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# A case report of anterior cruciate ligament and posterolateral corner reconstruction using tendon graft preserved in situ

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## ABSTRACT

**INTRODUCTION:** Combined anterior cruciate ligament (ACL) and posterolateral corner (PLC) reconstruction are a rare clinical entity in orthopedic literature, whose management requires different types of tendon grafts. Missed PLC injury leads to the failure of ACL repair due to the joint instability.

**PRESENTATION OF CASE:** We are presenting a case of posttraumatic right ACL, PLC and lateral meniscus injury. The patient was taken to theatre for arthroscopic meniscectomy, ACL and PLC reconstruction. We had to harvest bilateral Gracilis and semitendinosus tendon grafts. Intraoperatively, we used a pump and after meniscectomy and ACL reconstruction the knee was quite swollen; we opted to offer a two-staged procedure for PLC reconstruction. Hence we had to preserve the graft in situ for the next procedure. Posterolateral corner reconstruction was done in a week's time and preserved ligament was found to be intact.

**DISCUSSION:** The fact that we did not have a tissue bank or facilities for cryopreservation of the harvested tendons at  $-80^{\circ}\text{C}$  or with liquid nitrogen at  $-179^{\circ}\text{C}$  yet we had to keep the harvested tendons safe.

**CONCLUSION:** In case of absence of graft and bone bank, tendon graft was in situ and found intact and ready to be used after seven days.

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## 1. Introduction

Anterior cruciate ligament (ACL) injuries represent one of the most common injuries in orthopedics [1]. The ACL is an important stabilizer of the knee and its main function is to prevent the tibia from moving forward relative to the femur. Successful outcome of ACL reconstruction depends on multiple factors including proper management ACL itself and of associated injuries [2]. Combined injuries cause more severe functional impairment [3]. Posterolateral corner (PLC) also known as “the dark side of the knee” is rare and it is only seen in 2% of all knee ligament injuries [4]. Combined ACL and PLC occur in approximately 10% of complex knee injuries and it is more common when combined with Posterior Cruciate Ligament (PCL) injury seen in 60% of cases [5]. Missed PLC injury leads to the failure of ACL because the deficiency of posterolateral structures significantly increases the varus load on the ACL graft, resulting in an increased risk for failure. PCL repair is important in preventing the posterolateral laxity clinically [6].

Anatomically, the posterolateral corner consists of the lateral collateral ligament (LCL), popliteus tendon complex, popliteofibular ligament (PFL), and posterolateral capsule. It plays a very important role in resisting external rotation of the lateral side of the tibia on the femur. PLC injuries cause severe disability and articular cartilage degeneration. Furthermore, multiple ligament knee injury that includes PLC disruption often associated with palsy of the common peroneal nerve (CPN), which occurs in 44% of cases. Approximately half of these cases may not functionally recover [7].

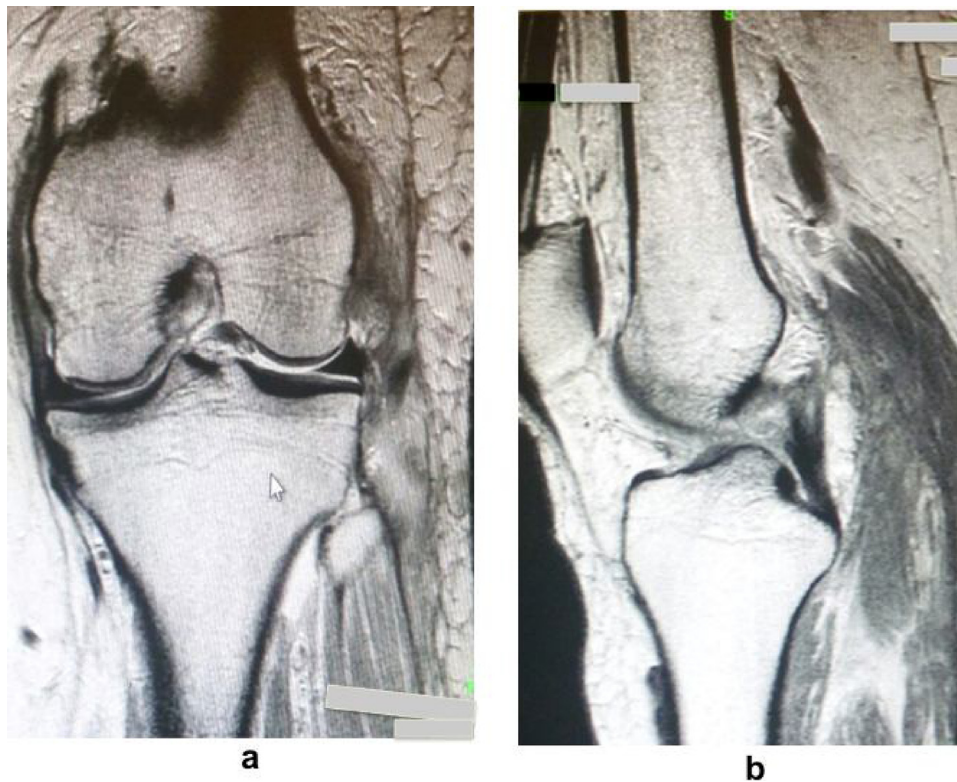
This case report aims to present a two staged ACL and PLC repair where the autograft tendons were used. The second staged procedure was performed using the tendon grafts preserved in situ. The present work has been reported in line with the SCARE criteria [8].

## 2. Presentation of case

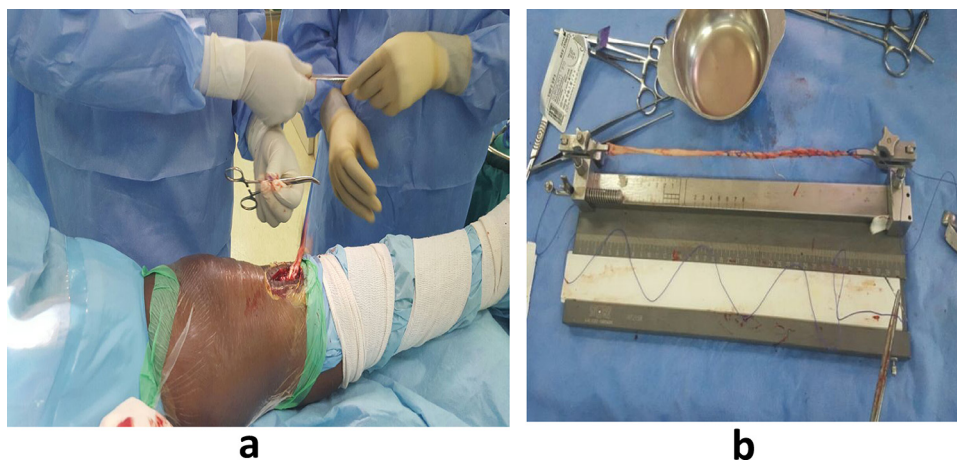
A 35 years old male Burundian previously healthy consulted our outpatient department complaining of painful right knee. He reported having sustained a direct blow on the lateral side of the right knee while playing soccer a month earlier. He sustained an anterior dislocation of his right knee, which was reduced immediately on the pitch, but he failed to walk at the scene. He was

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**Fig. 1.** (a) Magnetic Resonance Imaging (MRI); T2 weighted coronal image showing posterolateral corner structures tear. (b) MRI T2 weighted sagittal image showing the anterior cruciate ligament rupture and Lateral meniscal tear.



**Fig. 2.** (a) Intact preserved tendon was removed from the tissue and ready to be used for PLC reconstruction. (b) Preserved tendon after preparation.

taking pain medication and using a single elbow crutch and knee brace. The right knee was swollen, tender with large effusion. Passive range of motion and special test were not performed due to severe pain. Peripheral examination revealed inability of dorsiflexion of the right ankle and hallux presenting with a drop foot and the sensory function of the common peroneal nerve (CPN) was absent. The Manual Muscle Test grade of the tibialis anterior muscle and extensor hallucis longus muscle was 0.

Radiography showed no fracture in the injured right knee. Magnetic Resonance Imaging (MRI) showed evidence of a complete ACL rupture and PLC injury with Lateral meniscal tear (Fig. 1).

Following informed consent and pre-operative optimization, the patient was taken to theatre for arthroscopic meniscectomy, ACL and PLC reconstruction. The fact that we did not perform complete examination of the injured knee; we had to do an examination

under Spine Anesthesia before surgery which revealed positive Lachman test, positive external recurvatum test (Reverse Dial Test), positive anterior drawer test but with stable posterior drawer test. The knee had laxity with varus stress at both 0° and 30° of knee flexion but good stability with valgus stress testing.

Intra operatively, we used a pump; bilateral gracilis and semi tendinosus autograft tendons were harvested. Arthroscopic meniscectomy and ACL reconstruction were performed successfully using one side harvested autograft tendons.

At the end of above procedures the knee was quite swollen with a high risk of compartment syndrome. The actual situation was communicated to the patient and explanations on the best options and alternatives. The second procedure of posterolateral corner repair was postponed, and planned a second staged procedure after one-week. Hence we had to preserve the pre-harvested grafts for

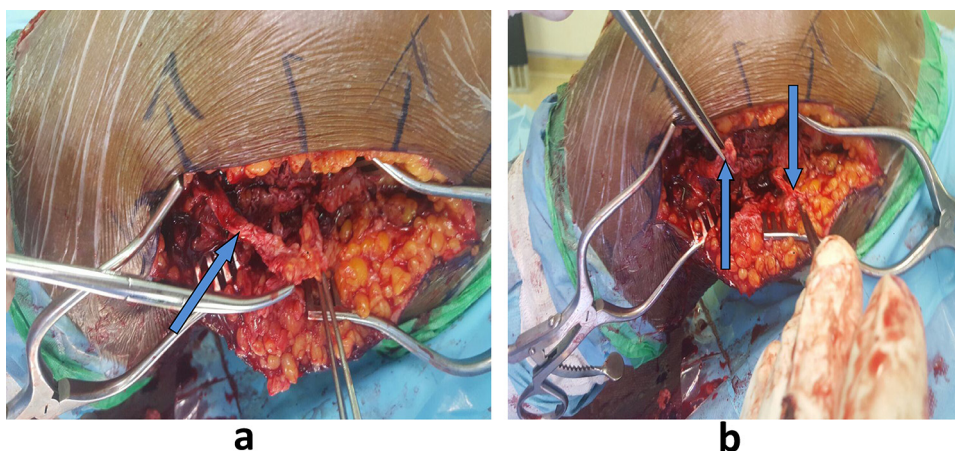


Fig. 3. (a) PLC structures found to be completely teared. (b) Common peroneal nerve was explored and found to be completely resected.

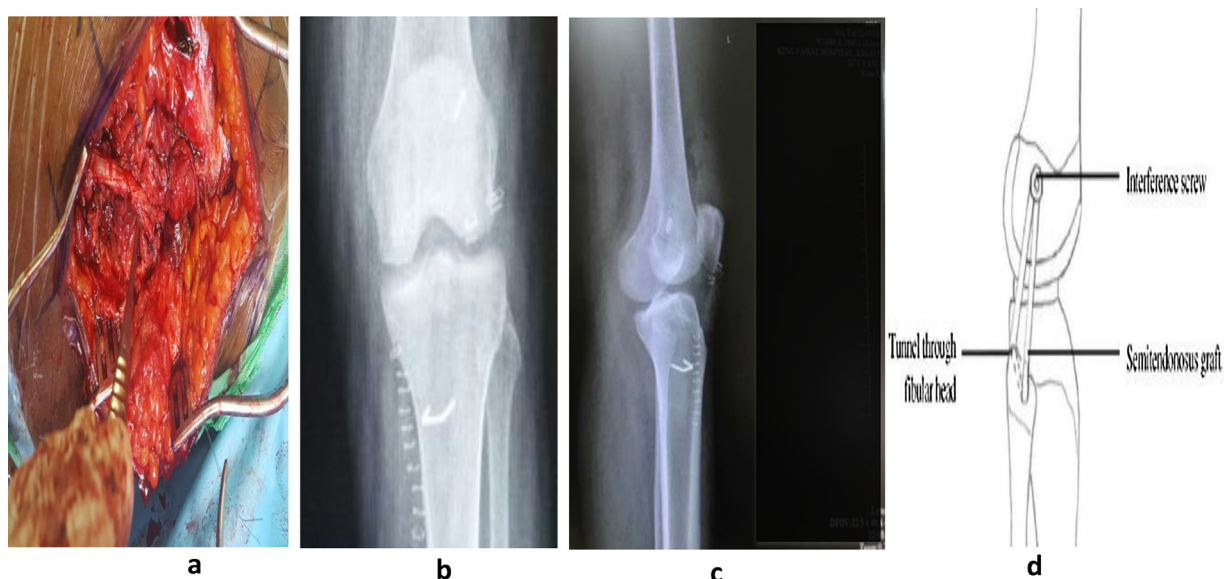


Fig. 4. (a) PLC was reconstructed and CPN repair. (b) Post operative AP radiographic view of the knee joint showing trans fibula and femoral anchor screws used for PLC repair and tibial anchor for ACL reconstruction. (c) Modified Larson's technique used for PLC reconstruction.

the next procedure in situ. The tendon grafts were first tagged with nonabsorbable suture and left in the pes anserinus muscles loge, (where they have been harvested from before) under the subcutaneous tissue and the skin. We kept monitoring temperatures and incision site to ensure there were no features of surgical site infection. One week after, the swelling was subsided and the patient was prepared for the PLC reconstruction. The preserved ligament was found to be intact (Fig. 2).

At the second procedure, a curved incision was made laterally over the right knee and all posterolateral structures were found to be completely avulsed. CPN was also explored which was also found to be completely resected (Fig. 3).

Using a modified Larson's approach, the posterolateral corner repair was done using the in situ preserved tendon grafts. The common peroneal nerve also was repaired (Fig. 4).

Postoperatively, the knee joint was kept in ROM brace and physiotherapy started on day one postoperatively with isometric contraction of knee focusing on vastus medialis oblique muscle and range of motion of the knee. The patient was discharged after one week and physiotherapy/rehabilitation was planned to continue until six months. He underwent one month of physiotherapy in our hospital and continued in Burundi for five months (Fig. 5). The

patient has progressed quite well as he was doing rehabilitation the knee is stable and has full range of motion. Irrespective of having had a foot drop he has been using ankle foot orthosis, which enables him to walk quite well. He is able to perform moderate activities like jogging without any knee pains and no difficulty in using stairs.

### 3. Discussion

There are several different types of autograft and allograft options that can be used to reconstruct the ACL and PLC structures. The graft can be your own tissue (Autograft) or donor tissue from a cadaver (Allograft) [9]. Different studies have shown that allograft tendons might have higher failure rates compared to autograft tendons [10]. For this case autograft using semi tendinosus and gracilis tendons was the option used. Long tendon graft was needed for both ACL and posterolateral corner reconstruction, a reason why bilateral gracilis and semi-tendinosus tendons were harvested. We had to operate early as the patient had unstable knee following a dislocation associated with common peroneal nerve injury, which required exploration. He was from the neighboring country and would not stay for long. When a decision to do a staged operation was decided during operation, we did not have a tissue bank

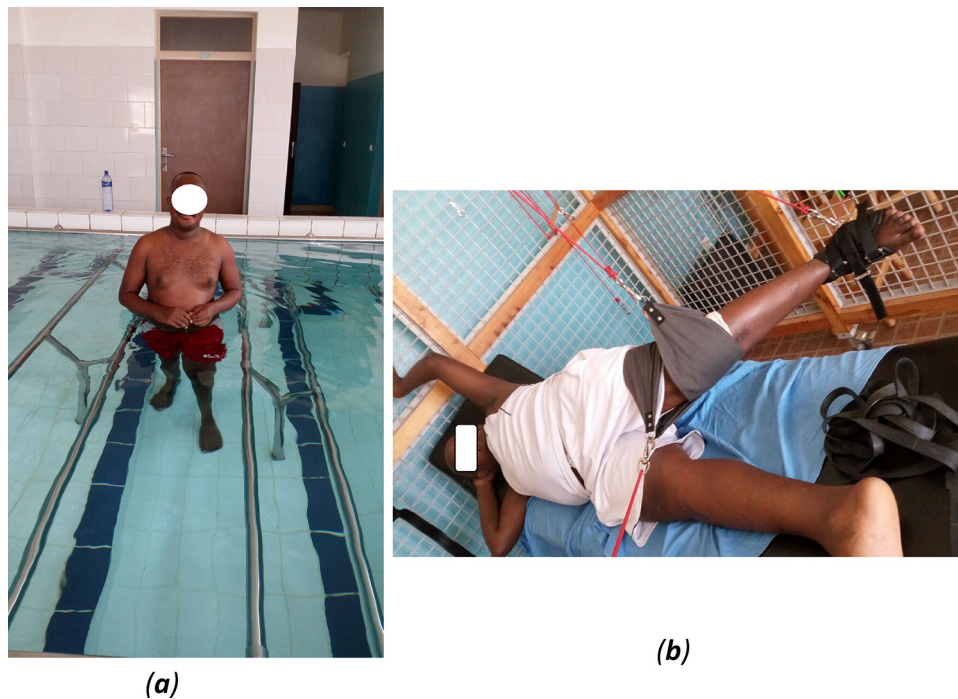


Fig. 5. (a) Three months post operatively in hydrotherapy. (b) During Physiotherapy 4 months ago with above 90° of knee flexion.

or facilities for cryopreservation of the harvested tendons at  $-80^{\circ}\text{C}$  or with liquid nitrogen at  $-179^{\circ}\text{C}$  yet we had to keep the harvested tendons safe [11]. We opted to keep them in situ as the best option in our situation. Preserving in situ would keep them in their natural environment and well hydrated and the storage period of one week would be relatively short. As far as common peroneal nerve repair is concerned, in multiple ligament knee injury that includes posterolateral corner it occurs in about 44% of cases. Unfortunately, approximately half of these cases do not show functional recovery [12]. On the other hand, Takeshi Oshima et al. (case report 2015) reported an excellent outcome of common peroneal nerve repair with a stable knee, excellent range of motion, and improvement in the palsy. The limitation of our study was short time follow up and not having supervised physiotherapy as the patient returned to his home country.

#### 4. Conclusion

A combined ACL and PLC injury is seen in 10% of complex knee injuries and is more associated with more functional impairment. Successful management of these cases requires proper management of ACL and associated injuries. This requires multiple grafts with associated challenges of obtaining and preserving them. To the best of our knowledge, this is the first case report describing an in situ preservation of tendon grafts during multiple-ligamentous knee reconstruction. Seven days of in situ autograft tendon graft preservation was found to be intact and able to be used with a good outcome, excellent ROM, Good knee stability and CPN palsy moderate improvement. A long-term follow-up would be required to confirm the conclusion.

#### Conflict of interest

None declared.

#### Funding

None.

#### Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images. No ethical approval was required by the RMH institution to publish this case report.

#### Consent

Signed consent is available and can be submitted on request.

#### Authors contribution

Bosco Mpatswenumugabo collected the data, investigated the literature and drafted the manuscript; Emmanuel Bukara guided the data collection; Muhammad Semakula, Albert Nzayisenga, Rene Mukezamfura, Lambert Rutayisire, Basile Habumugisha, and Salvador Kamarampaka reviewed the manuscript; Leon Mutesa and Alex Butera coordinated the whole work.

#### Guarantor

Bosco Mpatswenumugabo is the one who accepted full responsibility for the work and the conduct of the study.

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