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Peroneus longus graft in arthroscopic ACL ligament reconstruction surgeries

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Abstract
Background: Different kind of grafts has been described in the literature in detail for ACL reconstruction. They are mostly bone-patella tendon-bone, hamstrings, allograft and synthetic grafts. In this study we evaluated the possible advantage of peroneus longus tendon (PLT) graft over other grafts for anterior cruciate ligament (ACL) reconstruction.
Materials and Methods: The study included in total of 24 patients, out of which 20 were males, and 4 were females. The mean age was 28 years; range 22 to 37 years who underwent ACL reconstruction using a PLT autograft. Eight patients have torn meniscus for which repair/debridement were done depending on the condition. The results were assessed according to the clinical examination and functional score at the end of at least 6 months of follow-up.
Results: No difference were noted in the movement of operated and non-operated ankles. There was good antero- posterior stability noticed in the operated knee post reconstruction, which was assessed by lachman test and normal range of motion post-surgery. According to Lysholm score 15 had excellent or good results. One patient developed foot drop due to peroneal nerve neuropraxia.
Conclusion: Our study concluded that harvesting the peroneus longus tendon has no effect on gait of the patient and does not lead to instability of the ankle. So, it can be used as an autogenous graft in orthopedic surgeries. Compared to other graft peroneus longus size is sufficient, graft harvesting is easy, thickness is appropriate, can be used in multi-ligament injury and no fear of graft loss while harvesting. Results of ACL reconstruction by PLT was comparable to any other graft reconstruction.

Keywords: Peroneus, longus, arthroscopic, ACL, surgeries

Introduction
Anterior cruciate ligament injuries have become common now a days [1]. Correction of the antero-posterior stability is the purpose of ACL reconstruction. The functionally stable reconstructed ACL is good in both resisting rotational or antero-posterior translation. A variety of technique as well as different kinds of grafts are now available for ACL reconstruction.
Patient's degree of symptoms, activity level and participation in pivoting sports are few of the factors which determine the need of surgery in these individuals [2]. Proprioceptive rehabilitation helps a lot of patient with ACL injuries to become asymptomatic after a while [3]. ACL reconstruction should be done after acutely injured knee gets settled, giving time for resolution of effusion, recovery from of concomitant ligamentous injuries and restoration of range of motion [4].
Every surgeon has their own choice of graft depending on their training, comfort of harvesting, severity of injury and the profile of the patient. Hamstrings, bone patella bone, quadriceps tendon, peroneus longus tendon and allograft. Bone patellar tendon has their advantages like bone to bone union, early recovery and better rehabilitation in sports person due to no loss of hamstring strength [2-6]. On the other side hamstring tendon grafts have greater mechanical strength than a bone-patellar tendon-bone complex, patients treated with hamstring tendon grafts are less likely to suffer patellofemoral pain and extension loss [6]. Hamstring muscle counters the forward pull of the quadriceps and thus is necessary for the protection of the graft post operatively. Allograft are shorter operation and anesthetic time and good cosmetic results, however high costs, delayed corporation, disease transmission and immunological reaction represent disadvantages [7].

The peroneus longus tendon (PLT) is as strong as the ACL and may substitute for it. In addition, there have been several studies in which regeneration potential in the harvested tendon has been observed. In our study, the clinical results of ACL reconstruction in which was used PLT as an alternative graft source were evaluated.

Patients and Methods

PLT autografts were used in 24 patients for the reconstruction of ACL ruptures in our study. The study was done from Mar 2017 to Mar 2019. The indications for reconstruction were functional instability during daily or sports activities and complete rupture or absence of the ACL as verified arthroscopically. The operative technique was standardized in all patients and is described in detail below. In this study, 24 patients, who had at least 7 months of follow-up, were evaluated (20 males, 4 females; mean age 28 years; range 22 to 37 years).

Surgical technique

All the patient was given spinal anaesthesia after PAC, were positioned in supine with tourniquet applied. Incision of 2cm is made on the back of lateral malleolus. Incision over the deep fascia exposes the peroneal compartment. The peroneus longus muscle is visualized on top of the peroneus brevis muscle after doing the faciotomy. Peroneus longus is identified out of the two tendons. After confirming, PLT, tendon is harvested. Tendon preparation was done and ACL reconstruction was done by endo button for the femoral end and interference screw on tibial end in all cases.

Patient was allowed full weight bearing the next very day after ACL reconstruction. If meniscal repair was done then patient is kept non-weight bearing for 3 to 4 weeks. Daily activities were permitted increasingly step by step to the fourth week. Sports specific exercises were commenced at week 12. No return to original sports was permitted earlier than 6 months postoperatively. Knee braces or splints were used during walking till 3 weeks.

Results

The mean age of the patients was 28 yrs. (range 22 to 37 years). Most of the patient nearly 70 % were due to sports injury compared to other causes. The mean follows up was 13 months.

The mean IKDC subjective score increased from 72.2 ±11.9 preoperatively to 94.1±6.8 at the last follow-up. Patient were also assessed by using mean Lysholm score which also improved from 56.2±7.9 preoperatively to 95.4±6.8 at the last follow-up. Lachman test showed a significant improvement in the integrity of tendon post operatively with none of the patient demonstrating pivot shift test. If we examine the ankles for any deficiencies after peroneus longus harvesting, none of the patient presented with any gait problem, graft site morbidity, ankle function and strength. Only one of the patients developed graft sural nerve neurapraxia, which got cured with two months of methylcobalamine treatment.

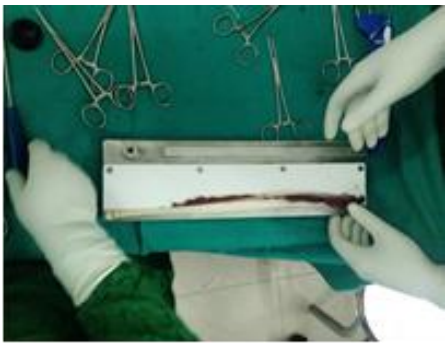

Fig 1: Peroneus Longus Graft

Fig 2: Peroneus Longus Harvesting

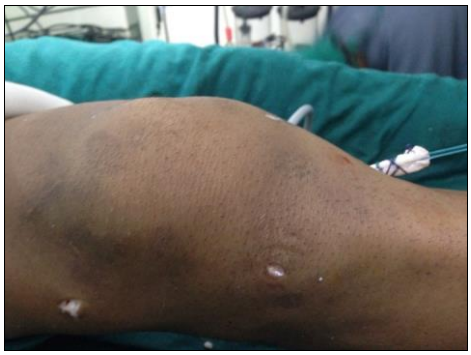

Fig 3: 5 Hole Arthroscopic surgery with help of plt graft

Discussion

Bone patella tendon graft is one of the tendons which is used in ACL reconstruction. But donor site morbidity has been reported in patients with patellar tendon grafts including kneeling pain, tendon shortening, patellar chondromalacia, patellar fractures, persistent quadriceps weakness, patellofemoral pain syndromes and patellar tendon ruptures. Hamstring is one more tendon which is used. Mechanical strength of the hamstring tendon is greater than a bone-patellar tendon-bone complex. But hamstring function which is flexion at the knee and preventing the anterior translation of tibia by countering the quadriceps tendon is greatly affected. So, post reconstruction of ACL by a hamstring tendon loses the protective mechanism and is more prone for degenerative changes. Therefore, preservation of the hamstring muscle strength is of particular importance for athletes with ACL injuries. Semi-tendinous muscle is one of a strong flexor of knee and along with the gracilis it is important stabilizer of the postero-medial corner. The loss of knee flexion strength following the harvesting of the hamstring tendons may be more significant than has been estimated. Cosmetically also bone patella bone and hamstring tendon were not very popular among patient who were concerned about scar around the knee. Peroneous longus tendon used in reconstruction of ACL had an added advantage of having protective dynamic support supplied from hamstring muscles. Because of knee joint complications involving patellar and hamstring tendon grafts in ACL reconstruction, PLT graft has been preferred. PLT tendons are large in length compared to other tendons and averages 280 mm. There is no case of failure in harvesting the tendon, as the graft does not retract like the hamstring tendon. After the peroneus longus tendon was prepared the double bundled tendon sized 8. PLT was fixed with an endo button for femoral end and interference screw for tibial tunnel. Aperture fixation is always better than other fixation and is possible in all the cases with good length of tendon on both sides (femoral and tibial tunnel) because of PLT length. In addition, there are many studies about the regeneration potential of harvesting tendons. The regeneration potential of the harvested tendons for graft has been shown both clinically and at MRI. We are in a strong opinion that the PLT can also regenerate which need further studies. This thought has been supported that patients did not complain about their ankles. Biomechanically, PLT is as strong as

native ACL. Noyes *et al*. reported that the maximum tensile load of ACL is 1725 N. In our study, the PLT was preferred because of this biomechanical behavior. It is reported a slight loss of extension in 3% of patients in their hamstring group. There was no extension or flexion loss in our patients. Furthermore, no patellofemoral pain was reported by our patients. At physical examination, dysesthesias and paresthesias were determined in the region of the extracted PLT in 1 patient. In our study, no patients experienced any evident impairment in their activities except one who suffered numbness in the sural nerve area. Sural nerve is mostly not in danger but its course should be kept in mind when the PLT is harvested from below the lateral malleolus. Ankle joint was assessed in all the patient clinically and by gait analysis. No difference was observed in preoperative and post-operative assessment of ankle. One more question was flat foot which some authors have raised after the extraction of the peroneus longus tendon. But we did not notice any of the patient developing flat foot. Our study follows up was averaging only 13 months, which is a limitation of this study. However, our results show that PLT can be a good option as a graft source in ACL reconstruction, long term studies are necessary to support these findings.

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