

## Study of Functional Outcome of Peroneus Longus Tendon Autograft Compared To Hamstring Tendon Autograft For Arthroscopic Acl Reconstruction

Dr. MARRAPU VENKATA VINAY (M.S. ORTHO)<sup>1</sup>, Dr. MONINGI KEDAR, M.S. ORTHO, FIAS<sup>2</sup>, Dr. S. SASI BHUSHANA RAO, M.S, M.Ch ORTHO<sup>3</sup>, Dr. VULASALA SRINIVASALU (M.S ORTHO)<sup>4</sup>

<sup>1</sup>(Junior resident, Department of orthopaedics, Maharajah's institute of medical sciences, Nellimarla, Vizianagaram, Andhra pradesh-535217, India.),

<sup>2</sup>(Assistant professor, Department of orthopaedics, Maharajah's institute of medical sciences, Nellimarla, Vizianagaram, Andhra pradesh-535217, India.),

<sup>3</sup>(HOD & Professor, Department of orthopaedics, Maharajah's institute of medical sciences, Nellimarla, Vizianagaram, Andhra pradesh-535217, India.),

<sup>4</sup>(Junior resident, Department of orthopaedics, Maharajah's institute of medical sciences, Nellimarla, Vizianagaram, Andhra pradesh-535217, India.),

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### ABSTRACT:

**Introduction:** Peroneus longus tendon autograft is biomechanically similar to the hamstring tendon autograft. The objective of our study is to compare functional outcome of peroneus longus tendon autograft compared to hamstring tendon autograft for arthroscopic ACL reconstruction.

**Methods:** This prospective study included 30 patients with complete ACL tear and arthroscopic ACL reconstruction done. In 14 patients peroneus longus autograft used and in 16 patients hamstring tendon autograft used. The functional outcome of knee was assessed using Lysholmscore, IKDC(International Knee Documentation Committee)score preoperatively and 1year after operation. Diameter of the graft measured during procedure. To know Donor site morbidity at ankle FADI( The Foot & Ankle Disability Index) & AOFAS( American Orthopaedic Foot & Ankle score) was used. Thigh circumference also measured pre & post operatively.

**Results:** All 30 patients(each group of 15 patients) were followed up to 1year. There is no significant difference in knee functional outcome. Diameter of peroneus longus graft was significantly larger than the hamstrings diameter(P=0.012). AOFAS, FADI showed no ankle dysfunction. Significant thigh wasting was seen in the hamstring group.

**Conclusion:** With no significant donor site morbidity and a very acceptable FADI & AOFAS score, ACL reconstruction using peroneus longus tendon autografts had an outstanding functional outcome (IKDC, Lysholm) and shown comparable outcomes to hamstring tendon.

**Keywords:** Anterior cruciate ligament reconstruction, peroneus longus tendon autograft, hamstring tendon autograft.

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### I. INTRODUCTION:

One of the most often damaged knee joint stabilisers is the anterior cruciate ligament (ACL), which is more likely to happen during physical activity and direct impact. Reconstructing the ligament is the main course of action for ACL injuries in order to stabilise and reestablish the knee joint's functionality. For the reconstruction of the ACL, there are several autograft alternatives available. In the past, bone-patellar tendon-bone grafts (BPTB) were chosen above hamstring tendons (HT) and quadriceps tendons. While BPTB grafts have excellent bone-to-bone healing, donor site morbidity has caused them to lose popularity<sup>1</sup>.

The variation in graft size from patient to patient is still a crucial factor in determining the outcome because a less-than-ideal diameter of the harvested hamstring autografts can result in graft failure, even though HT grafts have greater mechanical strength and a lower risk of donor site morbidity<sup>2</sup>. According to studies, the surgeons can forecast the tendon quality using simple but useful criteria such as height, weight, and body mass

index (BMI)<sup>3</sup>. According to the primary surgeon, collecting hamstring grafts for an ACL in a situation where a medial collateral ligament (MCL) damage is concurrent or pre-existing can harm the MCL.

Peroneus longus tendon has been proposed as an alternate autograft material for ACL reconstruction in several investigations<sup>4,5,6</sup>. The peroneus longus tendon has the right size, and biomechanical analyses of its characteristics showed that it is strong enough for knee ACL reconstruction<sup>7,8,9</sup>. Peroneus longus and hamstring tendons did not differ in terms of tensile strength in a research by Rudy et al<sup>10</sup>. According to Rhatomy et al., ACL reconstruction using the peroneus longus tendon demonstrated superior functional ratings compared to the hamstring tendon<sup>11</sup>.

Few studies have compared the peroneus longus tendon's clinical results with those of other grafts, and the evaluation of ankle morbidity following autogenous peroneus longus tendon harvesting for ACL reconstruction is inadequate<sup>11,12,13</sup>. The current study focused on the donor site morbidity with a minimum follow-up time of 1 year following ACL reconstruction in order to assess the functional result and donor site morbidity between the peroneus longus and hamstring autografts.

## II. MATERIALS AND METHODS :

The ethics committee approved this study of our institution, & informed consent obtained from all patients. This study involved both male and female patients with ACL tear, who presented to our institute. 30 patients with ACL tear and met the criteria of selection were treated with arthroscopic reconstruction of ACL during the period from November 2020 to June 2022 were included in study.

This study is a prospective study with a sample of 30 patients with ACL tears. Of this 14 were treated by peroneus longus as graft and 16 treated with hamstring at our institution.

### Inclusion criteria:

- 1) patient with an isolated rupture of ACL,
- 2) age 16 to 45 years.

### Exclusion criteria:

- 1) associated ligament injury,
- 2) Chondral damage,
- 3) fracture around the knee,
- 4) presence of a pathological condition in the lower extremity or an abnormal contra lateral knee joint.

Clinical diagnosis was made by positive lachman, anterior drawer & Pivot shift tests. The indication for surgery was an ACL tear confirmed by clinical diagnosis and MRI in a healthy patient experiencing knee instability in daily activities or wished to maintain his or her pre-injury level of activities. All patients were operated by same surgeon, with same procedure. All patients were followed up to minimum 1 year.

Patients were reviewed periodically. Preoperative and postoperative IKDC (international knee documentation committee), Lysholm score of knee were assessed for knee functioning. Graft diameter was measured intraoperatively. Donor site morbidities were assessed with thigh circumference measurements and ankle scoring with AOFAS and FADI for peroneus longus as graft.

## III. RESULTS:

In the present study out of 30 patients who were treated with arthroscopic ACL reconstruction, in 14 patients peroneus longus auto graft used and 16 patients hamstrings autograft used.

**Table 1 - GRAFT DIAMETER**

| Graft           | Mean graft diameter | P value |
|-----------------|---------------------|---------|
| Hamstrings      | 8.2 ± 0.8           | 0.012   |
| Peroneus longus | 8.8 ± 0.7           |         |

Mean Graft diameter in four stranded hamstrings graft was 8.2±0.8cm & in two stranded peroneus longus graft 8.8±0.7cm. There is a significant difference in graft diameter (p<0.012)

There is no significant knee functional score difference between two groups.

**Table 2 - IKDC SCORE**

| Graft           | Pre- op     | 1 year follow up | Mean difference | P value |
|-----------------|-------------|------------------|-----------------|---------|
| Hamstrings      | 56.9 ± 15.7 | 88.9 ± 9.7       | 31.8 ± 15.1     | <0.001  |
| Peroneus longus | 58.7 ± 11.2 | 92.5 ± 6.2       | 33.8 ± 11.8     | <0.001  |

**Table 3 - LYSHOLM SCORE**

| Graft           | Pre- op     | 1 year follow up | Mean difference | P value |
|-----------------|-------------|------------------|-----------------|---------|
| Hamstrings      | 69.8 ± 15.9 | 93.1 ± 7.3       | 23.2 ± 14.3     | <0.001  |
| Peroneus longus | 70.8 ± 10.2 | 94.9 ± 5.6       | 24.1 ± 10.4     | <0.001  |

Significant thigh wasting seen in operated leg in hamstrings group when compared to peroneus longus group(p<0.001). Mean thigh wasting in hamstrings group is 11.4 ± 3.6mm, in peroneus longus group 2.5 ± 0.5mm. Ankle score in peroneus longus group was AOFAS(American Orthopaedic Foot & Ankle score) - 97.3 ± 4.2 & FADI(Foot & Ankle Disability Index) - 98 ± 3.4.

#### IV. DISCUSSION:

The most important findings in present study were as follows. The peroneus longus autograft showed a comparable functional score at the 1-year follow up compared with the hamstring tendon; the peroneus longus autograft had a larger diameter compared with the hamstring autograft; less thigh hypotrophy was found in the peroneus longus graft group; some of the patients in the hamstring group experienced anterior kneeling pain which disrupted their daily activity; an evaluation of the functional ankle score in the peroneus longus group revealed excellent results, even after harvesting the graft from the ankle.

Autograft choice is one of most important considerations during ACL reconstruction surgery of the knee. With a mean difference of 0.6 mm in favour of the peroneus graft, we discovered that there was a substantial difference in graft diameter between the hamstring and peroneus longus tendons. Previous studies concluded that a graft diameter of 8.5 mm had a 1.7% revision rate. Additionally, between graft thicknesses of 7 mm and 9 mm, the probability of a patient having a revision ACL reconstruction decreased by 0.82 times for every 0.5 mm increase in graft diameter<sup>14</sup>. Another study discovered a positive link which is statistically significant, between graft diameter and revision rate with graft diameters smaller than 8 mm and a 1 mm increase in graft diameter and a higher IKDC score<sup>15</sup>.

In view of functional outcome and knee stability, previous research showed positive outcomes following ACL restoration using the peroneus longus tendon<sup>9</sup>. When hamstring grafts were used, there was few donor site morbidity, such as thigh hypotrophy and patient-reported symptoms like hypoesthesia or anaesthesia brought on by damage to the infrapatellar branch of the saphenous nerve. Hamstring strength is decreased because of thigh hypotrophy brought on by semi-T and gracilis tendon harvesting, particularly at deep flexion angles. A quadriceps-hamstring imbalance brought on by hypotrophy of the hamstring also affects dynamic knee stability<sup>1,3</sup>.

According to earlier research's, the Peroneus Brevis is a more potent ankle evertor, maintaining the ankle's eversion function even after the peroneus longus tendon has been removed<sup>9</sup>. We discovered that the functional result was still quite good.

With the observations of this study, the peroneus longus can be promoted in medical practice as the preferred graft for single-bundle ACL reconstruction because it exhibits comparable functional scores to the hamstring tendon with minimum donor site morbidity, especially in patient groups who frequently squat during daily activities, as is the case in our country.

#### V. CONCLUSION:

With no significant donor site morbidity evaluation and a very acceptable FADI & AOFAS score, single-bundle ACL restoration using two strand peroneus longus tendon autografts had an outstanding functional outcome (IKDC, Lysholm) and shown comparable outcomes to the four-strand hamstring tendon.

**Limitations of the study:** This research has a few restrictions. It is challenging to evaluate the cohort objectively since study group is too small and stability and range of motion were not evaluated. However, by utilising a single surgeon, the same rehabilitation plan, and the same approach for surgery for both groups, the bias was reduced. Further research might concentrate on a longer evaluation of ACL repair utilising peroneus longus autografts, as this study's 1-year follow-up is also a drawback. There is a need for clinical studies with bigger sample sizes to achieve the statistical significance applicable to the population at large.

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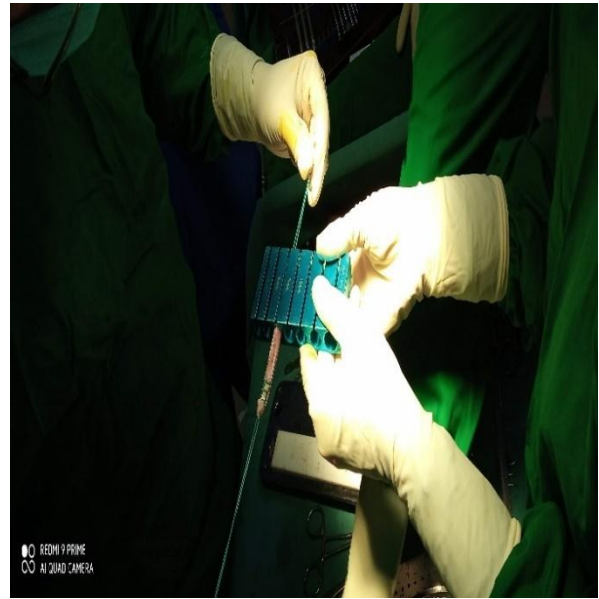
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**Figures:**

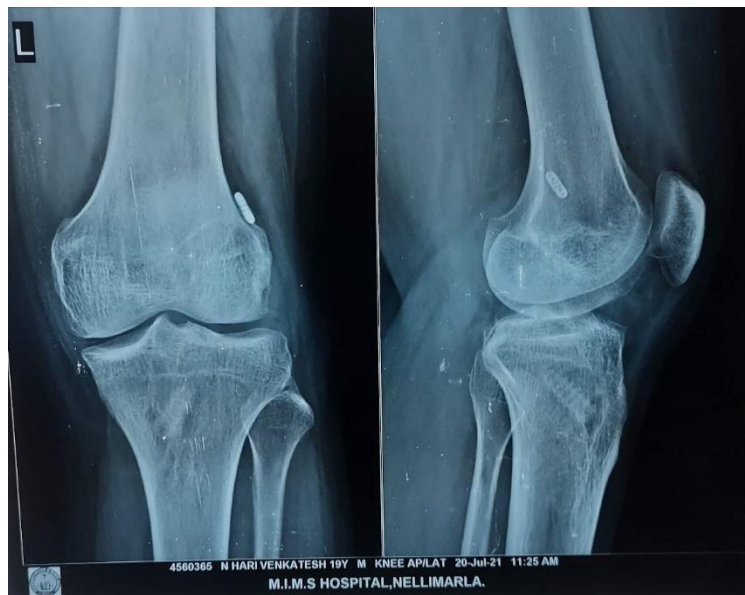
**Case 1 - hamstrings**



Hamstrings harvesting

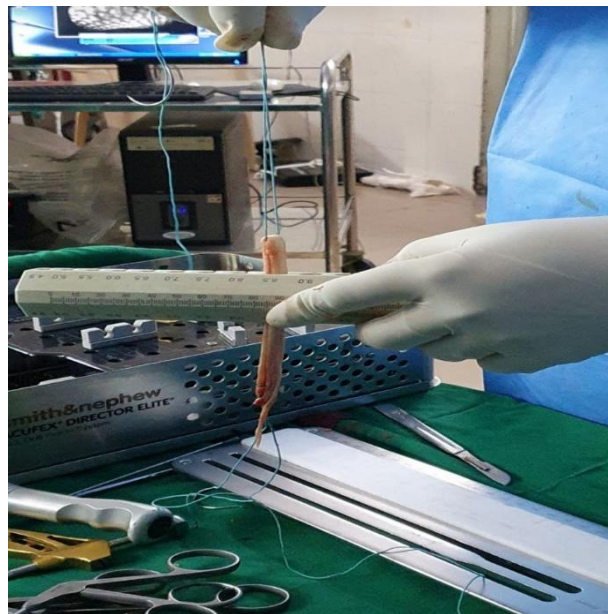


Graft diameter



Post operative x ray

**Case 2- peroneus longus**



Peroneus longus harvesting. Graft diameter



Post op x ray

**Abbreviations and symbols :**

|       |   |
|-------|---|
| ACL   | Anterior Cruciate ligament                  |
| IKDC  | International knee Documentation Committees |
| AOFAS | American Orthopaedic Foot & Ankle score     |
| FADI  | Foot & Ankle Disability Index               |