

ORIGINAL RESEARCH

A study of use of Peroneus Longus as graft in primary ACL reconstruction as an alternative in non-athletic patients

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ABSTRACT

The ACL is one of the most common knee ligament injury due to it being one of the primary stabilizers and has a big importance in knee biomechanics. ACL injuries are commonly associated with sports injuries and road traffic accidents. The primary aim of ACL

reconstruction is to restore the function of the ACL and native kinematics of the knee.¹ ACL reconstruction restores the stability of the knee joint and protects the menisci and joint surfaces from further damage.² Hamstrings have been one of the most preferred graft tissues for ACL reconstruction for quite a long time. However, in view of simplicity of the technique the preference of peroneus tendon graft is increasing. Peroneus longus and Brevis have synergistic action which allows for the harvest of peroneus longus tendon. Some studies suggest that peroneus brevis is a more effective evolver than peroneus longus, justifying harvest of peroneus longus tendon.³ Our Study assessed results of arthroscopic ACL reconstruction with peroneus longus graft in 38 patients using Lysholm score and donor site morbidity of foot and ankle after tendon harvesting using AOFAS (American orthopaedic foot and ankle score) and FADI (Foot and Ankle Disability Index) score.¹ Peroneus longus tendon has shown that it is one of the most promising autograft for ACL reconstruction with advantage of simple harvesting technique, larger graft diameter and minimal graft complications.

Keywords: ACL injury, Arthroscopy, ACL reconstruction, Peroneus longus tendon autograft, Lysholm score, Ankle function, AOFAS, FADI.

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Introduction

The knee is a modified hinge joint, a type of synovial joint, which is stabilised by various intracapsular and extracapsular ligaments. Amongst them, the pairs of cruciate ligaments are extremely important. The anterior cruciate ligament (ACL) is vitally important as it prevents anterior translation of tibia over femur. We have an option of single bundle (anteromedial) or double bundle (both anteromedial and posterolateral) ACL reconstruction. Generally high athletic demanding patients require double bundle ACL reconstruction. Commonly used graft tissues for ACL reconstruction include hamstrings tendon (semi membranous and gracilis), peroneus tendon, bone-patellar tendon-bone and the quadriceps tendon grafts.⁴ The hamstring tendon is one of the most commonly used grafts for ACLR but the use of hamstring tendon graft is decreasing due to unpredictable graft size, reduction in hamstrings power post-harvest, complications like internal rotation strength decrease and sensory deficit were

reported in some studies.^[5,6] Hence, ideal alternative grafts should be acknowledged for safe and effective ACLR.^[7-9] The Peroneus Longus Tendon (PLT) is now considered to be a promising graft which is a safe and efficient alternative to the existing grafting methods.^[10-12] PLT has been found to be used in various procedures like Medial Patellofemoral Ligament (MPFL) reconstruction and deltoid ligament reconstruction^[13,14]. It has proven to fill the necessary criterion with promising results^[12]. PLT has been found to fulfil all major requirements expected for an excellent autograft donor, such as appropriate strength, size, and the convenience and safety of graft harvesting. Furthermore, PLT is large and strong enough to be used as an autograft in an ACL reconstruction^[11]. Additionally, removal of PLT has no change on gait and ankle stability. Therefore, PLT is thought to be an effective and safe autograft option for ACL reconstruction with respect to its strength, safety, and donor site morbidity^[12].

Objectives

The objective of this prospective study was to evaluate the stability and the functional outcome of arthroscopic ACL reconstruction in nonathletic patients by using PLT as an effective and safe alternative graft option for ACL reconstruction.

Materials and Methods

We have done 38 cases of ACL injury treated with primary arthroscopic ACL reconstruction in non-athletic patients using peroneus longus autograft at Government Medical College, Surat between July 2021 and January 2023. After taking consent from the patients, under spinal anaesthesia, in supine position first a diagnostic arthroscopy was performed and diagnosis of ACL injury with/without meniscus and other ligamentous injury was confirmed. First, we perform an arthroscopic debridement and then we prepare the femoral footprint for ACL. Then by making a longitudinal skin incision over the posterolateral aspect of distal fibula of the affected limb peroneus longus tendon was identified (Fig1) and sutured distally with peroneus brevis tendon. Tendon was then harvested using closed tendon stripper. Then we

prepared the double/quadruple strand graft for single bundle ACL reconstruction (Fig 2).

Thereafter appropriate femur and tibial tunnels (Fig. 3) were created and graft was secured at both at femur and tibia tunnels by using either an endobutton (used for femur tunnel only) or a titanium screw or the PEEK (Polyethylene ether ketone) screw (Fig. 4). After reconstruction, stability of ACL was checked by Lachman's test, which showed no laxity. Post operatively, a strict and standardised rehabilitation protocol was implemented from first day and the patients were taught static quadriceps, knee range of motion exercises, ankle pump and heel slides. Encouragement was given to each and every patient to stretch the affected ankle gently and actively from first postop day. At 3rd week patients were allowed full weight bearing. Patients were assessed immediately post operatively and then followed up regularly at 1 month, 3 month, 6 month and 18 months using Lysholm score. Ankle biomechanics was assessed using AOFAS and FADI scores. Eversion power of ankle were noted at every follow-up to check for deterioration in ankle function.



Fig1: Harvesting Peroneus Longus Tendon



Fig 2: PLT Graft Preparation

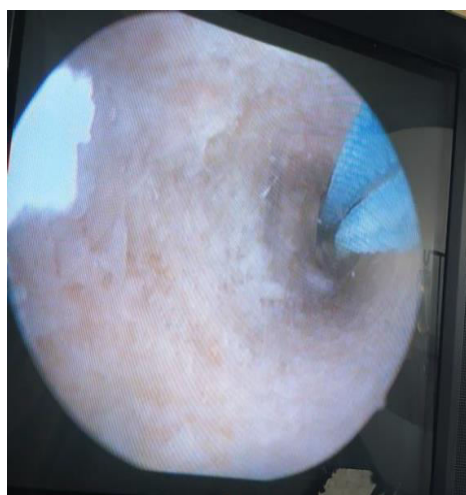


Fig 3: Femoral Tunnel



Fig 4: Graft fixation using PEEK screw

Result

In our study, all 38 patients had complete follow up of 18 months. There were 23 (60%) males and 15 (40%) females. At final follow up, anterior drawer test showed normal findings in 80%, while 20% of all examined patients had 1+ anterior laxity. Figure 5 describes the length of graft (mm), where 8 (21%) patients had grafts of length between 210-230 mm, followed by 21 (55%) patients who had grafts between 230-250 mm, 9 (24%) between 250-280 mm. Fig 6 shows the thickness of graft (mm), where 10 patients (26%) had thickness graft ranged between 8-8.5 mm, followed by 15 (40%) in between 8.6-9 mm, 10 (26%) in between 9-9.5 mm and 3 (8%) was >9.5 mm.

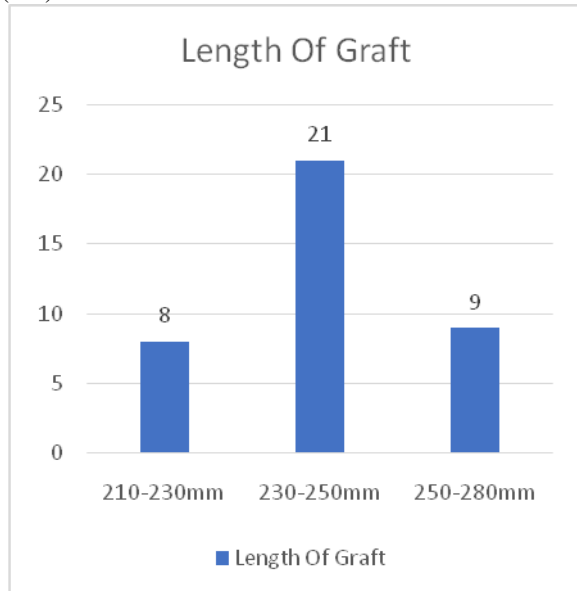


Fig 5: Length of Graft (mm)

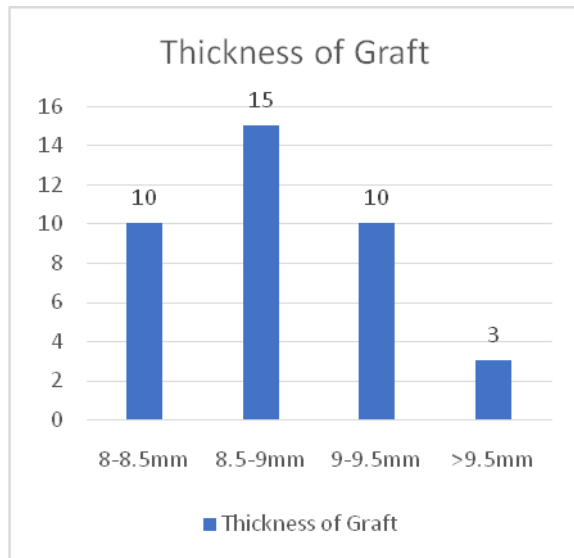


Fig 6: Thickness of Graft (mm)

Fig 7 shows the follow-up period at Lachman indicators after the surgery. At the 6-month follow-up, 34 (89.4%) of the respondents graded 0 and followed by 4 (10.6%) grade I. At 12-months follow up the most 36 (94.7%) were graded 0 where 2 (5.3%) graded I and at the 18-months follow up, the values were the same.

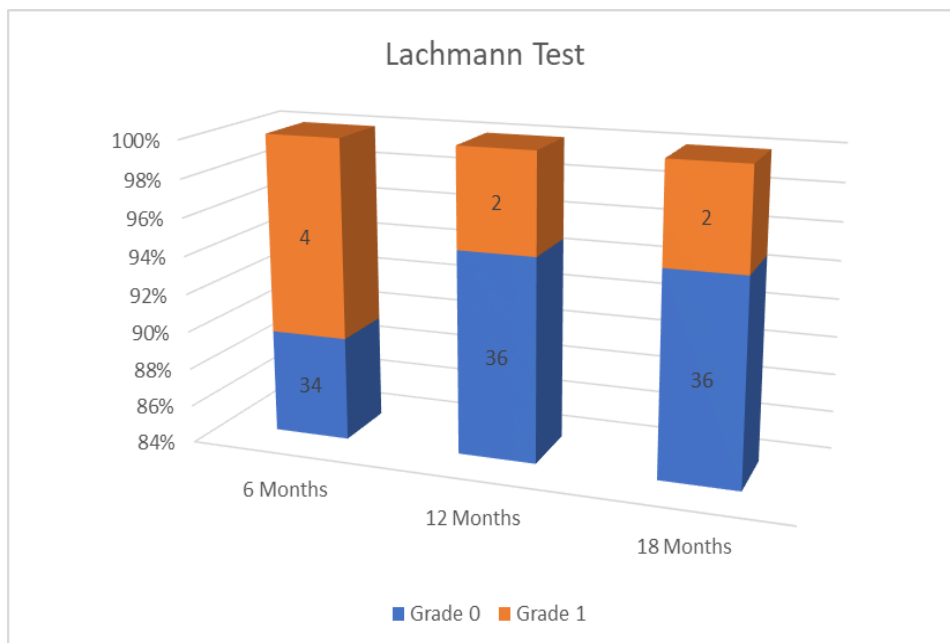


Figure 7: Post operative Lachmann Test Grade.

In our study mean for Lysholm score was 95 +/- 0.5 and for AOFAS it was 94.5 +/- 1.5 and FADI 94.2 +/- 1.1.



Fig 8: Clinical pictures showing Function of Knee and Ankle

Discussion

The peroneus longus autograft showed a comparable functional score at the 18 months follow up. Autograft choice is one of the most important considerations during ACL reconstruction surgery. In our study, we found comparable results with peroneus longus autograft at 18 months of follow-up. It also has advantage of larger graft diameter and simplicity of technique and minimal donor site morbidity.^[11,15] Kumar et al in their study found that the majority had graft thickness between 7.5-8 mm, followed by 12% in between 8.1-8.5 mm, 32% in between 8.6-9 mm, and 24% was >9 mm.¹⁶ We found similar results of Graft thickness in our study (Fig 6). Complications like thigh hypotrophy,¹⁷ anterior kneeling pain, hypoesthesia due to injury to infrapatellar branch of saphenous nerve which are associated with hamstring graft can be prevented. A previous study by Anghong et al mentioned reduced peak torque eversion and inversion, decreased ankle functions and concerns about ankle stability when PLT was used.³ But in our study mean for AOFAS is 94.5 +/- 1.5 and FADI is 94.2 +/- 1.1, which shows minimal donor site morbidity and no significant deterioration in ankle function. Peroneus longus autograft produces an excellent functional score (Lysholm scoring system)

in 85% of our patients and remaining 15% patients had good functional score. Joshi et al.¹⁸ described the Lachman indicators at 6-month follow-up period as 91.67% of the respondents were graded 0, followed by 8.37% at grade I. At the 12-month follow-up, 93.75% were graded 0, while 6.25% were graded I, and at the 18-month follow-up, 91.67% were graded 0, and 8.37% were graded I.¹⁸ Our study scores for the Lachman indicators were comparable to this study.

Conclusion

Peroneus longus tendon is turning out to be one of the most reassuring autograft for primary ACLR surgery due to its simple harvesting technique, larger graft diameter and fewer graft complications. Proper harvesting technique does not deteriorate ankle functions, thus helps to avoid complications associated with other autografts. Lysholm scores are comparable to that of hamstring autografts at 18 months follow-up, with the advantages of larger graft diameter, less thigh hypotrophy and excellent ankle function based on AOFAS and FADI scores. Multiple studies have shown that the PLT autograft is extremely safe and it has demonstrated excellent Lachman's test scores. Peroneus longus tendon may be

a viable alternative autograft for ACL restoration. PLT is easy to harvest, less time consuming, has adequate size, a higher ultimate tensile load, more thickness and length, almost no donor site morbidity, and a satisfactory functional outcome and knee stability scores, and after removal, the peroneus longus tendon has no effect on gait parameters and does not cause ankle instability. Furthermore, removal of PLT has shown no adverse effects on the ankle joint. It is because of all these characteristics that PLT has shown to be an effective and safe autograft option for ACL reconstruction.

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