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Comparison of Clinical Outcomes in Arthroscopic Anterior Cruciate Ligament Reconstruction Using Quadruple Hamstring Autograft versus Peroneus Longus Autograft: A Prospective Comparative Study

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ABSTRACT

Background: Anterior cruciate ligament (ACL) injuries are prevalent, and reconstruction using autografts is the standard management for active patients. The quadruple hamstring tendon (HT) autograft is widely used, but the peroneus longus tendon (PLT) has emerged as a potential alternative. This study aimed to compare the clinical outcomes of arthroscopic ACL reconstruction using quadruple HT versus PLT autografts.

Methods: A prospective comparative study was conducted on 36 patients with Grade 3 ACL tears, allocated into two groups: Group A (HT, n=18) and Group B (PLT, n=18). Functional outcomes were assessed using the International Knee Documentation Committee (IKDC) and Lysholm scores preoperatively and at 2, 6, 12, 26, and 52 weeks postoperatively. Data were analyzed using SPSS, with a p-value <0.05 considered significant.

Results: The mean age was 34.72±10.02 years in Group A and 30.56±8.67 years in Group B (p=0.191). Males comprised 61.1% of the total cohort. Baseline IKDC (42.39±4.08 vs. 41.39±4.08, p=0.467) and Lysholm scores (46.72±4.61 vs. 47.72±4.61, p=0.520) were comparable between groups. At the final 52-week follow-up, both groups showed significant improvement, with mean IKDC scores of 91.00±3.36 (HT) and 92.67±2.74 (PLT) (p=0.112), and mean Lysholm scores of 94.67±2.74 (HT) and 96.17±2.23 (PLT) (p=0.081). No significant intergroup differences were observed for most intervals, except at 26 weeks where the Lysholm score favored the PLT group (p=0.017). Both grafts demonstrated comparable functional restoration.

Conclusion: Both quadruple hamstring and peroneus longus tendon autografts provide excellent and comparable clinical outcomes for arthroscopic ACL reconstruction at one-year follow-up. The PLT autograft is a safe and effective alternative to the HT autograft.

Keywords*: Anterior Cruciate Ligament Reconstruction, Hamstring Tendon, Peroneus Longus Tendon, Autograft, Lysholm Score, IKDC Score.*

INTRODUCTION

Anterior cruciate ligament (ACL) injuries are common, especially in physically active populations, with an estimated annual incidence of about 200,000–250,000 cases in the US [1]. The incidence in India is reported to be 68.6 per 100,000 population [2]. The majority of ACL tears occur through non-contact mechanisms such as sudden deceleration, pivoting, and awkward landing [3]. Management of ACL injuries requires an individualized approach. Nonoperative management is generally considered for patients with low activity demands, while operative management, usually ACL reconstruction (ACLR), is recommended for young, active patients or those with persistent instability [4].

Graft selection for ACLR balances biomechanics, donor-site morbidity, and failure risk. Autografts remain the gold standard in young, active patients. The bone–patellar tendon–bone (BPTB) graft offers excellent fixation but is associated with anterior knee pain. Hamstring tendon (HT) grafts reduce donor pain yet may have concerns regarding fixation stiffness

and graft diameter [5]. In recent years, the peroneus longus tendon (PLT) has emerged as a reliable alternative graft for ACLR, attributed to its reproducible graft diameter, satisfactory tensile properties, and reduced harvest-site morbidity relative to other donor sites [6]. However, apprehensions persist regarding possible donor site complications and alterations in ankle performance.

Despite the conceptual advantages of the PLT graft, there are limited studies directly comparing its performance against the time-proven quadruple hamstring autograft. Hence, the present study was planned to compare the clinical outcome in patients undergoing Arthroscopic Anterior Cruciate Ligament Reconstruction using Quadruple Hamstring Autograft and Peroneus Longus Autograft, with the primary objective being to assess clinical outcomes according to the Lysholm score and International Knee Documentation Committee (IKDC) score.

MATERIAL AND METHODS

Study Design and Setting: This was a prospective comparative study conducted at the Department of Orthopedics, Era's Lucknow Medical College & Hospital, Lucknow, a tertiary care center. The study duration was 24 months.

Ethical Considerations: Clearance for carrying out the study was obtained from the Institutional Ethical Committee, Era's Lucknow Medical College & Hospital, Lucknow. The study was conducted in accordance with the Declaration of Helsinki. An informed written consent was obtained from all patients. The study reporting followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cohort studies.

Participants: All patients aged 18-50 years of either gender with an ACL rupture (Grade 3) attending the OPD and undergoing surgical treatment were included. Patients with osteoarthritis knee, multi-ligament injury, prior knee surgery, or pre-existing ankle joint problems were excluded.

Sample Size Calculation: The sample size was calculated based on the variation in Lysholm scores from a previous study (Vijay et al.) [7]. Using a formula for comparing two means with a 5% type I error (α) and 10% type II error (β) for 90% power, the required sample size was calculated as 18 patients per group (total N=36).

Procedure and Groups: A total of 36 patients were enrolled and allocated into two groups:

- **Group A (n=18):** ACL Reconstruction with Quadruple Hamstring Tendon Autograft.
- **Group B (n=18):** ACL Reconstruction with Peroneus Longus Tendon Autograft.

Operative procedures were performed as described by Khalid et al. [8].

Outcome Measures: The primary outcome was functional assessment using the IKDC and Lysholm scores. The Lysholm scale (0-100, higher score = fewer symptoms) and the IKDC score (0-100, higher score = higher function) were recorded preoperatively and at 2, 6, 12, 26, and 52 weeks postoperatively.

Statistical Analysis: Data were recorded in MS-Excel and analyzed using SPSS Version 25.0. Categorical data were compared using the Chi-square test, and continuous data using the Student's 't'-test (intergroup) and Paired 't'-test (intragroup). A p-value <0.05 was considered statistically significant.

RESULTS

A total of 36 patients with Grade 3 ACL tears were enrolled, with 18 patients in each group (Table 1). The mean age of patients was 32.64±9.47 years, with no significant difference between Group A (34.72±10.02) and Group B (30.56±8.67) (p=0.191). Overall, 61.1% were males, with a higher proportion in Group B (72.2%) compared to Group A (50%), though this difference was not statistically significant (p=0.305). Baseline functional scores were comparable between the two groups (Table 2).

Table 1: Group-wise Distribution of Study Population

Group	Description	No. of patients	Percentage
A	ACL reconstruction with Hamstring Tendon Graft	18	50.0%
B	ACL reconstruction with Peroneus Longus Tendon Graft	18	50.0%
Total		**36**	**100.0%**

Table 2: Comparison of Baseline Functional Scores

Score	Group A (HT) (n=18)	Group B (PLT) (n=18)	p-value
IKDC Score (Mean±SD)	42.39±4.08	41.39±4.08	0.467
Lysholm Score (Mean±SD)	46.72±4.61	47.72±4.61	0.520

Longitudinal Functional Outcomes: A consistent incremental trend in both IKDC and Lysholm scores was observed in both groups over the 52-week follow-up (Table 3). At the final follow-up, mean IKDC scores were 91.00±3.36 in Group A and 92.67±2.74 in Group B (p=0.112). Mean Lysholm scores were 94.67±2.74 in Group A and 96.17±2.23 in Group B (p=0.081). No statistically significant difference was found between the two groups at any time point except for the Lysholm score at 26 weeks, which was significantly higher in the PLT group (91.78±3.57 vs. 88.78±3.57, p=0.017).

Table 3: Comparison of IKDC and Lysholm Scores at Different Time Intervals

Time	IKDC Score (Mean±SD)		Lysholm Score (Mean±SD)	
	Group A (HT)	**Group B (PLT)**	**Group A (HT)**	**Group B (PLT)**
Pre-op	42.39±4.07	41.39±4.07	46.72±4.61	47.72±4.61
2wk p.o.	48.94±3.47	49.94±3.47	54.50±4.30	55.50±4.30
6wk p.o.	58.94±3.47	60.94±3.47	66.50±4.30	68.50±4.30
12wk p.o.	69.72±3.80	71.78±3.75	77.61±4.10	79.61±4.10
26wk p.o.	82.17±3.54	84.22±3.42	88.78±3.57	**91.78±3.57***
52wk p.o.	91.00±3.36	92.67±2.74	94.67±2.74	96.17±2.23
p=0.017; For all other comparisons, p>0.05. p.o. = post-operative.				

Intragroup Improvement: Both groups showed a statistically significant improvement from baseline at all follow-up intervals (p<0.001). At final assessment, the percentage increase in IKDC score was 114.68% in Group A and 123.89% in Group B. For the Lysholm score, the percentage increase was 102.62% in Group A and 101.52% in Group B.

DISCUSSION

This prospective comparative study evaluated the clinical outcomes of arthroscopic ACL reconstruction using quadruple hamstring tendon versus peroneus longus tendon autografts. The key finding is that both grafts result in significant and comparable improvement in functional knee scores (IKDC and Lysholm) at one-year follow-up. This supports the growing body of evidence that PLT is a viable alternative to the established HT autograft.

The patient demographics in our study (mean age ~32.6 years, 61.1% males) were comparable to other Indian studies, such as Reddy et al. (mean age 35.15 and 33.95 years) [9] and Agarwal et al. (64.4% males) [10]. The comparability of baseline functional scores between the two groups ensured that any postoperative differences could be attributed to the graft type.
Our results align closely with several contemporary studies and meta-analyses. A comparison of final Lysholm scores from our study with others shows remarkable consistency (Table 4). The mean Lysholm scores in our HT group (94.67) and PLT group (96.17) are within the range of 85-99.85 reported in the literature. Importantly, like the meta-analysis by Kumar et al. (94.17 for HT vs. 94.92 for PLT) [11] and the study by Gok et al. (91.02 for HT vs. 91.4 for PLT) [12], we found no statistically significant difference between the two grafts. The slight numerical advantage for the PLT group in our study, while not significant at final follow-up, has been observed by others and may relate to differences in graft diameter or early rehabilitation.

Table 4: Comparison of Final Lysholm Scores with Other Studies

Study (Year)	HT Group	PLT Group	Significance
Vijay et al. (2022) [7]	86.55±2.74	88.39±4.6	NS
Saeed et al. (2023) [13]	95.88±1.86	95.93±2.37	NS
Agarwal et al. (2023) [10]	85.19±11.81	88.78±7.42	NS

Study (Year)	HT Group	PLT Group	Significance
Gok et al. (2024) [12]	91.02±5.4	91.4±4.7	NS
Punnoose et al. (2024) [14]	98.22±2.37	98.40±2.97	NS
Present Study (2026)	**94.67±2.74**	**96.17±2.23**	**NS**
NS = Not significant.			

Similarly, the final IKDC scores in our study (91.00 for HT, 92.67 for PLT) are comparable to those reported by Gok et al. (91.0 for HT, 91.8 for PLT) [12] and Khalil and Zawam (92.31 for HT, 92.78 for PLT) [15]. The significant intragroup improvement from baseline in both groups underscores the effectiveness of ACL reconstruction irrespective of graft choice. The percentage improvements observed (over 100% for Lysholm) are substantial and reflect the poor preoperative function in our cohort, which was primarily Grade 3 injuries.

The strength of our study lies in its prospective design and complete follow-up. However, it has limitations, including a relatively small sample size and a follow-up period limited to one year. Longer-term follow-up is needed to assess graft failure rates, the development of osteoarthritis, and potential late donor-site morbidity, especially ankle function in the PLT group.

CONCLUSION

This study demonstrates that both quadruple hamstring tendon and peroneus longus tendon autografts provide excellent and statistically comparable clinical outcomes in terms of IKDC and Lysholm scores for patients undergoing arthroscopic anterior cruciate ligament reconstruction at one-year follow-up. The peroneus longus tendon autograft is a safe, effective, and promising alternative to the standard hamstring tendon autograft. Further long-term studies with larger sample sizes are recommended to confirm these findings and evaluate late complications.

REFERENCES

1. Kiapour AM, Murray MM. Basic science of anterior cruciate ligament injury and repair. Bone Joint Res. 2014;3(2):20-31.
2. Kumar H, Chawla HKS, Seth A, Mehta K, Sahni G, Sharma M, et al. Comparison of Surgical and Non-Surgical Treatment of Anterior Cruciate Ligament Injury in Middle-Aged Population: A Prospective Cohort Study. Cureus. 2025;17(5):e84489.
3. Wetters N, Weber AE, Wuerz TH, Schub DL, Mandelbaum BR. Mechanism of Injury and Risk Factors for Anterior Cruciate Ligament Injury. Op Tech Sports Med. 2016;24(1):2-6.
4. Rodriguez K, Soni M, Joshi PK, Patel SC, Shreya D, Zamora DI, et al. Anterior Cruciate Ligament Injury: Conservative Versus Surgical Treatment. Cureus. 2021;13(12):e20206.
5. Lin KM, Boyle C, Marom N, Marx RG. Graft Selection in Anterior Cruciate Ligament Reconstruction. Sports Med Arthrosc Rev. 2020;28(2):41-48.
6. Rhatomy S, Abadi MBT, Setyawan R, Asikin AIZ, Soekarno NR, Imelda LG, et al. Posterior cruciate ligament reconstruction with peroneus longus tendon versus hamstring tendon: A comparison of functional outcome and donor site morbidity. Knee Surg Sports Traumatol Arthrosc. 2021;29(4):1045-51.
7. 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 comparative study. J Arthrosc Surg Sports Med. 2024;5:32-7.
8. Khalid MN, Janjua SN, Mustafa S, Kanwal S, Ghouri QM, Shaheen UU. Clinical outcomes in anterior cruciate ligament reconstruction using peroneus longus tendon autograft versus hamstring tendon autograft. J Musculoskelet Surg Res. 2024;8:198-203.
9. Reddy KS, Keerthi N, Sarvani KK. Functional Outcome Between Peroneus Longus Vs Hamstring Graft in an ACL Reconstruction. Eur J Cardiovasc Med. 2023;13(3):2346-2351.
10. Agarwal A, Singh S, Singh A, Tewari P. 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.
11. Kumar K, Rao V, Panda AK, Joshi D. Peroneus Longus Tendon Versus Hamstring Tendon Autograft for Primary Anterior Cruciate Ligament Reconstruction: A Systematic Review and Meta-analysis of Comparative Studies. Orthop J Sports Med. 2025 Sep 17;13(9):23259671251374313.
12. Gök B, Kanar M, Tutak Y. Peroneus Longus vs Hamstring Tendon Autografts in ACL Reconstruction: A Comparative Study of 106 Patients' Outcomes. Med Sci Monit. 2024 Oct 26;30:e945626.

13. Saeed UB, Ramzan A, Anwar M, Tariq H, Tariq H, Yasin A, et al. Earlier return to sports, reduced donor-site morbidity with doubled peroneus longus versus quadrupled hamstring tendon autograft in ACL reconstruction. JBJS Open Access. 2023;8(4):e23.
14. Punnoose DJ, Varghese J, Theruvil B, Thomas AB. Peroneus Longus Tendon Autografts have Better Graft Diameter, Less Morbidity, and Enhanced Muscle Recuperation than Hamstring Tendon in ACL Reconstruction. Indian J Orthop. 2024;58(7):979-986.
15. Khalil MH, Zawam SH. Comparative study of Peroneus longus tendon autograft versus Hamstring tendon autograft in arthroscopic anterior cruciate ligament reconstruction. Int Orthop. 2025;49(6):1365-1372.