

COMPARISON OF FUNCTIONAL OUTCOME OF ARTHROSCOPIC ACL RECONSTRUCTION USING HAMSTRING GRAFT VS PERONEUS LONGUS TENDON AUTOGRAFT

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ABSTRACT

Background: Anterior cruciate ligament (ACL) reconstruction is a standard orthopedic procedure, with hamstring tendon autografts (HT) traditionally serving as the preferred graft choice. Recently, the peroneus longus tendon (PLT) has emerged as a promising alternative due to comparable biomechanical strength and minimal donor-site morbidity. **Objective:** To compare the functional outcomes of arthroscopic ACL reconstruction using hamstring tendon autograft versus peroneus longus tendon autograft. **Study Design:** Comparative prospective study. **Setting:** Department of Orthopedic Surgery, Lady Reading Hospital, Peshawar, Pakistan. **Duration of Study:** From August 2024 to July 2025. **Methods:** A total of 60 patients with ACL tears were enrolled and equally divided into two groups. Group A underwent ACL reconstruction using an ipsilateral hamstring tendon autograft, while Group B received an ipsilateral peroneus longus tendon autograft. All patients followed a standardized postoperative rehabilitation protocol. Functional outcomes were evaluated using the International Knee Documentation Committee (IKDC) score and the Modified Cincinnati Score (MCS), assessed preoperatively and at six months postoperatively. Statistical analysis was performed using SPSS version 25, with $p < 0.05$ considered significant. **Results:** The mean age was 28.87 ± 6.75 years in Group A and 28.07 ± 6.11 years in Group B. Males constituted 90.0% in Group A and 83.3% in Group B. At the six-month follow-up, both groups demonstrated significant improvement in functional outcomes. The mean postoperative IKDC scores were 83.27 ± 3.79 (Group A) and 84.83 ± 3.07 (Group B), while mean MCS values were 85.33 ± 2.46 and 86.17 ± 1.96 , respectively. No statistically significant difference was observed between the two groups ($p > 0.05$). **Conclusion:** Arthroscopic ACL reconstruction using either hamstring or peroneus longus tendon autografts provides excellent and comparable functional outcomes. Although the peroneus longus tendon group showed slightly higher IKDC and MCS scores, the difference was not statistically significant, supporting its use as a viable alternative graft source.

Keywords: Anterior Cruciate Ligament Reconstruction, Peroneus Longus Tendon, Hamstring Tendon, Autograft, Functional Outcome

INTRODUCTION

The anterior cruciate ligament (ACL) remains the most commonly injured ligament in the knee joint, thereby rendering its effective reconstruction vital. ACL reconstruction (ACLR) using the patient's autograft to manage ACL deficiency is a commonly utilized surgical intervention (1, 2). The most widely used autografts consist of the hamstring tendons, bone patellar tendon bone (BPTB), and quadriceps tendon. Recent studies suggest that BPTB is the preferred graft given its ability to promote bone-to-bone healing, facilitating effective graft fusion with tunnels as well as enabling a swift return to the patient's work routine. This characteristic is significant, particularly for athletes with injuries to their ACL. Nonetheless, it poses a risk of patellar fracture and patellar tendon contracture due to the invasive nature of the procedure (3-7), which requires a longer incision and has inferior tensile strength compared to the native ACL. This makes it less favorable for conventional reconstruction, where pain-free kneeling is vital. Consequently, hamstring tendons have since become a widespread graft due to the relative simplicity of harvesting, minimal donor site complications, and tensile strength identical to that of the native ACL. However, variations in graft size could lead to considerations about using plastic fiber tape for augmentation (8). Surgeons continually seek a suitable autograft that is readily available for harvest, prevents donor site morbidity, and applies to patients of all ethnic backgrounds without impacting their daily activities. Recent studies have examined the peroneus longus tendon (PLT) as an option for standard ACLR. The risk of post-operative hamstring weakness affecting the saphenous nerve during graft retrieval is not present. The PLT exhibits beneficial biomechanical characteristics as well as a

significant load-to-failure strength (9), which has contributed to its growing popularity as a graft for ACLR by orthopedic surgeons (10). ACL injury is a common cause of knee instability, particularly among young and active individuals, often requiring surgical reconstruction to restore joint function and prevent long-term disability. Hamstring tendon autografts are widely used in ACL reconstruction due to their favorable biomechanical properties and low donor site morbidity. Recently, the peroneus longus tendon has been explored as an alternative autograft, offering adequate graft diameter. Limited evidence exists comparing the functional outcomes of these two autografts. This study seeks to provide a comparative analysis of the functional outcomes of arthroscopic ACL reconstruction using these two autografts, thereby contributing to the ongoing debate on the most effective and reliable graft choice for optimizing patient recovery and long-term knee function.

METHODOLOGY

We conducted this comparative prospective study in the Orthopedic unit of Lady Reading Hospital, Peshawar, from August 2024 to July 2025. Sixty patients, aged 18 years or above of either gender, who presented with ACL rupture, which was confirmed clinically along with radiological assessment, and were scheduled for primary reconstruction, were enrolled in this research. Patients with associated injuries such as fractures around the knee, significant chondral lesions, multi-ligamentous knee injuries, or those requiring revision surgery were not enrolled. All the patients gave their consent.

These patients were equally allocated into two groups. Group A underwent the standard arthroscopic ACL reconstruction procedure

utilizing an autograft harvested from the ipsilateral hamstring tendons, specifically the semitendinosus and gracilis. Group B received the same reconstructive procedure but with the autograft sourced from the ipsilateral peroneus longus tendon. All surgical procedures were performed by an experienced orthopedic surgeon with more than 5 years of experience post-fellowship. Following surgery, the patients were put on a structured rehabilitation protocol. This protocol was designed to progress from initial pain and swelling control and restricted weight-bearing to gradual range-of-motion exercises and finally to strengthening and functional training. To assess and compare the outcomes between the two groups, we used the International Knee Documentation Committee (IKDC) subjective score and the Modified Cincinnati Knee Score at baseline and six months follow-up.

All the acquired data were analyzed with SPSS 26. Comparisons were assessed with Independent Tests. P-value was kept notable at ≤ 0.05 .



Figure 1: Intraoperative image showing introduction of the stripper to harvest the PL tendon



Figure 2: Intraoperative image showing harvesting of the hamstrings tendon.

RESULTS

The Hamstring Graft (Group A) had a mean age of 28.87 ± 6.75 years and a BMI of 24.37 ± 2.17 kg/m². the Peroneus Longus Graft (Group

B), had a mean age of 28.07 ± 6.11 years and a BMI of 24.33 ± 1.37 kg/m².

The majority of the study population was male in both groups. In Group A, 27 (90.0%) were male, while in Group B, 25 (83.3%) were male (Table 1). The primary mechanism of injury for ACL rupture was sports-related in 21 (70%) in group A and 24 (80%) in group B. Road accidents were 9 (30%) in group A and 6 (20%) in group B (Figure 3).

Regarding functional outcomes, the preoperative IKDC scores in Group A were 46.53 ± 3.78 , and Group B had a mean score of 45.80 ± 3.59 . At the six-month postoperative assessment, both groups demonstrated noteworthy and comparable improvement in their IKDC scores. Group A achieved a mean score of 83.27 ± 3.79 , while Group B showed 84.83 ± 3.07 , with the difference between the groups not reaching statistical significance. A similar trend was observed with the MCS. The preoperative MCS values were 50.97 ± 1.49 for Group A and 51.00 ± 1.33 for Group B. At six months postoperatively, the scores improved to 85.33 ± 2.46 for Group A and 86.17 ± 1.96 for Group B, again with no statistically significant difference observed between the two surgical approaches (Table 2).

Table 1: Baseline characteristics

Baseline characteristics		Groups			
		Group A (HS)		Group B (PL)	
		n	%	n	%
Gender	Male	25	83.3%	27	90.0%
	Female	5	16.7%	3	10.0%
Residence	Urban	19	63.3%	17	56.7%
	Rural	11	36.7%	13	43.3%
Education	Educated	16	53.3%	13	43.3%
	Uneducated	14	46.7%	17	56.7%
Economic status	Low	8	26.7%	7	23.3%
	Middle	21	70.0%	20	66.7%
	High	1	3.3%	3	10.0%
Mechanism of injury	Sports injury	21	70.0%	24	80.0%
	Traffic accident	9	30.0%	6	20.0%

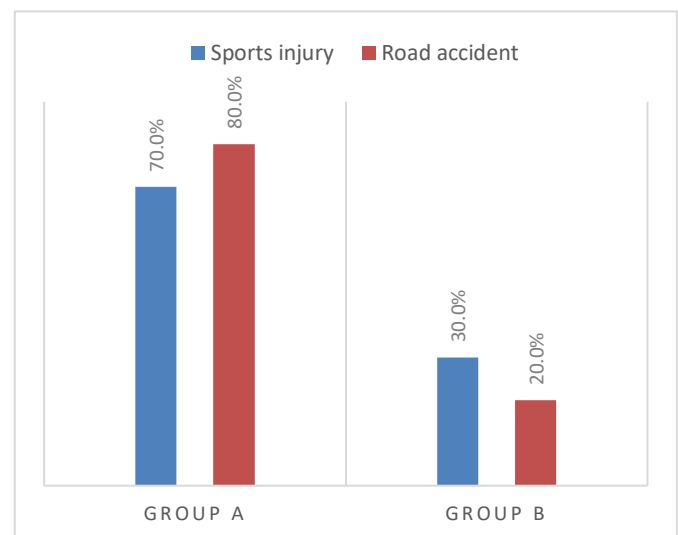


Figure 3: Mechanism of injury

Table 2: Comparison of functional outcome between both groups

Functional outcome	Groups	N	Mean	Std. Deviation	P value
Pre-operative IKDC	Group A (HS)	30	46.53	3.785	P > 0.05
	Group B (PL)	30	45.80	3.595	

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Postop IKDC at 6 months	Group A (HS)	30	83.27	3.796	P > 0.05
	Group B (PL)	30	84.83	3.075	
Pre-operative MCS	Group A (HS)	30	50.97	1.497	P > 0.05
	Group B (PL)	30	51.00	1.339	
Postop MCS at 6 months	Group A (HS)	30	85.33	2.468	P > 0.05
	Group B (PL)	30	86.17	1.967	

DISCUSSION

Our study demonstrated that the functional outcomes, in terms of IKDC and MCS scores at a six-month follow-up, were statistically equivalent between patients receiving hamstring tendon (HT) autografts and those receiving PLT autografts. This fundamental finding of functional parity aligns with the conclusions drawn from multiple studies. The preoperative scores in our cohort were closely matched, and the postoperative improvements at six months, while substantial and clinically meaningful for both groups, showed no significant inter-group difference. This suggests that from the perspective of restoring patient-reported knee function and stability in the short to intermediate term, the PLT graft performs just as effectively as the well-established HT graft.

Agarwal et al. conducted a study involving 194 patients and found no notable differences in IKDC and Lysholm scores between PLT and HT groups at six-month and one-year intervals. Their work reinforces the notion that the PLT provides comparable knee stability, a result further validated by their clinical assessments showing nearly identical rates of negative Lachman and pivot shift tests between the groups (11). Similarly, the cross-sectional study by Munir et al., which focused exclusively on the PLT autograft, reported excellent functional results, thereby affirming the graft's inherent capacity to facilitate a successful recovery (12). Shair et al. and Vijay et al. documented similar results, noting no significant difference between the two groups. However, they found that the PL group demonstrated slightly better results in IKDC and MCS scores (13, 14). The consistency of these findings across different study designs and populations strengthens the validity of the conclusion that the PLT is a functionally non-inferior graft choice.

However, the actual value of comparing these two autograft sources may lie not in their similar functional endpoints but in their distinct donor-site profiles and ancillary effects. The harvest of the semitendinosus and gracilis tendons for the HT graft, while generally safe, is associated with two specific concerns. The first is anterior kneeling pain, a complication notably absent in the PLT group. Shair et al. directly addressed this issue, finding that 16.7% of their HT group patients experienced anterior kneeling pain, while none in the PLT group reported this issue. This is a particularly noticeable point in populations where kneeling is a frequent component of daily activities, and it represents a clear potential advantage for the PLT graft in enhancing patient satisfaction in specific cultural contexts (13).

The second concern is thigh muscle atrophy. The harvest of the hamstring tendons can lead to a measurable reduction in thigh circumference and hamstring strength. Our study did not directly measure this variable, but the study by Agarwal et al. provided compelling data on this front. They documented that the difference in thigh circumference between the operated and normal leg was significantly smaller in the PLT group (0.216 cm) compared to the HT group (0.88 cm) at the one-year follow-up. This finding seems rational, harvesting the PLT from the distal leg avoids direct trauma to the thigh musculature, thereby preserving quadriceps and hamstring bulk and potentially leading to a more symmetric and efficient recovery of knee stability. This superior recovery of thigh musculature in the PLT group, as demonstrated by Agarwal et al., suggests a tangible physiological benefit that may not be immediately captured by subjective functional scores but could influence long-term joint

health and athletic performance (11). Similarly, Rhatomy et al. also documented that the PL group had notably lower thigh hypotrophy compared to the HS group (15).

Based on our findings and the established literature, we suggest that the peroneus longus tendon be strongly considered as a first-line autograft option for primary ACL reconstruction. Future studies should further assess the effect of comorbidities and demographics on functional outcomes in both techniques.

CONCLUSION

In conclusion, our study did not find a significant difference in the functional outcome evaluated in terms of IKDC and MCS score between Hamstring graft and peroneus Longus tendon autograft for the arthroscopic ACL reconstruction; however, the PL group showed slightly increased IKDC and MCS scores.

DECLARATIONS

Data Availability Statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned. (IRB)

Consent for publication

Approved

Funding

Not applicable

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTION

JAWAD IQBAL (Postgraduate Resident)

Conceived the study, collected data, performed initial analysis, and prepared the first draft of the manuscript.

SHAHID AKBAR (Postgraduate Resident)

Assisted in data collection, literature review, and manuscript editing.

SALIM RIAZ (Postgraduate Resident)

Contributed to methodology development, data interpretation, and organization of findings.

TALHA IDREES (Postgraduate Resident)

Helped in statistical analysis, data entry, and manuscript formatting.

ASHFAQ AHMAD (Postgraduate Resident)

Contributed to referencing, proofreading, and final revisions of the manuscript.

NOMAN ALAM KHAN (Postgraduate Resident)

Data analysis, coordinated among authors, finalized the manuscript, and approved the final version.

All authors read and approved the final version of the manuscript.

REFERENCES

1. Parsons JL, Coen SE, Bekker S. Anterior cruciate ligament injury: towards a gendered environmental approach. *Br J Sports Med.* 2021;55(17):984–990. <https://doi.org/10.1136/bjsports-2020-103173>
2. Maniar N, Cole MH, Bryant AL, Opar DA. Muscle force contributions to anterior cruciate ligament loading. *Sports Med.* 2022;52(8):1737–1750. <https://doi.org/10.1007/s40279-022-01674-3>
3. Papastergiou SG, Konstantinidis GA, Natsis K, Papathanasiou E, Koukoulis N, Papadopoulos AG. Adequacy of the semitendinosus tendon alone for anterior cruciate ligament reconstruction graft and prediction of hamstring graft size by evaluating simple anthropometric parameters. *Anat Res Int.* 2012;2012:424158. <https://doi.org/10.1155/2012/424158>
4. Koh E, Oe K, Takemura S, Iida H. Anterior cruciate ligament reconstruction using a bone–patellar tendon–bone autograft to avoid harvest-site morbidity in knee arthroscopy. *Arthrosc Tech.* 2015;4(2):e179–e184. <https://doi.org/10.1016/j.eats.2015.01.002>
5. Macura M, Veselko M. Simultaneous reconstruction of ruptured anterior cruciate ligament and medial patellofemoral ligament with ipsilateral quadriceps grafts. *Arthroscopy.* 2010;26(9):1258–1262. <https://doi.org/10.1016/j.arthro.2010.06.018>
6. Ismailidis P, Neopoulos G, Egloff C, Mündermann A, Halbeisen FS, Nüesch C, et al. Simultaneous patellar tendon and anterior cruciate ligament rupture: a systematic review, meta-analysis and algorithmic approach. *Arch Orthop Trauma Surg.* 2024;145(1):61. <https://doi.org/10.1007/s00402-024-05676-w>
7. Ferrer MD, Lobo MD, Almeida L, Freitas A, Macedo Neto SL, Paiva LM, et al. Patellar fracture in anterior cruciate ligament reconstruction: in vitro analysis. *Acta Ortop Bras.* 2023;31:e259557. <https://doi.org/10.1590/1413-785220233102e259557>
8. Tashiro T, Kurosawa H, Kawakami A, Hikita A, Fukui N. Influence of medial hamstring tendon harvest on knee flexor strength after anterior cruciate ligament reconstruction: a detailed evaluation with comparison of single- and double-tendon harvest. *Am J Sports Med.* 2003;31(4):521–529. <https://doi.org/10.1177/03635465030310040801>
9. Kerimoglu S, Aynaci O, Saracoglu M, Aydin H, Turhan A. Anterior cruciate ligament reconstruction with the peroneus longus tendon. *Acta Orthop Traumatol Turc.* 2008;42(1):38–43. <https://doi.org/10.3944/aott.2008.038>
10. Williams BR, Ellis SJ, Deyer TW, Pavlov H, Deland JT. Reconstruction of the spring ligament using a peroneus longus autograft tendon transfer. *Foot Ankle Int.* 2010;31(7):567–577. <https://doi.org/10.3113/FAI.2010.0567>
11. Agarwal A, Singh S, Singh A, et al. Comparison of functional outcomes of an anterior cruciate ligament (ACL) reconstruction using a peroneus longus graft as an alternative to the hamstring tendon graft. *Cureus.* 2023;15(4):e37273. <https://doi.org/10.7759/cureus.37273>
12. Munir S, Nadeem WA, Nadeem M, Raza A, Malik AT, Siddique Z. Functional outcome of unilateral peroneus longus autograft in arthroscopic anterior cruciate ligament reconstruction. *Pak Armed Forces Med J.* 2023;73(6):1594–1597. <https://doi.org/10.51253/pafmj.v73i6.6932>
13. Shair NA, Siddiq UAB, Tariq A, Khalid M, Mian MH. Anterior cruciate ligament reconstruction with hamstring tendon autografts versus peroneus longus tendon autografts in isolated anterior cruciate ligament injury. *Rawal Med J.* 2022;47(2):362–366. [No DOI found]
14. Vijay VK, Deepak DK, Pande H, Thakur S, Anand R. Functional outcome of hamstring versus peroneus longus tendon graft in arthroscopic anterior cruciate ligament reconstruction: a prospective comparative study. *J Arthrosc Surg Sports Med.* 2024;5(1):32–37. <https://doi.org/10.25259/JASSM.22.2023>
15. Rhatomy S, Asikin AIZ, Wardani AE, Rukmoyo T, Lumban-Gaol I, Budhiparama NC. Peroneus longus autograft can be recommended as a superior graft to the hamstring tendon in single-bundle ACL reconstruction. *Knee Surg Sports Traumatol Arthrosc.* 2019;27(11):3552–3559. <https://doi.org/10.1007/s00167-019-05455-w>



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