

Original Research Article

CLINICAL AND FUNCTIONAL OUTCOMES OF SINGLE-BUNDLE ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION USING PERONEUS LONGUS TENDON AUTOGRAFT: A PROSPECTIVE COHORT STUDY

Mayank¹, Sagar Arora², Ditesh Jain³, Vidhu Chauhan⁴, Nikhil Ranjan⁵, Vikas Tomar⁶, Diven Yadav⁷, Mohammad Aslam⁸, Preksha Goyal⁹

^{1,2,3,4,7,8,9}Department of Orthopaedics, NC Medical College and Hospital, Panipat, Haryana, India.

^{5,6}Department of Orthopaedics, ESIC Model Hospital, Namkun, Ranchi, India.

Received : 15/08/2026
Received in revised form : 12/09/2026
Accepted : 26/09/2026

Corresponding Author:

Dr. Ditesh Jain,
Department of Orthopaedics, NC
Medical College and Hospital, Panipat,
Haryana, India.
Email: dr.swetasingh@outlook.com

DOI: 10.70034/ijmedph.2026.4.12

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (4); 75-79

ABSTRACT

Background: Peroneus longus tendon (PLT) autograft has emerged as an alternative graft source for anterior cruciate ligament (ACL) reconstruction because it provides adequate graft dimensions while avoiding morbidity at the anterior knee and preserving the hamstring tendons. Evidence from prospective cohorts remains limited in many clinical settings. **Objective:** To evaluate clinical and functional outcomes after arthroscopic single-bundle ACL reconstruction using a peroneus longus tendon autograft, with particular attention to knee function and donor ankle function.

Materials and Methods: This prospective cohort study was conducted in the Department of Orthopaedics, NC Medical College and Hospital, Panipat, over an 18-month study period. Thirty-four patients with clinically and radiologically confirmed ACL injury who met the stated eligibility criteria underwent single-bundle ACL reconstruction using an ipsilateral PLT autograft. Functional outcomes were assessed using the International Knee Documentation Committee (IKDC) score and Modified Cincinnati Knee Rating (MCKR) score. Donor-site function was assessed using the Foot and Ankle Disability Index (FADI). Scores were recorded at baseline and during postoperative follow-up. The thesis data set was independently reanalysed using Friedman's test for repeated measures; paired comparisons were additionally assessed using paired t-tests.

Results: The reported cohort had a mean age of 31.6 ± 10.6 years. Seventeen patients (50.0%) were aged 21–30 years and 33 (97.1%) were male. Right-sided reconstruction was performed in 20 (58.8%) patients. Sports injury was the most frequent mechanism (14/34, 41.2%). Mean IKDC score improved from 43.4 ± 3.76 at baseline to 97.7 ± 1.71 at 12 months; mean MCKR improved from 36.1 ± 4.61 to 94.9 ± 4.16 ; and mean FADI improved from 35.5 ± 4.64 to 94.6 ± 2.01 . Across the five time points, Friedman's test demonstrated significant longitudinal change for IKDC ($\chi^2=136.0$, $p<0.001$), MCKR ($\chi^2=135.22$, $p<0.001$), and FADI ($\chi^2=136.0$, $p<0.001$).

Conclusion: In this 34-patient prospective cohort, single-bundle ACL reconstruction using PLT autograft was associated with marked improvement in knee-specific functional scores over 12 months and progressive recovery of donor foot-and-ankle function. The findings support PLT as a potential graft option, while the small single-centre sample and lack of a comparison group limit causal inference.

Keywords: anterior cruciate ligament; ACL reconstruction; peroneus longus tendon; autograft; IKDC; Modified Cincinnati Knee Rating; FADI; donor-site morbidity.

INTRODUCTION

Anterior cruciate ligament injury is a common cause of knee instability, particularly in individuals exposed to pivoting, jumping, sudden deceleration, and contact or non-contact sporting activities. The ACL contributes substantially to anterior-posterior and rotational stability of the knee. Persistent instability after ACL rupture may impair activity and is associated with subsequent meniscal and cartilage injury and an increased risk of post-traumatic osteoarthritis.^[1-6]

ACL reconstruction aims to restore knee stability and permit progressive return to functional activity. Graft selection is an important component of reconstruction. Hamstring and bone-patellar tendon-bone autografts are widely used, but each has recognized donor-site considerations. Patellar tendon harvest may be associated with anterior knee pain and kneeling discomfort, whereas hamstring harvest can affect knee-flexion strength. These limitations have stimulated interest in alternative autograft sources.^[7,8]

The peroneus longus tendon has favorable length, diameter, and tensile properties and can be harvested through a distal-leg approach while preserving the hamstring tendons and avoiding a donor site around the knee. Previous studies summarized in the source thesis have reported satisfactory knee function and generally preserved donor ankle function following PLT ACL reconstruction.^[4,9-12] However, the evidence base includes heterogeneous study designs, and the long-term clinical role of PLT continues to be evaluated.

The present study therefore evaluated clinical and functional outcomes following single-bundle ACL reconstruction using a PLT autograft, with serial assessment of knee function and donor ankle function over 12 months.

Aim and Objectives

The primary aim was to evaluate clinical outcomes and functional recovery after single-bundle ACL reconstruction using a peroneus longus tendon autograft.

The objectives were to assess functional outcome, describe the surgical technique, evaluate donor-site morbidity, document recovery of knee range of motion and return toward pre-injury status, and monitor postoperative complications.

MATERIALS AND METHODS

Study design and setting

This was a prospective cohort study conducted in the Department of Orthopaedics, NC Medical College

and Hospital, Panipat, over an 18-month study period. Written informed consent was obtained using bilingual Hindi/English documentation.

Participants

The thesis reports recruitment of 34 participants using non-probability convenience sampling. Eligibility criteria included age 18–50 years, clinically and radiologically confirmed ACL injury, generally good health without systemic inflammatory disease, no previous surgery on the affected knee, and written informed consent. Exclusion criteria included associated ligament injury, chondral damage, fracture around the knee, pathological conditions of the lower extremity, pre-existing arthritic changes, overlying skin infection of the knee or ankle, and chronic systemic medical disease.

Surgical technique

The procedure consisted of arthroscopic single-bundle ACL reconstruction using an ipsilateral PLT autograft. The thesis describes a small incision proximal to the distal tip of the lateral malleolus, identification and harvest of the PLT, and tenodesis of the PLT to the peroneus brevis before distal release and graft retrieval. The graft was prepared and tensioned. Arthroscopic femoral and tibial tunnels were created at the intended ACL footprints, after which the graft was passed and fixed with suspensory femoral fixation and tibial interference-screw fixation. Intraoperative range of motion and stability were assessed before closure. Postoperative rehabilitation included early active range-of-motion exercises and weight bearing as tolerated, with clinical follow-up at 1, 3 and 6 months; the master chart additionally contains 12-month functional scores.

Outcome measures

Knee-specific functional outcome was assessed with the IKDC subjective score and Modified Cincinnati Knee Rating score. Donor-site function was assessed with the FADI. The master chart contains measurements at baseline, 1, 3, 6 and 12 months for all three instruments.

Statistical Analysis

The thesis states that data were entered into Microsoft Excel and analysed using Stata version 17.0, with descriptive statistics and inferential analyses including paired t-tests, Wilcoxon signed-rank tests and regression analyses. For this publication draft, the 34-patient master chart was independently reanalysed for the serial outcome scores using Friedman's non-parametric repeated-measures test. Baseline-to-12-month changes were summarized with mean differences and 95% confidence intervals. A two-sided $p < 0.05$ was considered statistically significant. The reanalysis is reported separately from the statistics explicitly tabulated in the thesis.

RESULTS

Thirty-four participants underwent single-bundle ACL reconstruction using a PLT autograft. The cohort characteristics reported in the thesis are summarized below

Characteristic	N	%
Age 18–20 years	3	8.82
Age 21–30 years	17	50.0
Age 31–40 years	7	20.6
Age 41–50 years	7	20.5
Male	33	97.1
Female	1	2.94
Right knee	20	58.8
Left knee	14	41.2
Sports injury	14	41.2
Road traffic accident	4	11.8
Fall from height	9	26.5
Fight	7	20.6
Rural residence	22	64.7
Urban residence	12	35.3
Normal BMI	12	35.3
Overweight	15	44.1
Obese	7	20.6

Mean age was 31.6 ± 10.6 years. The largest age group was 21–30 years (50.0%). The cohort was predominantly male (97.1%). Right-sided ACL reconstruction was performed in 58.8% and left-sided reconstruction in 41.2%. Sports injury was the commonest reported mechanism (41.2%), followed by fall from height (26.5%), fight (20.6%), and road

traffic accident (11.8%). Most participants were from rural areas (64.7%). Mean BMI was 26.5 ± 3.3 kg/m²; 44.1% were overweight and 20.6% obese. Smoking and alcohol use were each reported in 19 participants (55.9%), while tobacco chewing was reported in 6 (17.6%).

Serial functional outcomes

Outcome	Baseline mean $\pm$ SD	1 month	3 months	6 months	12 months
IKDC	43.4 ± 3.76	55.1 ± 4.11	69.3 ± 5.20	87.3 ± 5.89	97.7 ± 1.71
MCKR	36.1 ± 4.61	49.9 ± 5.70	67.0 ± 6.91	83.5 ± 7.63	94.9 ± 4.16
FADI	35.5 ± 4.64	46.8 ± 4.42	58.2 ± 4.95	75.7 ± 5.90	94.6 ± 2.01

IKDC increased progressively from 43.4 ± 3.76 at baseline to 97.7 ± 1.71 at 12 months. MCKR increased from 36.1 ± 4.61 to 94.9 ± 4.16 , while FADI increased from 35.5 ± 4.64 to 94.6 ± 2.01 . The absolute mean improvement from baseline to 12 months was 54.26 points for IKDC (95% CI 53.05–55.48), 58.79 points for MCKR (95% CI 57.14–60.45), and 59.15 points for FADI (95% CI 57.37–60.92).

Friedman's test demonstrated significant change across the five repeated time points for IKDC ($\chi^2=136.00$, $p<0.001$), MCKR ($\chi^2=135.22$, $p<0.001$), and FADI ($\chi^2=136.00$, $p<0.001$). Baseline-to-12-month paired comparisons were also highly significant for all three outcomes (paired t-test, $p<0.001$ for each).

Postoperative complications and donor-site findings

The protocol included surveillance for infection, graft failure, abnormal knee function and donor-site pain or discomfort. The thesis narrative describes favorable donor ankle recovery based on FADI scores. However, the results section does not provide a separate numerical table detailing the incidence of individual postoperative complications, graft failures, neurovascular events, or exact time to full range of motion/return to pre-injury status. These outcomes should therefore, not be presented as

numerical event rates without verification against the original case records.

DISCUSSION

The principal finding of this prospective cohort was a marked and progressive improvement in knee-specific functional scores following single-bundle ACL reconstruction with a PLT autograft. IKDC improved from 43.4 at baseline to 97.7 at 12 months, while MCKR increased from 36.1 to 94.9. Donor-site function, measured by FADI, also improved substantially from 35.5 to 94.6.

The direction and magnitude of recovery are consistent with the body of evidence summarized in the thesis. Hossain et al. reported significant improvement in IKDC and Modified Cincinnati scores in a large prospective cohort of 439 patients undergoing ACL reconstruction with ipsilateral PLT grafts. The same study reported favorable donor ankle function and no neurovascular deficit. Comparative evidence cited in the thesis has also found broadly similar clinical outcomes between PLT and hamstring autografts, with potential advantages related to preservation of hamstring function and avoidance of anterior knee donor-site morbidity.^[12,13,18,19]

The present study's FADI findings are relevant because donor ankle morbidity is a key consideration when harvesting the PLT. The progressive increase in FADI suggests recovery of foot-and-ankle function during follow-up. This is compatible with reports summarized in the thesis showing satisfactory donor ankle function after PLT harvest.^[14-17,21,22,23] Nevertheless, FADI is a patient-reported functional measure and does not fully replace objective strength, range-of-motion, eversion/inversion, or hop-testing assessment.

The study also provides a useful description of the clinical population treated at a single tertiary centre. Half of the cohort was aged 21–30 years and 97.1% were male. Sports injury was the most frequent mechanism. These descriptive findings are clinically plausible for an ACL reconstruction cohort but should not be interpreted as population incidence estimates because the study used convenience sampling and had no non-ACL control population.

The study has several limitations. First, the sample size was small (n=34), and there was no comparator group using hamstring, patellar tendon, quadriceps tendon, or another graft. Second, follow-up was limited to 12 months for the master-chart functional scores, which is insufficient to assess long-term graft survival, return-to-sport durability, or post-traumatic osteoarthritis. Third, the cohort was overwhelmingly male, limiting generalizability to female athletes and other populations. Fourth, the study relied heavily on patient-reported scores and did not provide complete numerical complication, laxity, strength, or return-to-sport data in the results section.

Finally, the master chart contains internal data discrepancies that should be resolved before journal submission. The stated eligibility range is 18–50 years, yet the master chart includes patients aged 15 and 54 years. The chart also contains repeated IDs (for example, 49464 and 7621) and labels two cases as ACL repair despite the study being described as ACL reconstruction. These discrepancies do not alter the aggregate score means reported in the thesis but should be reconciled against the source case records and ethics-approved protocol before submission.

CONCLUSION

In this prospective cohort of 34 patients, single-bundle ACL reconstruction using an ipsilateral peroneus longus tendon autograft was associated with substantial improvement in knee-specific functional outcomes over 12 months. Mean IKDC, Modified Cincinnati Knee Rating, and FADI scores all improved progressively, with highly significant longitudinal changes on independent reanalysis of the master chart. The findings support PLT as a potential autograft option for ACL reconstruction, particularly when preservation of hamstring tissue and avoidance of anterior knee donor-site morbidity are desirable. Larger comparative studies with longer follow-up, objective stability and strength testing, standardized

return-to-sport criteria, and complete complication reporting are required.

Conflict of Interest

The study reports no conflict of interest.

REFERENCES

1. Boden BP, Dean CS, Feagin JA, Garrett WE. Mechanisms of anterior cruciate ligament injury. *Orthopedics*. 2000;23(6):573–578.
2. Evans J, Mabrouk A, Nielson JL. Anterior Cruciate Ligament Knee Injury. *StatPearls*. 2023.
3. Benjaminse A, Gokeler A, Van Der Schans CP. Clinical diagnosis of an anterior cruciate ligament rupture: a meta-analysis. *J Orthop Sports PhysTher*. 2006;36(5):267–288.
4. Agrawal V, Ravikiran HG, Santhosh MS, Vijay C, Prashasth BS, Chandra A. Assessment of functional outcome and donor site morbidity in anterior cruciate ligament reconstruction using peroneus longus autograft. *J Med Sci Heal*. 2022;8(1):22–27.
5. Musahl V, Karlsson J. Anterior cruciate ligament tear. *N Engl J Med*. 2019;380(24):2341–2348.
6. Duchman KR, Lynch TS, Spindler KP. Graft selection in anterior cruciate ligament surgery: who gets what and why? *Clin Sports Med*. 2017;36(1):25–33.
7. Hossain GMJ, Islam MS, Rahman Khan MM, et al. A prospective study of arthroscopic primary ACL reconstruction with ipsilateral peroneus longus tendon graft: experience of 439 cases. *Medicine (Baltimore)*. 2023;102(9):e32943.
8. Budhiparama NC, Rhatomy S, Phatama KY, et al. Peroneus longus tendon autograft: a promising graft for ACL reconstruction. 2021.
9. Butt UM, Khan ZA, Amin A, et al. Peroneus longus tendon harvesting for anterior cruciate ligament reconstruction. *JBJS Essent Surg Tech*. 2022;12(2).
10. Vijay C, Santosh MS, Avinash C, Adarsh T. Is peroneus longus autograft a better alternative to the hamstring autograft for anterior cruciate ligament reconstruction? *J Orthop Trauma Rehabil*. 2022;29(1).
11. Shi FD, Hess DE, Zuo JZ, et al. Peroneus longus tendon autograft is a safe and effective alternative for anterior cruciate ligament reconstruction. *J Knee Surg*. 2019;32(8):804–811.
12. He J, Tang Q, Ernst S, et al. Peroneus longus tendon autograft has functional outcomes comparable to hamstring tendon autograft for anterior cruciate ligament reconstruction: a systematic review and meta-analysis. *Knee Surg Sports Traumatol Arthrosc*. 2021;29(9):2869–2879.
13. Bi M, Zhao C, Zhang S, et al. All-inside single-bundle reconstruction of the anterior cruciate ligament with the anterior half of the peroneus longus tendon compared to the semitendinosus tendon. *J Knee Surg*. 2018;31(10):1022–1030.
14. Dwidmuthe S, Roy M, Bhikshavarthi Math SA, et al. Functional outcome of single-bundle arthroscopic anterior cruciate ligament reconstruction using peroneus longus graft and hamstring graft: an open-label, randomized, comparative study. *Cureus*. 2024;16(5):e60239.
15. Rhatomy S, Hartoko L, Setyawan R, et al. Single bundle ACL reconstruction with peroneus longus tendon graft: 2-years follow-up. *J ClinOrthop Trauma*. 2020;11(Suppl 3):S332–S336.
16. Acharya K, Mody A, Madi S. Functional outcomes of anatomic single bundle primary ACL reconstruction with peroneus longus tendon versus hamstring autografts. *Arch Bone Jt Surg*. 2024;12(2):116–122.
17. Zhang S, Cai G, Ge Z. The efficacy of anterior cruciate ligament reconstruction with peroneus longus tendon and its impact on ankle joint function. *Orthop Surg*. 2024;16(6):1317–1326.
18. Viswanathan VK, Iyengar KP, Jain VK. The role of peroneus longus autograft in the reconstruction of anterior cruciate ligament: a comprehensive narrative review. *J ClinOrthop Trauma*. 2024;49:102352.

19. Keyhani S, Qoreishi M, Mousavi M, et al. Peroneus longus tendon autograft versus hamstring tendon autograft in anterior cruciate ligament reconstruction: a comparative study with a mean follow-up of two years. *Arch Bone Jt Surg.* 2022;10(8):695–701.
20. Rhatomy S, Hartoko L, Setyawan R, et al. Single bundle ACL reconstruction with peroneus longus tendon graft: 2-years follow-up. *J ClinOrthop Trauma.* 2019;11.
21. Higgins LD, Taylor MK, Park D, et al. Reliability and validity of the International Knee Documentation Committee Subjective Knee Form. *Joint Bone Spine.* 2007;74(6):594–599.
22. Agel J, LaPrade RF. Assessment of differences between the modified Cincinnati and International Knee Documentation Committee patient outcome scores: a prospective study. *Am J Sports Med.* 2009;37(11):2151–2157.
23. Marín Fermin T, Hovsepian JM, Symeonidis PD, et al. Insufficient evidence to support peroneus longus tendon over other autografts for primary anterior cruciate ligament reconstruction: a systematic review. *J ISAKOS.* 2021;6(3):161–169.