

# Comparative Study of Autologous Peroneus Longus Versus Hamstring Tendon For Anterior Cruciate Ligament Reconstruction In Knee

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## ABSTRACT

*STUDY DESIGN – Prospective and Interventional Randomized Comparative Study*

*DURATION OF STUDY – October 2019 to September 2021.*

*OBJECTIVE: To compare the:*

*1) Functional outcome using IKDC score*

*2) Donor site morbidity by AOFAS score and mid-thigh circumference between the autologous peroneus longus tendon and hamstrings tendon graft in ACL reconstruction.*

**Methodology** – Study was done on around 100 patients and patients were grouped under two categories. Gr A undergoing Autologous Peroneus Longus tendon and Gr B undergoing hamstrings tendon graft in ACL reconstruction. Both the group of patients were regularly followed up in Post op wk 1, wk 4, Wk 8 and outcomes were measured via AOFAS score and statistical analysis.

**Observation and Result** - Based on our observation we conclude that both the groups were comparable in terms of post operative knee functional score and donor site morbidity. However, the ease of harvest due to its superficial location, short operative time, adequate graft thickness, absence of any muscle weakness and a relatively smaller post operative scar makes peroneus longus is a good alternative choice for anterior cruciate ligament reconstruction.

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## I. Introduction

The anterior cruciate ligament (ACL) injury is one of the commonest injury seen in adults.

In the recent time the prevalence of this injury has increased which has also increased the socioeconomic burden, but despite all this, it is still a matter of debate amongst orthopedist to devise the optimal treatment strategy. Mostly the young and active patients especially the athletes opt to proceed with surgical management, because conservative treatment is usually associated with increases the risk of instability, secondary meniscal tears, early osteoarthritis, and future risk of undergoing total knee replacement.

There are different techniques to manage the ACL tears. The selection of graft is very crucial aspect of the pre-operative planning for ACL reconstruction, but there is still a lot of controversy for selection of an ideal graft.

The ACL repair can be performed using different grafts like patellar tendon, quadriceps tendon, hamstring tendon and other allografts. A Bone Patellar Tendon Bone autograft is a good choice as it has bone-to-bone healing which lead to better incorporation of tunnel and graft, and a comparatively faster rehabilitation which help a professional athlete to return to sports activity. Despite a faster return it also carries the risk of patellar bone fracture, secondary patellar tendinitis and residual flexion contracture. The patellar tendon graft is not suitable for double-bundle reconstruction as it has a fixed length and the strength is weaker in comparison to native ACL.

Quadriceps Tendon is also a graft option but is associated with strength deficits and anterior knee pain.

Hamstring tendon autograft is easy to harvest and is associated with less donor site morbidity and the strength is comparable to the native ACL. One of the disadvantages is that it has unpredictable graft size and

carries a risk of potential decrease in hamstring power, which remains crucial for active young individuals especially in athletes who require a dominant hamstring power. It also carries risk of damage to sartorial branch of saphenous nerve while harvesting and premature graft transaction.

Allografts are considered biomechanically inferior to autograft, so grafts are harvested from young donors preferably younger than 40 years of age so as to maximize the strength of the allograft construct. Excessive irradiation of the harvested graft should be minimized and focus should be on maximizing the graft cross-sectional area. It is seen that in young and highly active patients there is a significant increase in re-tear rate with allografts.

The peroneus longus tendon can be used as an autograft for ACL reconstruction, but there is a little information regarding clinical outcomes of using this tendon.

Through our prospective clinical study, the aim is to compare the functional outcome as well as the donor site morbidity between the peroneus tendon group and hamstring tendon group in ACL reconstruction. If the peroneus longus tendon autograft can show a comparable functional outcome in terms of various scores along with a lesser donor site morbidity as compared to the hamstring tendon autograft then the use of this tendon can be encouraged in clinical practice for single-bundle ACL reconstruction, especially for the patients who require a dominant hamstring power like in young athletes or in those people frequently kneel as part of daily religious activity because in them anterior kneeling pain couldn't be tolerated.

## II. Method

The study was done on around 100 patients and patients were grouped under two categories. Group A undergoing Autologous Peroneus Longus tendon and Group B undergoing hamstrings tendon graft in ACL reconstruction. Both the group of patients were regularly followed up in Post op wk 1, wk 4, Wk 8 and outcomes were measured via AOFAS score and statistical analysis.

Patients were randomized in two groups using a simple random number table method.

**Group A** – Arthroscopic ACL reconstruction using peroneus longus tendon autograft.

**Group B** - Arthroscopic ACL reconstruction using hamstrings tendon autograft.

In group A peroneus longus graft was harvested. The location of the incision was marked at 2cm above and 1 cm behind the lateral malleolus. The incision was made through the skin and the fascia underneath. Later both peroneus longus and peroneus brevis tendon were identified. Peroneus longus was harvested using closed tendon stripper and sutured distally with peroneus brevis tendon. Graft was prepared and folded into double/quadruple strands for single bundle ACL reconstruction.

In group B hamstring graft was harvested by a 2-3 cm incision is placed along the pesanserinus after palpating it midway between the tibial tubercle and the posteromedial border of the tibia. The incision was made in the subcutaneous tissue till the sartorial fascia with blunt dissection. The borders of the gracilis and semitendinosus tendons were palpated under the sartorial fascia. At the level of the pesanserinus, the tendon of gracilis was located superiorly in relation to the semitendinosus tendon, whereas the semitendinosus tendon had a bigger diameter compared to the gracilis tendon. A no. 15 scalpel was then used to make an "inverted L"-shaped incision in the sartorial fascia separate, and dissect gracilis and semitendinosus tendons. The preparation of graft involved doubling of the semitendinosus and gracilis tendons which was harvested (or sometimes even quadrupling, if only semitendinosus was harvested).

Following graft preparation in both groups, using transportal technique femoral and tibial tunnels were drilled and the prepared graft was passed using ethibond sutures and secured using endobutton and bioscrew. Closure was done.

Immediately after surgery, patient was advised for Quadriceps and Hamstring strengthening exercises with flexion of knee from 0 degree to 90 degree until 3 weeks post-surgery with subsequent full flexion.

The patient was then followed up at the interval of 1 month, 3 months, 6 months.

For both the group IKDC scores, mid-thigh circumference was measured (15 cm proximal to the superior pole of patella) and it was compared with the contralateral healthy side.

For the peroneus longus group functional score of the ankle was assessed with the AOFAS (American Orthopedic Foot and Ankle Score).

The patient was allowed return to sports activities after an average of 6 months.

## III. Observations And Results

### Age Distribution:

In the present study, the mean age of patients of Group A and Group B was 30.6±9.09 and 32.4±9.22 years respectively. There was no statistically significant ( $p > 0.05$ ) difference between both the groups in terms of age. Similarly in study conducted by Hurd W J et al in 2008 the mean age in which patient sustained anterior cruciate ligament injury was around 30 years which shows that the injury is more common in young active individuals.<sup>[4]</sup> In 2016 Sanders TL et al also found that majority of injury occurred in younger patients.<sup>[5]</sup>

#### **Gender distribution:**

In this study, majority of patients of both Group A (70%) and Group B (90%) were males. There was no statistically significant ( $p>0.05$ ) difference in gender between the groups showing comparability of the groups in terms of gender.

Hurd W J et al (2008) found male predominance in anterior cruciate ligament injury as a greater number of males participate in sports activity than female and that too in collision sports.<sup>[41]</sup>

Similarly in study conducted by Sanders TL et al in 2016 showed that the incidence of Anterior cruciate ligament tear was higher in male than that in females (81.7 vs 55.3 per 100,000). The results also showed that with increase in age, the incidence of Anterior Cruciate Ligament tears decreased in males but in case of females it remained stable with majority of injury occurring in younger age groups.<sup>[6]</sup>

#### **Distribution of patients according to side of Knee operated between the groups:**

In this study half of patients of Group, A (50%) and (40%) of Group B were operated on left knee. Half of patients of Group A (50%) and (60%) of Group B were operated on right knee. There was no significant ( $p>0.05$ ) difference in side of knee between the groups.

In study conducted by Dafalla S E et al in 2020, the results showed that right knee was more often injured as compared to left knee and that too more in males.<sup>[7]</sup>

#### **Comparison of the IKDC score between both the groups:**

In our study, comparison of IKDC score was done between the groups (A and B). There was no significant ( $p>0.05$ ) change in IKDC score pre-operatively, 1 month, 3 month & 6 month in both the groups. The mean IKDC score pre-operatively was 57 in Group A and 58.20 in Group B. The mean IKDC score was 67.40 in Group A and 68.20 in Group B at 1 month post-operatively. At 3 months, the mean IKDC score was 80.6 in Group A and 80 in Group B. At the end of the study (6 months), the mean IKDC was 91.9 in group A and 90.7 in Group B. There was no statistical significant ( $p>0.05$ ) difference in IKDC between the groups.

In study done by Rhatomy S et al in 2019, showed a statistical analysis comparing the postoperative functional score for the hamstring and peroneus longus groups, the mean IKDC score in hamstring group was 88.8 +/- 9.7 and in peroneus group was 92.5 +/- 6.2, the difference was statistically significant i.e p value <0.001.<sup>[8]</sup>

In a study conducted by Bi Metalin 2017 in which total 62 patients in each group were included and were followed up after 24 months post operative, the mean IKDC score in peroneus longus tendon group was 89.3 +/- 8.4 and the mean IKDC score in hamstring tendon group was 90.4 +/- 7.1. The difference was statistically insignificant.<sup>[9]</sup>

In 2020 He J et al conducted a meta-analysis of 23 studies which included 925 patients and the results showed that IKDC subjective score were better in peroneus longus tendon group as compared to hamstring tendon group.<sup>[10]</sup>

### **IV. Conclusion**

Based on our observation we conclude that both the groups were comparable in terms of post operative knee functional score and donor site morbidity. However, the ease of harvest due to its superficial location, short operative time, adequate graft thickness, absence of any muscle weakness and a relatively smaller post operative scar makes peroneus longus a good alternative choice for anterior cruciate ligament reconstruction.

Though the limitations of our study were small sample size, short duration of study period and constraints present due to ongoing COVID – 19 pandemic, limited follow up due to dampening of OPD services. The studies with larger sample size and long duration of study period are required to have more robust and conclusive findings.

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