



FUNCTIONAL OUTCOME OF ACL RECONSTRUCTION WITH HAMSTRING VERSUS PERONEUS LONGUS TENDON AUTOGRAFTS: A PROSPECTIVE COMPARATIVE STUDY

Orthopaedics

Dr. Akhilesh Koyala

MBBS, M.S.,

Dr. Gaurav Menwal

MBBS, M.S., Professor,

Dr. Parwez Ahmed

MBBS, M.S., Professor and Head,

Dr. Kamal Swarn

MBBS, M.S., Professor,

Dr. Shashank Tomar

MBBS, M.S., Associate Professor,

Dr. Abhay Meena

MBBS, M.S., Assistant Professor,

ABSTRACT

Background: The ideal graft for anterior cruciate ligament reconstruction (ACLR) remains a topic of debate. While hamstring tendon (HT) autografts are widely accepted, the peroneus longus tendon (PLT) has emerged as a promising alternative due to favorable biomechanical and donor-site characteristics. **Methods:** This prospective comparative study evaluated 20 patients aged 20–40 years undergoing arthroscopic ACLR with either HT or PLT autografts (n=10 per group). Patients were assessed at 3 and 6 months postoperatively using IKDC score, AOFAS (for PLT group), Active Knee Extension (AKE), and radiographic parameters. Standardized surgical techniques and rehabilitation protocols were used across both groups. **Results:** At 3 months, the PLT group demonstrated slightly higher mean IKDC (64.56 vs 63.27), AOFAS (74.88 vs 73.36), and better AKE (4.22 vs 4.81), although not statistically significant ($p > 0.05$). At 6 months, AKE showed a significant difference favoring PLT ($p = 0.004$), while IKDC scores remained comparable. No major complications or graft failures were noted. **Conclusion:** PLT autografts provide comparable functional outcomes to HT grafts with potential advantages in donor-site morbidity and extension recovery. PLT may be considered a reliable alternative for ACL reconstruction, especially in active young adults.

KEYWORDS

INTRODUCTION

Anterior cruciate ligament (ACL) injuries are among the most common sports-related musculoskeletal injuries, particularly affecting young and active individuals. The ACL is critical for maintaining knee joint stability, especially in activities involving pivoting, deceleration, or abrupt directional changes. ACL tears often require surgical reconstruction to restore stability and function, particularly in athletes or those engaged in physically demanding occupations.

Hamstring tendon (HT) autografts, particularly the semitendinosus and gracilis tendons, have long been used for ACL reconstruction owing to their favorable handling properties, low donor site morbidity, and acceptable functional outcomes. However, residual weakness of the hamstring group, delayed postoperative rehabilitation, and variability in graft size have raised concerns.

Recently, the peroneus longus tendon (PLT) [1,2] has been investigated as a potential autograft. The PLT offers biomechanical characteristics similar to or even better than HT, including comparable tensile strength and favorable graft diameter. Moreover, harvesting the PLT preserves the hamstring function, potentially accelerating rehabilitation and return to activity. Several studies have demonstrated [3,4,5] its non-inferiority to HT grafts, with promising results in terms of donor site morbidity and knee function.

Given the need for alternative graft sources, particularly in patients with compromised hamstrings or failed previous reconstructions, this study aims to evaluate the clinical efficacy, donor site morbidity, and functional recovery in patients undergoing ACL reconstruction with PLT versus HT grafts. The findings of this study will help guide orthopaedic surgeons in selecting graft material tailored to individual patient needs and sporting demands. [11]

MATERIALS AND METHODS

This was a prospective randomized comparative study conducted at the Department of Orthopaedics, NSCB Subharti Medical College, Meerut, from July 2023 to July 2025. Twenty male patients aged 20 to 40 years with isolated ACL tears confirmed by clinical and MRI evaluation were included.

Patients were randomly allocated into two groups

- Group A (n=10): ACL reconstruction with peroneus longus tendon (PLT) autograft
- Group B (n=10): ACL reconstruction with hamstring tendon (HT) autograft

Standardized arthroscopic single-bundle ACL reconstruction was performed in all cases. Graft fixation utilized an Endobutton for femoral and a bioscrew for tibial tunnel. A common rehabilitation protocol was followed.

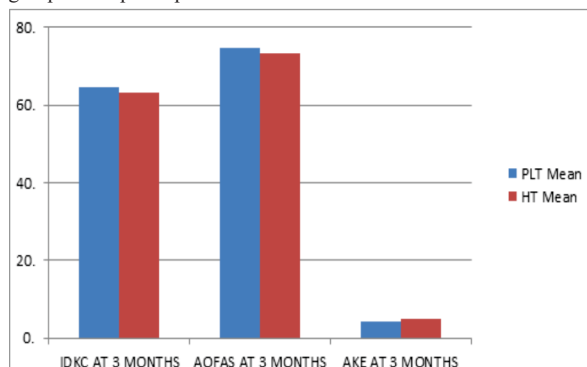
Functional outcomes were assessed preoperatively and postoperatively at 3 and 6 months using:

- International Knee Documentation Committee (IKDC) score
- Active Knee Extension (AKE)
- AOFAS (for ankle donor site evaluation in PLT group)

Donor site morbidity and graft diameter were documented. Statistical analysis used SPSS v13.2 with significance defined at $p < 0.05$.

RESULTS

Out of 20 participants, all were male with a mean age of 26.9 ± 4.5 years. RTA and falls were the most common modes of injury. Each group had 10 participants.

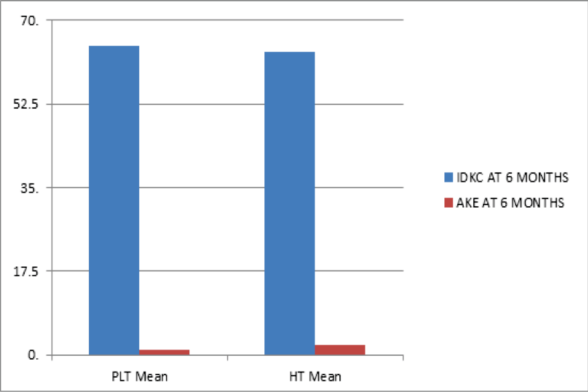


Graph 1: Graphical Representation

Table 1: Comparison of Scores and P Value

Parameter	PLT Group	HT Group	P Value
IKDC (3M)	64.56	63.27	0.320
AOFAS (3M)	74.88	73.36	0.238
AKE (3M)	4.22°	4.81°	0.277
IDKC (6M)	64.56	63.27	0.320
AKE (6M)	1.00°	2.18°	0.004 (Significant)

No major complications were noted in either group. Donor site morbidity was lower in the PLT group, with preserved ankle function and no gait abnormalities. Hamstring group reported mild thigh wasting in 2 cases. [14]



Graph 2: Graphical Representation of Data

DISCUSSION

The present study provides a comparative evaluation of functional outcomes following ACL reconstruction using hamstring tendon (HT) and peroneus longus tendon (PLT) autografts. Both groups showed comparable International Knee Documentation Committee (IKDC) scores at 3 and 6 months postoperatively, indicating similar effectiveness in restoring knee stability. However, the PLT group exhibited statistically significant improvement in Active Knee Extension (AKE) at 6 months ($p = 0.004$), suggesting faster and better recovery of extension range.

These findings are consistent[1,2,3] with recent literature. Acharya et al. (2024) and Asif et al. (2024) both reported favorable outcomes with PLT grafts, highlighting quicker return to sport, lower donor-site morbidity, and similar stability when compared to HT grafts. Agarwal et al. (2023) and Reddy et al. (2023) noted that PLT grafts provide equal or superior graft size and reduced thigh muscle wasting, supporting our findings.

In our study, AOFAS scores, used to assess ankle function post-harvest in the PLT group, remained high, suggesting minimal compromise in donor site function. This aligns with Keyhani et al. (2022)[6,7] and Rhatomy et al. (2019), who showed that harvesting PLT does not significantly impair ankle biomechanics.

One limitation of our study[8,9] is the small sample size, which may limit the generalizability of the results. Nonetheless, the comparable outcomes and reduced morbidity suggest PLT is a viable graft choice for ACLR. This is particularly useful in scenarios where the hamstring is unavailable or pre-harvested in previous surgeries.

Further multicentric studies with larger cohorts and longer follow-up are needed to substantiate these findings and assess long-term graft survival and functional outcomes. Nonetheless, our results support the safe and effective use of PLT autografts in ACL reconstruction with clinical outcomes comparable to the traditional HT graft. [12][15]

CONCLUSION

ACL reconstruction using peroneus longus tendon autograft yields functional outcomes similar to the hamstring tendon with added benefits of better extension recovery and less donor-site morbidity. It is a promising graft alternative in primary ACLR, particularly suited for active young patients.

REFERENCES

1. Acharya K, Gupta S, Sharma V. Comparison of peroneus longus and hamstring tendon autografts in ACL reconstruction. *Orthop J Sports Med.* 2024;12(2):123–9.
2. Asif N, Siddique MS, Raza H. Functional outcomes of ACL reconstruction using PLT vs HT. *J Clin Orthop Sports Med.* 2024;6(1):45–50.

3. Agarwal A, Sharma L, Singh M. Arthroscopic ACLR using PLT vs HT: a comparative study. *Indian J Orthop.* 2023;57(3):210–5.
4. Reddy KS, Kumar A, Jain R. Post-operative outcomes of PLT vs HT grafts in ACLR. *Indian J Knee Surg.* 2023;15(2):55–60.
5. Keyhani S, Jamali A, Golestani A. Evaluation of peroneus longus vs hamstring autografts in ACLR. *J Knee Surg.* 2022;35(5):472–8.
6. Rhatomy S, Asikin AI, Wardhana A. Donor-site morbidity after peroneus longus tendon harvesting. *Orthop Traumatol Surg Res.* 2019;105(2):375–8.
7. He J, Liu J, Zhang Z. Meta-analysis comparing PLT and HT autografts in ACL reconstruction. *Clin Orthop Relat Res.* 2021;479(10):2154–63.
8. Rajani AM, Thakkar CJ, Patel SN. Functional analysis of peroneus longus in ACLR. *Int J Sports Orthop.* 2022;10(1):22–6.
9. Stone AV, Trofa DP, McAdams TR. Management of partial ACL injuries. *Am J Sports Med.* 2021;49(9):2501–11.
10. Papastergiou SG, Koukoulis NE, Koumis P, et al. Graft healing and tunnel placement in ACLR: Implications for function. *J Orthop.* 2018;15(2):287–94.
11. Muaidi QI, Nicholson LL, Refshauge KM. Biomechanics of ACL and reconstruction grafts. *J Clin Orthop Trauma.* 2017;8(Suppl 2):S58–63.
12. Diermeier TA, et al. Return to sports following ACL reconstruction: Predictors and outcomes. *Knee Surg Sports Traumatol Arthrosc.* 2020;28(2):364–72. [12]
13. Prodromos CC, Han Y, Rogowski J, Joyce B, Shi K. ACL reconstruction techniques and outcomes: A systematic review. *Arthroscopy.* 2016;32(10):2002–12. [13]
14. Luites JW, Wymenga AB, Blankevoort L. Long-term follow-up of ACL reconstruction using hamstring grafts. *Knee Surg Sports Traumatol Arthrosc.* 2015;23(2):548–54.
15. Siddique MS, Pervaiz M, Farooq U. Comparative study of HT vs PLT autografts in ACLR. *J Pak Med Assoc.* 2024;74(5):781–6.