Case Report | Journal of Orthopaedic Case Reports 2023 July:13(7):Page 121-125

Multiligament knee injury with common peroneal nerve palsy in a long jump athlete with 4-year follow-up: A case report

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Learning Point of the Article:

The article highlights the need for detailed examination and proper surgical planning for reasonable outcome in multiligament injury with peroneal nerve palsy.

Abstract

Introduction: Multiligament knee injuries (MLKIs) are difficult to manage occurrence and are usually associated with poor functional outcomes. Knee dislocations involving both cruciate ligaments are relatively rare compared to other multifilament injuries involving one cruciate ligament and a collateral ligament. Multiple studies have reported the Tegnor score after surgery as 3 or 4. In 44% of cases with posterolateral corner (PLC) injury and biceps femoris tendon rupture or avulsion of the fibular head, a palsy of the common peroneal nerve (CPN) occurs. About half of these cases do not exhibit functional recovery.

Case Report: A 20 years old long jump national athlete sustained varus and hyperextension injury leading to a multiligament knee injury (anterior cruciate ligament, posterior cruciate ligament, PLC, and medial collateral ligament) and CPN palsy. After a staged surgical procedure and structured rehabilitation protocol, the athlete was able to return to preinjury level in 18 months. At present, 4 years postoperatively, the patient can walk full weight-bearing with no instability. On the latest follow-up, the Lachman's test is negative, posterior drawer test negative, varus, and valgus stress test negative. Knee ranges of motion 0 to 140 degrees. The patient reported that Tegnor Score was 8.

Conclusion: Surgical management of MKLI with CPN palsy can give reasonable functional outcome.

Keywords: Multiligament knee injury, posterolateral corner injury, common peroneal nerve dysfunction.

Introduction

Multiligament knee injuries (MLKIs) are difficult to manage and are usually associated with poor functional outcomes. Multiple studies have reported the Tegnor score after surgery as 3 or 4. These injuries present as combination of anteromedial, anterolateral, posteromedial, and posterolateral, along with coronal and sagittal instabilities. Out of these, about 7–16% are lateral ligamentous complex injuries. Posterolateral instability of the knee is an abnormal movement of lateral condyle of the tibia over the femur (external rotation and posterior translation) about an intact posterior cruciate ligament (PCL) [1]. It occurs due to an acute injury or repeated injuries to the arcuate ligament complex. It includes popliteal-fibular ligament, lateral head of gastrocnemius, arcuate ligament, short lateral collateral ligaments (LCLs), and fibular/LCL. These injuries occur as a result of hyperextension injuries to the knee, a lateral blow to the flexed knee, and traumatic knee dislocations [2].

About 15–30% of posterolateral corner (PLC) injuries are associated with neurovascular injuries [2]. Immediate address to the vascular component is required which needs to be managed.

Access this article online

Website: www.jocr.co.in

DOI: https://doi.org/10.13107/jocr.2023.v13.i07.3778

Author's Photo Gallery


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Submitted: 17/04/2023; Review: 06/05/2023; Accepted: June 2023; Published: July 2023

DOI: https://doi.org/10.13107/jocr.2023.v13.i07.3778

Figure 1: Pre-operative X-ray anterior posterior and lateral, along with MRI images of the left knee of the patient.

The common peroneal nerve is most commonly injured due to its anatomical position between the fibular neck and intermuscular septum which restricts its excursion.

The treatment options for MKLI are staged intervention of the extra-articular ligaments and intra-articular ligaments along with neurolysis, nerve transfer, and tendon transfer. Posterior tibial tendon transfer is undertaken for the deficit due common peroneal nerve (CPN) palsy [3].

We would like to report a case of MLKI with CPN palsy in an athlete with return to sports and a 4-year follow-up. The patient reported that Tegnor score was 8 at 4 years of follow-up. We would like to highlight the fact that reasonable functional outcome can be obtained after complex knee injuries such as the MLKI (anterior cruciate ligament [ACL], PCL, PLC, and medial collateral ligament) with CPN involvement.

Case Report

A 20-year-old male, an athlete who was preparing for a national level long jump competition fumbled and then landed awkwardly leading to varus and hyperextension injury to his left knee. He was unable to walk. The patient was immediately taken to a local hospital where his left lower limb was immobilized in a splint and a standard anterior posterior and lateral radiograph and MRI is shown in Fig. 1. He was referred to our center for further management.

On examination, there was fullness in the supra-, para-, and infrapatellar pouch. Tenderness was present over the lateral condyle of the left tibia and the lateral and posterolateral joint line was also tender. Active knee range of motion (ROM) was 10–30°. Passive knee ROM flexion and extension were possible from 0 to 90° as compared to ROM of 0–140° of the unaffected knee. Grade III Lachman's test. Significant laxity (3+) was seen on a varus stress test at various degrees of flexion. There was a complete loss of ankle and toe dorsiflexion. Muscle testing of dorsiflexion of ankle including tibialis anterior, extensor digitorum, and extensor hallucis longus was suggestive of a complete foot drop.

X-ray of the knee revealed a Segonds Fracture (Avulsion fracture of lateral condyle of the tibia). Magnetic resonance

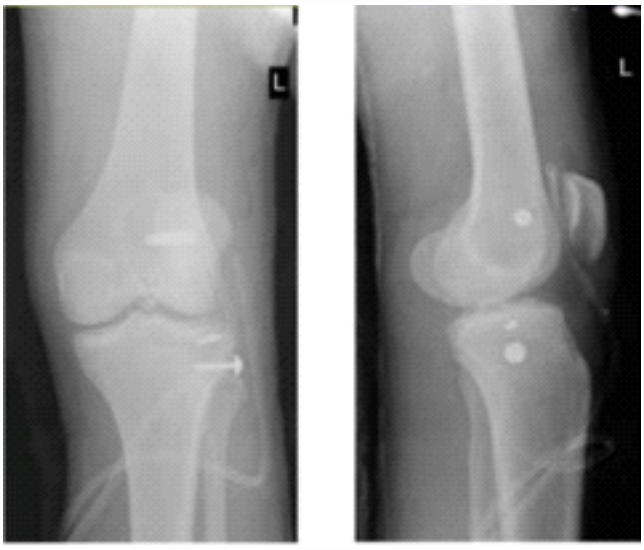

Figure 2: Immediate post-operative X-ray images anterior posterior and lateral after Stage 1 of the surgery. X-ray shows fixation of the Segonds fracture with cannulated cancellous screw and the biceps avulsion fixation with anchor tenodesis and lateral collateral ligament femoral repair using interference screw and bracing with fiber wire.

Figure 3: Immediate post-operative images after Stage 3 showing the anterior cruciate ligament and posterior cruciate ligament reconstruction with implant in situ.

Figure 4: The functional recovery of the patient in terms dorsiflexion of the foot, running and jumping activity.

Figure 5: Follow-up X-ray 4 years after the surgery.

imaging (MRI) was suggestive of a complete tear of ACL, complete tear of the PCL, PLC injury including LCL avulsion, biceps femoris rupture, and Segonds fracture of the left tibia. Nerve conduction velocity study showed CPN palsy.

A two-staged procedure was planned. The Stage I of the surgery was performed on day 2 of the admission. In Stage 1, the patient was examined under anesthesia. Anterior drawer test and posterior drawer test positive, varus stress test positive at 0 and 30°. Dial test was positive at 0 and 90°. Pivot shift test was found to be positive. Initially, diagnostic arthroscopy was done which showed – complete ACL tear, complete midsubstance PCL tear, lateral meniscus tear, and lateral capsular rupture. The lateral meniscus was balanced and remnants of ACL and PCL were debrided to prepare for the next step. PLC was repaired with an open lateral approach. LCL was seen to be avulsed, iliotibial band and biceps femoris were seen to be torn, and large rent was seen in a lateral capsule. The common peroneal nerve was explored along its course and contusion of the nerve was observed at the anatomical part traversing on the posterior aspect of the fibula. The LCL was repaired using an interference screw. Segonds fracture was reduced using suture anchors. The rest of the PLC was repaired using double row style anchor insertion with ethibond and cannulated cancellous screw. Surgical neurolysis of CPN was performed 5 cm proximal and distal to the site of contusion. Post-operative radiograph of the patient after Stage 1 Fig. 2.

Postoperatively, the patient left lower limb was kept in a long knee brace. The patient was discharged after suture removal on post-operative day 15 and was followed up after 1 month. The patient was non-weight-bearing for a period of 6 weeks and a physiotherapy program was designed for the patient involving guarded knee ROM and gradually strengthening the quadriceps and hamstrings, but he developed stiffness in his operated knee and an arthroscopic adhesiolysis was done after which patients knee ROM improved. Thereafter, the patient followed the physiotherapy program designed for him under supervision.

After 6 months post first surgery on examining the patient: Lachman's test – positive (posterior>anterior), posterior drawer test – positive, there was no laxity on varus and valgus stress, knee ROM was 0–120°, Grade 2 power of tibialis anterior and EHL was observed with no hypoesthesia in CPN course. The patient could walk comfortably now and had some residual instability on trying to completely flex the knee.

Once the patient recovered in terms of range of movement of the knee the second stage of the surgery was planned. It was after 6 months of the index surgery. ACL was reconstructed using autologous semitendinosus and gracilis graft. PCL was arthroscopically reconstructed using an autologous peroneus longus graft. Fig. 3 shows the immediate post-operative X-ray of the patient following the Stage 2 of the surgery.

One year postoperatively, the patient was able to walk full weight-bearing with no instability, Lachman's test – negative, posterior drawer test – negative, varus and valgus stress test – negative, and knee ROM 0–140°. The patient did have some residual weakness in ankle dorsiflexion and required an ankle foot orthosis. After the second surgery, the patient was given faradic stimulation therapy to aid in the recovery of the peroneal nerve.

The patient at a 2-year follow-up does not require any knee brace while walking or performing daily activities. He has started running and cycling and has returned to complete pre-operative function. On examination, the patient has excellent knee ROM from 0 to 150°. There is no extension lag. Lachman's test, posterior drawer test, and dial test are all negative. On individual muscle examination, his tibialis anterior and EHL has grade 5 power. There is no hypoesthesia in the course of the common peroneal nerve. The patient is currently training for a return to long jump competitions. Fig. 4 is the patient reported pics of recovery of running and jumping.

Discussion

Multiligamentous knee injuries are complex injuries. These injuries usually occur as a result of high-speed motor vehicular injuries or as sports injuries. A combined ACL and PLC injury occur as a result of hyperextension and varus forces acting on the knee. Simultaneous complete tear along with both collateral tears is relatively uncommon. Multiligament knee injuries account for approximately <0.02% of orthopedic injuries. Of these injuries, 20–40% of injuries are associated with CPN injury. The association of PLC injury and CPN injury is higher. The common peroneal nerve is most commonly damaged due to its placement between the fibular neck and intermuscular septum which restricts its ability to accommodate to various changes in the knee joint. Given the challenges associated with managing both the knee ligament injury and foot drop, such patients are best managed in a tertiary care center [4]. Post-traumatic Common Peroneal Nerve palsy is associated with morbidities such as the poor function of the foot and ankle, the need for usage of orthosis, and poor quality of life due to pain [5, 6]. In addition, it also hinders the ability to have painless, stable, and properly functioning knees postoperatively, decreasing the likelihood of a successful MLKI reconstruction. Literature shows poor outcomes, but there have been relatively few studies with inconsistent data regarding the appropriate management of such injuries, likely due to the rarity of the injury [7, 8, 9].

The limitation of the clinical report is that Telos or KT-1000 were not performed. On follow-up, the patient was evaluated by the operating surgeon and he was able to demonstrate the triple hop test. At 4 years of follow-up, the patient reported Tegnor score is 8 [10].

Conclusion

MLKI is a serious injury and is commonly associated with common peroneal nerve palsy. There are no fixed protocols available for its management. Management should be patient specific. Our patient has a stable knee; excellent function and his Common Peroneal Nerve function improved with Tegnor 8 on 4 years follow-up. We recommend early CPN decompression and a multistaged approach to treatment.

Clinical Message

Multiligament knee injuries are difficult to treat. Common Peroneal Nerve Involvement can further complicate the injury and return to sports after the combination is seldom reported. These injuries can be effectively dealt with in a staged surgical manner and coordinated physiotherapy program.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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Conflict of Interest: Nil
Source of Support: Nil

Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report

How to Cite this Article

Kekatpure A, Kekatpure A, Deshpande S, Srivastava S, Saoji K. Multiligament knee injury with common peroneal nerve palsy in a long jump athlete with 4-year follow-up: A case report. Journal of Orthopaedic Case Reports 2023 July;13(7): 121-125.