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## Ipsilateral peroneus longus tendon graft in failed ACL reconstruction: Our experience

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### Abstract

Failure of ACL reconstruction is very common and may be due to technical failure or new traumatic injuries. The graft options in these cases are minimal and may include taking a graft from the opposite leg or allograft. The allograft availability is very limited in our country and is also very expensive. The use of graft from the opposite leg gives morbidity to the other side also. We describe our experience of using ipsilateral peroneus longus graft for failed ACL reconstruction cases.

**Methodology:** six patients with failed ACL reconstruction with age less than 40 years old and having normal knee ROM were included in the study. Clinical tests and Lysholm score were used to evaluate the outcome. Graft site morbidity was assessed using AOFAS Score and ankle disability test.

**Results:** Lachmann test and Pivot shift test was positive in all the six cases, while these tests were negative at one year follow-up with no signs of instability. The average Lysholm score pre-op was 66+/- while it was of 87 +/- 5 at the end of one-year follow-up. There was no case of graft failure and reoperation after one year. Donor site Mean pre and postoperative AOFAS scores were 100.0 ± 0.0 and 96.0 ± 9.6, respectively at 6-month follow-up (p = 0.06).

**Conclusion:** Ipsilateral peroneus longus graft can be used for reconstruction in failed ACL cases with minimal morbidity at the donor site and good clinical outcome.

**Keywords:** Peroneus longus, failed ACL reconstruction, eversion weakness

### Introduction

The Anterior cruciate ligament is one of the most commonly torn ligaments of the knee. It is an antigravity ligament and an important stabilizer of the knee. ACL reconstruction is a common procedure to treat ACL injuries with a success rate of 75% to 97% [2]. There is multiples graft which are used for ACL reconstruction like Bone patellar tendon-bone graft, hamstrings tendon graft, etc. ACL is prone to getting injured in sports or accidents [1]. The number of patients undergoing revision surgery following failure of anterior cruciate ligament (ACL) reconstruction has increased over the recent past, following the overall increased number of primary ACL reconstructions performed. Failure of primary ACL reconstruction can be attributed to technical errors, biological failures, or new traumatic injuries. Technical errors include femoral and/or tibial tunnels malposition, untreated associated ligaments insufficiencies, uncorrected lower limb misalignment, and graft fixation failures. The ideal graft for use in anterior cruciate ligament reconstruction should have structural and biomechanical properties similar to those of the native ligament, permit secure fixation and rapid biologic incorporation, and limit donor site morbidity. Noyes *et al.* published a detailed description of ACL reconstruction failure and their indications for surgery are A) complete graft tear with > 6 mm of anterior tibial displacement as compared to healthy knee. B) A positive pivot shift test graded +2 or +3 compared to the healthy knee, with or without knee pain or inflammation. C) Subjective sensation of instability or functional limitations for daily life and/or sports activities. They noted that significant number of patients (10% to 15%) will require a revision [4]. Classically literature showed that ACL-reconstruction failures are primarily caused by technical mistakes (estimated at around 70%), chronic or acute traumas, and biologic causes [5]. A recent Multicenter ACL Revision Study (MARS) Group developed a multi-surgeon, multicenter prospective longitudinal study to allow multivariable analysis and determine predictors of clinical outcome in revision ACL [6].

The MARS cohort (460 patients) showed that mode of failure, as deemed by the revising surgeon, was traumatic (32%), technical (24%), biologic (7%), combination (37%), infection (<1%), and no response (<1%)<sup>[6]</sup>.

We did a prospective study to evaluate the role of ipsilateral peroneus longus tendon graft in failed ACL reconstruction.

### Materials and Methods

A prospective study was conducted at Artemis Hospitals Gurgaon from 2017-2020. Six cases (5 males and 1 female) with failed ACL reconstruction were selected for the study. The Inclusion Criteria for study includes 1) Patients of age less than 40 years with Failed ACL reconstruction and having normal range of Movements at the knee joint.

A detailed history was taken regarding the mode and type of Trauma or sports injury, time since injury, time of the previous surgery and duration after which symptoms started post-surgery again. Clinical examination was performed and integrity of Cruciates, collateral and meniscus was assessed by Lachman test, Pivot Shift test, anterior & posterior drawer test, varus-valgus stress tests and tests for meniscal injury.

After taking a detailed history and doing the thorough clinical examination, a radiograph of the knee and MRI Knee were performed. ACL with associated ligament and Menisci injuries were noted. Written consent for surgery was taken and ACL reconstruction was done using Ipsilateral Peroneus longus tendon as autograft.

### Technique

The procedure was carried out under spinal or combined spinal and epidural anaesthesia. Firstly the examination of the involved knee was performed under anaesthesia.

**Position-** The patient was placed supine on OT table. The ipsilateral lower limb was scrubbed, painted and draped under all aseptic precautions.

**Graft Harvesting-** A vertical incision was made 3 to 4 cm above the lateral malleoli and was extended distally (Fig 1). Soft-tissue dissection was done and the peroneus longus tendon was exposed. Beneath that peroneus brevis tendon was found. After everting the foot, the peroneus longus tendon was secured with an Ethibond suture (Fig 2). The distal part of peroneus longus tendon was sutured with peroneus brevis tendon using vicryl suture. Peroneus Longus tendon graft was then harvested using a tendon stripper (Fig 3).



**Fig 1:** Lateral incision given and peroneus longus tendon identified



**Fig 2:** Peroneus longus tendon secured with ethibond suture



**Fig 3:** Tendon stripper used to harvest the graft

### ACL Reconstruction

The knee was flexed to 90°. Standard anterolateral and anteromedial portals were made. Diagnostic arthroscopy was done to evaluate ACL, PCL, Menisci and cartilage. Probing of a ACL indicated that it was lax and frayed, this indicated functionally incompetent or torn ACL. The existing damaged ACL was removed with the help of a shaver leaving the footprints.

Articular notch was extremely narrow, then it was widened using a burr called as notchplasty. The graft of the ipsilateral peroneus longus tendon already harvested was prepared.

One tight rope RT and one tight rope loop were attached to the graft. Fibre tape internal brace was attached to the tight rope RT. Femoral Canal preparation was done by drilling at 11 O'clock position over the guide wire.

Using 55 degree tibial guide and tibial side canal retro-drilling was done with the help of a flip cutter. Graft was passed over the suture first on the femoral side with locking /flipping of the tightrope. Tight rope loop was then passed from the tibial side. Conical button was attached to the tight rope loop and tightening of the loop was the done in near extension position of the knee. Cycling was done and tight ropes were tightened again. Movements were checked and found satisfactory. Thorough wound wash was given. The closure was done in layers and then sterile dressing was applied.

### Postop rehabilitation

On first post-op day, the patient made to walk full weight bearing with a knee extension brace and the following rehabilitation protocol was followed: On the first post op day, the patient made to Walking without crutches. Passive knee flexion upto 90 degree, heel presses, prone leg extension exercise, Straight leg raising and hip abduction exercises and continued for one week. After one week, the patient is able to do lunges without support and wall squats. Squats without support started after three weeks. By six weeks, the patient made to do single leg squat, climbing, control and symmetry exercises. After 10 weeks, the patient is started with jumping onto unstable surface both single as well as both legs, single leg balance and straight-line activities. After 3 months, the patient starts single leg jumping, start pivoting, multidirectional running, agility drills and sports specific drills and running.

### Outcome measures

The patient was followed at 1, 3, 6 months and 1 year. The final outcome assessed after 1 year. The outcome assessment was performed using the Lachman test, Pivot shift test and Lysholm knee score, graft failure, reoperation rate and post-op infection. Donor site morbidity of the foot and ankle after tendon-harvesting was assessed using the American Orthopedic Foot-and-Ankle Society (AOFAS) and Ankle Disability Index at one-year follow-up.

## Results

Six patients were included in the study. There were 5 males and 1 female. The average age of the patients is 28 with youngest being 21 years and oldest 36 years. Four patients having left knees and two with a right knee injury. Four patients having a pivoting injury while playing and two patients having a history of fall. All the patients had associated medial / lateral meniscus tear, and was treated at the same time

Preoperatively, the Lachmann test and Pivot shift test was positive in all the six cases, while these tests were negative at one year follow-up with no signs of instability. The average Lysholm score pre-op was 66+/- while it was of 87 +/- 5 at the end of one-year follow-up. There was no case of graft failure and reoperation after one year. Donor site Mean pre- and postoperative AOFAS scores were 100.0 ± 0.0 and 96.0 ± 9.6, respectively at 6-month follow-up (p = 0.06). There was one case of superficial wound infection at the donor area, which was treated by antibiotics.

## Discussion

Failed ACL reconstruction has been reported in 10 to 15% cases. Ipsilateral hamstring tendon graft has been routinely used in these cases. The graft options for revision ACL include ipsilateral patellar tendon graft and quadriceps tendon graft. The problems with patellar tendon graft having graft site morbidity and knee pain.

The opposite side hamstring tendon has also been used as autograft, but the problems with this graft is that it involves the opposite limb also. There are options of allograft also, but they are costly, moreover they carry the risk of infection. Peroneal tendon has been used in ACL reconstruction. There have been various studies which support the use of peroneal tendon for ACL reconstruction with good to excellent results. There has been literature about the use of peroneal tendon autograft for primary ACL reconstruction but little use of it in failed ACL reconstruction. Sholahuddin Rhatomy *et al.* concluded that Single Bundle ACL reconstruction with Peroneus Longus tendon autograft had excellent functional outcome (IKDS, Modified Cincinnati, Tegner-Lysholm score), minimal donor site morbidity, excellent serial hop test result and no difference in thigh circumference. Peroneus Longus tendon can be considered as a potential graft of choice in ACL reconstruction. Dwijo Purboyo *et al.* concluded that Both Peroneus Longus and Hamstring group have an IKDA score of more than 80, but the IKDS score in the Hamstring group is better than Peroneus Longus Tendon group. But in terms of donor site, morbidity and complication peroneus longus tendon autograft can be considered as an alternative autograft.

Fu-Dong Shi *et al.* concluded that the structural capabilities of a peroneus longus tendon and its safety and effectiveness as a graft choice in ACL reconstruction with a concomitant grade III MCL tear are feasible and it is useful in revision situations or as a supplement to other autograft choices. Chung-Ting Liu *et al.* concluded that additional half Peroneus Longus tendon can successfully and safely reinforce unqualified hamstring tendon grafts for ACL reconstructions without significant complications of the ankle donor site.

Mingguang Bi, MD *et al.* concluded that there was no significant difference in knee stability or clinical functional outcomes between the semitendinosus group and anterior half peroneus longus tendon group at two years follow-up and that the anterior half peroneus longus tendon group may be a good alternative for all-inside ACL reconstruction, with no

significant donor site complications. Sholahuddin Rhatomy *et al.* Anterior cruciate ligament reconstruction with peroneus longus autograft produces a functional score (IKDC, modified Cincinnati, Lysholm) comparable to that of hamstring autograft with the advantages of larger graft diameter, less thigh hypotrophy and excellent ankle function based on AOFAS and FADI scores.

The peroneus longus tendon may be the option after other graft harvestings for the ligament reconstruction, which needs several tendon grafts in a patient with multi-directional instability of the knee.

## Limitation

1. Small sample size
2. Longer follow up needed

## Conclusion

Peroneus Longus is a good graft for revision reconstruction with the advantage of avoiding the morbidity of the opposite knee with comparable results to hamstring tendon graft and good functional outcomes.

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