis and treatment of an athlete suffering from an ACL tear and PLC injury and his return to competition with repair and reconstruction. This case discusses the evidence applied to initial ACL/PLC reconstructions and methods of second reconstructions of the ACL/PLC. This case highlights the strategies of treating athletes related to knee injuries and the need for quick intervention.



Defensive linemen use a lot of explosive motion in order to break the offensive line, creating a plethora of incidences for injury to occur

Introduction

The posterolateral corner of the knee is a complex injury that can be difficult to diagnose. Of the multiple ways the posterolateral corner can be ruptured, the most common involves impact from car accidents, but can be also caused by an impact on the proximal anteromedial tibia combined with hyperextension and varus forces. This injury is normally combined with damage to other tendons as well. One study used MRIs to look at acute injuries of the knee that presented with hemarthrosis following injury. Of the one hundred and eighty-seven patients observed to have ligament injuries, only thirty presented posterolateral corner injury. Only four cases of the total group had isolated tears of the posterolateral corner, with the other twenty-six being combined with multiple ligament injuries. Of the ligaments in the patellofemoral joint, trauma to posterior collateral ligament is associated with posterolateral corner pathology most often, with some studies indicating half of PCL tears include posterolateral corner tears. (Nannaparaju, Mortada, Wiiks, Khan, & Alam, 2017).

Anatomy of the Posterolateral Corner

There are three layers that are considered to make up the posterolateral corner of the knee. These three layers are can be slightly variable depending on the individual. The first layer is the superficial layer which consists of the ilio-tibial band, lateral retinaculum, and biceps femoris. Following this layer, the "middle" layer includes the vastus lateralis obliquus and the deep fibers of the ilio-tibial band. A joint capsule in this region connects the wider aspect of the lateral border of the patella with the lateral femoral epicondyle. Posterolateral forces are dispersed from the patella in this layer. Going into the deep layer of the posterolateral corner, the lateral collateral ligament is present upon the superficial lamina. The deepest layer also contains the arcuate ligament with the deepest aspect containing the popliteus tendon that attaches to the styloid process of the fibula. More research needs to be conducted to understand why there is a variability in the anatomy of this area. The purpose of the posterolateral corner is to aid in the restrict varus movement and external rotation during flexion and extension.

Deficiency of the different structures of the posterolateral corner will have different effects on the type of symptoms elicited from injury. Lateral cruciate ligament deficiency causes an increase in the angulation of the knee when subjected to varus forces. Deeper structures of the posterolateral corner were shown to cause an increase in external rotation of the knee as well as posterior translation of the tibiofemoral joint with damage present. During the gait cycle, all posterolateral structures show significant increased external rotation and posterior translation during the swing phase of the gait cycle (Kang, Koh, Son, Jung, Oh, Kim, Kim, 2018). This shows that patients who undergo strenuous activities like running pose a greater risk of potential injury greater than current injury due to the changes caused by their deficiency.

Surgical Interventions

Several different surgical procedures can be performed regarding posterolateral corner injuries. Surgical interventions often involve single-graft fibula-based techniques or a dual-graft fibula and tibia-based technique. In some cases, cadaveric grafts have shown to adequately restore the stability of the knee to varus and rotational forces. A study performed Sanders and Johnson took a look on the effectiveness of the single-graft surgical intervention on knee function post-operation. The cases in this study involved injury to multiple ligaments on top of the need for reconstruction on the posterolateral corner. After undergoing the same rehabilitation protocol resulting in return to activity in eight to twelve months, a follow-up visit would be conducted to assess laxity and range of motion of the subjects. Of the sixty-one patients of the study, about eighty-nine percent of the cases presented no laxity upon follow-up. One case presented grade two laxity, and six cases presented grade one laxity (Sanders, Johnson, 2017). This study demonstrated that single-graft methods of posterolateral corner injuries are quite effective in resolving the complications of the initial injury. The single graft surgical procedure may be more effective, as dual-graft techniques often result in disruption of the popliteus and popliteus tendon causing an asymmetric knee hyperextension. Regarding complications of surgery, once study found that complications were reported in seven and three-tenths percent of posterolateral corner reconstructions performed utilizing the single graft technique (Petrillo, Volpi, Papalia, Maffulli, Denaro, 2017).

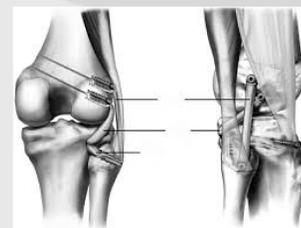


Image of a dual graft

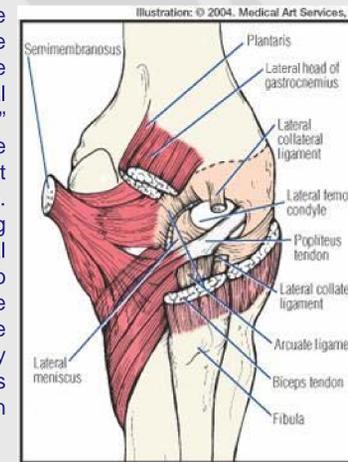


Diagram of the Posterolateral Corner



Knee immobilizers are utilized in early phases of rehab to protect the repaired tissues from being stretched prematurely and damaged again

Rehabilitation

Following surgery, the patients who have undergone posterolateral reconstruction will begin the rehabilitation process to return to normal daily function. In most cases, the physician will order the patient to be non-weightbearing on the affected limb for six weeks following the procedure. A knee immobilizer will also be utilized to prevent the knee from flexing or extending during ambulation. This is to protect the incision as well as prevent the knee from undergoing too much strain in quick sessions resulting in re-injury of the site. During the first two weeks following surgery, the focus should be placed on regaining the passive range of motion of knee flexion from zero to ninety degrees. These motions can be performed by a clinician up to four times a day (Kennedy, LaPrade, LaPrade, 2017). Without quickly establishing proper range of motion, the patient may experience severe difficulty regaining range of motion. Hypomobility could also result in scar tissue build-up at the surgery site resulting in the need to have surgical intervention to remove the excess tissue to begin range of motion work again. The proceeding phases will focus on incorporating light resistance and cardiovascular exercises with the goal of achieving full strength and range of motion around the six month marker post-operation, followed by a progressive return to play protocol.

Discussion and Summary

Posterolateral corner injuries can cause functional issues that can cause long term damage if not properly resolved. Magnetic resonance imaging may or may not show any damage to the posterolateral corner, meaning arthroscopy may be necessary to assess possible injury to this area. Studies have shown that roughly sixty percent of posterolateral corner injuries involve ligamentous damage to other structures in the knee.(Petrillo, Volpi, Papalia, Maffulli, Denaro, 2017). Without proper intervention, long term effects of posterolateral corner injuries can result in gait abnormalities that may gradually result in the degeneration of the medial cartilage of the knee. Surgical repairs for this injury can involve single-graft or double-graft techniques, with single graft techniques resulting in statistically better outcomes. With proper post-operation rehabilitation, return to regular activity can take between six months to a year.

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