Hyperextension of the Knee Leading to a 3rd Degree LCL Pathology and Hamstring Strain in College Football Athlete

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Abstract

Background: Athlete was an 18-year-old male division 1 football player. Athlete had no known prior history of knee injuries on affected extremity, but two meniscal procedures on contralateral knee. During practice the athlete was participating in a scrimmage on the defensive team and tried to make a play on the ball. The offensive player caught the ball, and upon completign this, the defensive player swung around him and planted; then hyperextended his right knee and slide into the fence. The defensive athlete immediately grabbed his knee wincing in pain. He recalled that when he hyperextended his knee he heard a "pop" then fell immediately to the ground. The sports medicine staff assisted the athlete off the field. Upon inspection the athlete had pain on proximal fibula, posterolateral and anteromedial joint line of the knee. Athlete had full range of motion of affected knee. When manual muscle testing the athletes affected knee flexion was 4/5 with pain and knee extension was 5/5. The endpoint wasn't appreciable when performing varus test at 30° of flexion. Also, was difficult to palpate the LCL when compared bilateral. **Differential Diagnosis:** Sprain of the LCL, sprain of the PCL, hamstring strain, lateral meniscus tear, posterior lateral tear. **Treatment:** Athlete was referred to orthopedic surgeon where a contrast MRI was requested. This MRI confirmed the prognosis of an LCL tear in athlete's right knee. Surgical intervention was required due to the complete tear of the right LCL, partial tear of the bicep femoris, and injury to the posterior capsule arcuate ligament. Due to the type of tear the procedure conducted was a re-approximation of the LCL, and the partial bicep femoris tear utilizing a locked horizontal mattress and figure of eight vicryl suture. The athlete will go through an intensive and lengthy LCL protocol given by the seurgeon. This begins with non-weight bearing for six weeks, as well as, no hamstring activation. Research suggests that this type of surgical reconstruction will take 16 weeks for a full return to participation. **Conclusion:** This case analysis will be highlighting on the anatomy, surgery, and clinical treatment of this LCL tear, and bicep femoris.

Introduction

Knee injuries are extremely common in US football players. In fact, the second and third most common behind ankle injuries. In a study conducted on 332 elite collegiate US football players suggested fifty-four percent, 233 out of the 332, of athletes had a history of knee injuries. The article stated: the most common injuries were medial collateral ligament injury (n = 79), meniscal injury (n = 51), and anterior cruciate ligament (ACL) injury (n = 40) (Bradley, et al., 2008). The following information will expound on the mechanism of injury, clinical assessments, diagnosis, treatments, and return to play to provide additional information to this unique injury.

Purpose

The purpose of this case report was to introduce a 19 year-old Division IA football athlete who ruptured his lateral collateral ligament and partially tore his bicep femoris during practice. The athlete opted for a surgical repair of the affected ligament and muscle tendon. An overview of this unique injury is presented to obtain additional information and a better understanding regarding the complete injury of a lateral collateral ligament, from onset to return to play of a Division IA football player.

Anatomy

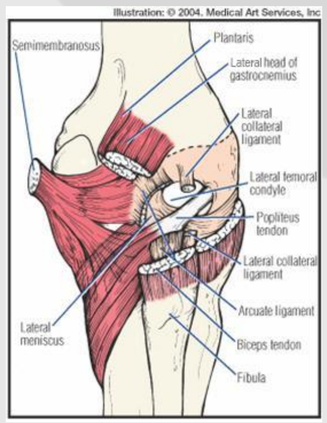
Have a foundational knowledge of the anatomy is paramount in understanding the injury and what it does functionally. The lateral, fibular, collateral ligament or LCL is one of the ligament in the knee that connects two bones, the femur and the fibula, at the knee joint. The proximal attachment of the LCL inserts on lateral epicondyle of the femur; while the distal attachment is on the apex of the fibular head. This extracapsular ligament restricts varus movement at full extension, 30° of flexion, and external tibial rotation. The bicep femoris long head originates on the ischial tuberosity and inserts onto the lateral fibular head.

Case Report

Patient: This Division IA football player is a 19 year-old (85 kg and 183cm) athlete that sustained a grade three LCL sprain with partial tearing of the bicep femoris, long head. The following information will explain the mechanism of injury, clinical assessments, diagnosis, treatments and return to play to provide additional information to this athlete's unique injury.

Mechanism of Injury: During practice the athlete reports hyperextending his knee while jumping trying to defend a ball. The athlete fell, landing on the wide receivers foot, rolling his ankle, and felt his knee buckle when he landed.

Clinical Examination: The athlete was lying supine, grimacing, and favoring his left knee. He was assisted of the practice field and further evaluated by the athletic training staff. The assessment reveled pain on his fibular head and on the lateral aspect of the joint line. Positive swelling was observed on the lateral knee and fibular head. Athlete reported no tenderness on the medial aspect of the joint line. Athlete recalled hearing and feeling a "pop" and his knee buckle when he landed. Athlete was tender to palpation over his fibular head as well as pain along the lateral side of his knee. Active range of motion revealed pain with resisted knee flexion; 4/5 strength. While knee extension was 5/5 strength without pain. Clinical special testing for this injury, the athlete tested negative on lachmans, anterior drawer, posterior drawer, valgus stress test, and McMurrays. However, athlete tested positive for pain when performing the varus stress test; in both full extension and at 30 degrees of knee flexion. Due to isolated injuries to the posterolateral corner being rare or nonexistent, injury to the anterior cruciate ligament (ACL) and posterior cruciate ligament (PCL) must be ruled out. The implications for a positive varus stress test at full extension could conclude indicate a sprain to the LCL, lateral joint capsule, cruciate ligaments, and related structures. Where as, the implication for a positive varus stress test at 25 degrees of knee flexion indicates a sprain of the LCL.



Case Report cont.

Clinical Examination: . During physical examination, swelling and tenderness during palpation was noted. Pain was located on the lateral aspect of the knee. Clinical tests used to evaluate LCL sprain are a varus stress test in complete extension and in 30 degrees of knee flexion. The varus stress test came back positive. Although the evidence is inconclusive on varus stress test, the reliability was found to be high towards the conclusion of a LCL strain. The results of the MRI however, confirmed that the athlete suffered a complete grade III lateral collateral ligament on his left knee, with a partial tear to the bicep femoris long head. Grade III is the most severe grade where a total rupture of the ligament causes symptoms that contain swelling, bruising, and pain. With the athlete experiencing a grade III lateral collateral sprain, and partial tear of the bicep femoris long head the choice of surgical procedure was given to the athlete. The athlete opted to perform surgery, then begin rehabilitation.

Rehabilitation

The initial phase was weeks 1- 4, with goals being pain modulation for the lateral aspect of the knee, non-weight bearing and hamstring activation for 6 weeks, lock the knee at 30° to 90° of flexion and ambulate on crutches. Early strengthening exercises of the joints above and below. Rehabilitation exercises to perform during this phase is sagittal plane exercises like straight leg raises, and isometric contraction of the quadricep. Transverse friction massage was also performed to allow for tissue healing, scar tissue management, and decrease sensitivity. Phase 2 consisted of weeks 5-9, with the post-op knee brace at 0° to 120° and discontinuing while rehabilitation progression. Progress weight bearing gradually in ADL till normal gait. Develop quadricep strength with open and closed kinetic chain exercises. Begin hamstring strengthening exercises, proprioceptive training, and aquatic jogging at chest level. Phase 3 and return to play spanned from weeks 10-16. Increase aquatic exercise to begin land running with functional brace. Also, start isokinetic quadricep strengthening. Multiplanar, as well as, frontal plane exercise was prescribed to help in the later stages to strengthen the affected leg. The multiplanar exercises, like cutting drills, were used to help the dynamic stabilization of the affected knee, and selective muscle firing.

Discussion and Conclusion

LCL tears are common sequelae of a varus force applied to the knee. This mechanism of injury is a hyperextension of the knee when the athlete planted. These injuries can occur in all sports that produce high collision and high velocity forces on the joint. LCL sprains are very rare but can lead to instability of the affected knee in the frontal plane. The lateral knee system is stronger than the medial structures because it is subject to increased stress during the initial contact phase of gait when the knee is extended and weight bearing, placing varus forces on the joint (Chen, Rokito, & Pitman, 2000). This is also paramount to sports, especially football, due to the dynamic turning and movements a football player makes. This case highlighted a Div IA collegiate athlete who suffered a complete rupture of LCL, and partial tear of the bicep femoris long head. The research suggest that the common mechanism of injury of LCL injuries result in a blow to the medial knee or by internal rotation of the tibia on the femur. The uniqueness of LCL injuries of the knee are the least common injury, with incidence of 4%, compared to all the knee ligament injuries. Injuries to the LCL are relatively uncommon but it is important to understand the sequence, severity, and significance associated with an injury to the LCL and bicep femoris long head to have a better understanding of a complex injury. As athletic trainers it is important to be aware of the mechanism of injury and ensure a complete orthopedic evaluation to ensure a correct diagnosis.

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