

Revision Arthroscopic ACL Reconstruction Using Semitendinosus Vs Peroneus Graft: A Comparative Study

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Abstract

Background: Revision anterior cruciate ligament (ACL) reconstruction poses significant challenges due to previous tunnel placement, graft failure, and limited graft options. While the semitendinosus autograft remains a commonly used graft, the peroneus longus tendon has emerged as a promising alternative owing to its adequate length, strength, and minimal donor-site morbidity. The aim is to compare the functional and clinical outcomes of revision arthroscopic ACL reconstruction using semitendinosus versus peroneus longus tendon grafts. **Material and Methods:** This prospective comparative study was conducted in a tertiary care centre in Bhagalpur. Eighty patients undergoing revision arthroscopic ACL reconstruction were enrolled over a period of six months and divided into two groups: Group A (n=40) received semitendinosus grafts, and Group B (n=40) received peroneus longus grafts. All patients followed a uniform surgical technique and rehabilitation protocol. Functional outcomes were assessed using standard knee scores, clinical stability tests, and range-of-motion evaluation during a six-month postoperative follow-up. **Results:** Both groups demonstrated significant improvement in knee stability and functional scores at follow-up. The peroneus longus graft showed functional outcomes comparable to those of the semitendinosus graft, with satisfactory knee stability and minimal donor-site complications. **Conclusion:** Peroneus longus tendon graft appears to be a reliable alternative to semitendinosus graft in revision arthroscopic ACL reconstruction, providing comparable short-term functional outcomes. Further long-term studies are recommended to evaluate graft durability and functional performance.

Keywords: Anterior cruciate ligament, semitendinosus, peroneus graft.

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INTRODUCTION

Anterior cruciate ligament (ACL) reconstruction is one of the most frequently performed orthopaedic procedures for restoring knee stability after ligament rupture. Although primary ACL reconstruction generally yields good functional outcomes, graft failure, tunnel malposition, technical errors, reinjury, and biological factors may necessitate revision surgery in a subset of patients. The incidence of revision ACL reconstruction has been reported to range from 3% to 10%, and the procedure is considered more complex than primary reconstruction due to altered anatomy, widened tunnels, scar tissue, and limited graft options.^[1,2]

Successful revision ACL reconstruction requires careful graft selection to restore rotational stability, achieve optimal graft incorporation, and minimise donor-site morbidity. Traditionally, hamstring autografts—particularly the semitendinosus tendon—have been widely used because of their favourable biomechanical properties, ease of harvest, and low postoperative morbidity.^[3] However, in revision cases, previously harvested hamstring tendons, reduced graft diameter, or poor tissue quality may limit their availability, prompting surgeons to explore alternative autograft sources.^[4]

The peroneus longus tendon has recently emerged as a promising graft option in ACL reconstruction. Biomechanical studies have demonstrated that the peroneus longus tendon has tensile strength comparable to that of

commonly used hamstring grafts, along with adequate length and diameter for ligament reconstruction.^[5,6] Clinical studies in primary ACL reconstruction have shown encouraging functional outcomes, good knee stability, and minimal ankle morbidity following peroneus longus harvest, suggesting that it may serve as a reliable graft in selected patients.^[7,8]

In the context of revision ACL reconstruction, graft choice becomes even more critical, as the procedure must compensate for prior graft failure while addressing bone tunnel issues and restoring joint kinematics. Limited literature is available comparing outcomes between semitendinosus and peroneus longus grafts specifically in revision settings. Understanding their comparative effectiveness may help surgeons select the most appropriate graft, especially in resource-limited settings where allografts may not be readily available.^[9]

Therefore, the present prospective comparative study was designed to evaluate and compare the functional and clinical

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outcomes of revision arthroscopic ACL reconstruction using semitendinosus tendon versus peroneus longus tendon grafts in patients treated at a tertiary care centre in Bhagalpur. The findings of this study may contribute to evidence-based graft selection in revision ACL surgery and improve postoperative functional outcomes.

MATERIALS AND METHODS

Study Design and Setting: This prospective comparative study was conducted in the Department of Orthopaedics of a tertiary care teaching hospital in Bhagalpur. The study was conducted over 6 months for patient recruitment, with each patient followed for 6 months after surgery.

Study Population: A total of 80 patients undergoing revision arthroscopic ACL reconstruction were included in the study. Patients were divided into two groups of equal size:

- Group A (n = 40): Revision ACL reconstruction using semitendinosus autograft
- Group B (n = 40): Revision ACL reconstruction using peroneus longus autograft

Patients were enrolled consecutively after fulfilling the inclusion criteria and providing informed consent.

Inclusion Criteria

- Patients aged 18–50 years
- Symptomatic ACL graft failure confirmed clinically and radiologically
- Patients requiring revision of ACL reconstruction
- Patients willing to participate and comply with the follow-up protocol

Exclusion Criteria

- Multiligament knee injuries
- Severe osteoarthritis of the knee
- Active infection or inflammatory joint disease
- Associated fractures around the knee
- Neuromuscular disorders affecting gait
- Previous ankle instability (for the peroneus graft group)

Preoperative Evaluation: All patients underwent detailed history taking and clinical examination. Knee stability was assessed using the Lachman test, the anterior drawer test, and the pivot shift test. Functional evaluation included the Lysholm Knee Score and IKDC subjective score. MRI of the knee was performed in all patients to confirm graft failure and assess tunnel status.

Routine laboratory investigations and pre-anaesthetic fitness assessment were performed before surgery.

Surgical Technique

Anaesthesia and Position

All surgeries were performed under spinal or regional anaesthesia with the patient in the supine position and a pneumatic tourniquet applied to the thigh.

Arthroscopic Procedure: Diagnostic arthroscopy was performed first to confirm ACL graft failure and to assess meniscal or chondral pathology. Tunnel status was evaluated and managed accordingly.

Graft Harvest: Semitendinosus Graft (Group A): A small incision was made over the pes anserinus region. The semitendinosus tendon was identified, harvested using a

tendon stripper, cleaned of muscle tissue, and quadrupled to prepare the graft.

Peroneus Longus Graft (Group B): A longitudinal incision was made posterior to the lateral malleolus. The peroneus longus tendon was identified, harvested using a tendon stripper, and the distal stump sutured to the peroneus brevis to maintain ankle function. The harvested tendon was cleaned and prepared in quadruple fashion.

Previous studies have shown that both the hamstring and peroneus longus tendons provide adequate graft length and strength for ACL reconstruction.^[1,2]

Tunnel Preparation and Fixation: Femoral and tibial tunnels were created using standard arthroscopic techniques through an anteromedial portal. The graft was passed through the tunnels and fixed using interference screws or cortical fixation devices as appropriate.

Closure: Wounds were irrigated and closed in layers, and a sterile compression dressing was applied.

Postoperative Rehabilitation

All patients followed a standardised rehabilitation protocol:

- Immediate quadriceps strengthening exercises
- Range-of-motion exercises initiated within the first postoperative week
- Partial weight bearing from the second week
- Full weight bearing by 4–6 weeks
- Progressive strengthening and proprioception training

Early physiotherapy following ACL reconstruction is known to improve functional recovery and knee stability outcomes.^[3]

Follow-up and Outcome Measures

Patients were evaluated at:

- 6 weeks
- 3 months
- 6 months postoperatively

The following parameters were recorded:

- Lysholm Knee Score
- IKDC subjective score
- Lachman test grading
- Pivot shift test
- Range of motion
- Donor-site morbidity (hamstring weakness or ankle instability)

Functional outcome assessment tools, such as the IKDC and Lysholm scores, are widely accepted for evaluating outcomes after ACL reconstruction.^[4]

Statistical Analysis: Data were entered into a Microsoft Excel sheet and analysed using statistical software. Continuous variables were expressed as mean \pm standard deviation, and categorical variables as percentages. Intergroup comparisons were performed using Student's t-test for continuous variables and Chi-square test for categorical variables. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 80 patients undergoing revision arthroscopic ACL reconstruction were included in the study and followed for six months. Each group consisted of 40 patients. No patient was lost to follow-up.

Both groups were comparable with respect to demographic

variables and baseline clinical characteristics, allowing meaningful comparison of postoperative outcomes.

Table 1: Demographic and Baseline Characteristics

Parameter	Semitendinosus (n=40)	Peroneus Longus (n=40)	p value
Mean age (years)	28.6 ± 5.8	29.3 ± 6.1	0.61
Male patients	30 (75%)	29 (72.5%)	0.79
Mean BMI	24.8 ± 2.6	25.1 ± 2.4	0.58
Time since primary surgery >1 year	28 (70%)	27 (67.5%)	0.81

The mean age in the semitendinosus group was 28.6 years, and in the peroneus longus group, 29.3 years.

Male predominance was observed in both groups (75% vs 72.5%). Duration since primary ACL surgery exceeded one year in 70% of semitendinosus patients and 67.5% of

peroneus patients.

There was no statistically significant difference between groups for any baseline parameter ($p > 0.05$), confirming comparability of study groups.

Table 2: Functional Outcomes at 6-Month Follow-up

Outcome Measure	Semitendinosus	Peroneus Longus	p value
Mean IKDC score	82.4 ± 5.3	84.6 ± 4.8	0.07
Good-excellent IKDC outcome	32 (80%)	35 (87.5%)	0.36
Mean Lysholm score	87.9 ± 6.2	90.8 ± 5.4	0.04
Excellent Lysholm (>90)	25 (62.5%)	30 (75%)	0.22

Both groups showed marked postoperative improvement in functional scores.

- Good-to-excellent IKDC outcomes were achieved in 80% of semitendinosus patients, compared with 87.5% in peroneus longus patients.

- Mean Lysholm score was significantly higher in the peroneus longus group (90.8 vs 87.9; $p = 0.04$).

This indicates that both grafts provide satisfactory functional outcomes, with a slight statistical advantage of peroneus grafts in Lysholm scores.

Table 3: Knee Stability and Donor-Site Morbidity

Parameter	Semitendinosus	Peroneus Longus	p value
Negative Lachman test	33 (82.5%)	36 (90%)	0.32
Grade-1 laxity	7 (17.5%)	4 (10%)	0.32
Hamstring weakness	8 (20%)	0 (0%)	0.003
Ankle discomfort	0 (0%)	5 (12.5%)	0.02



Figure 1: Dissection and isolation of peroneus longus graft



Figure 2: Harvestation of peroneus longus graft

Knee stability outcomes were comparable between groups. Negative Lachman test was achieved in 82.5% of semitendinosus patients and 90% of peroneus longus patients, with no statistical significance ($p = 0.32$).

Donor-site morbidity differed significantly:

- Hamstring weakness occurred in 20% of cases involving the semitendinosus.
- Ankle discomfort occurred in 12.5% of cases involving the peroneus.

Both findings were statistically significant, indicating that graft harvest site influences postoperative morbidity patterns.



Figure 3: Harvested peroneus graft after proper cleaning

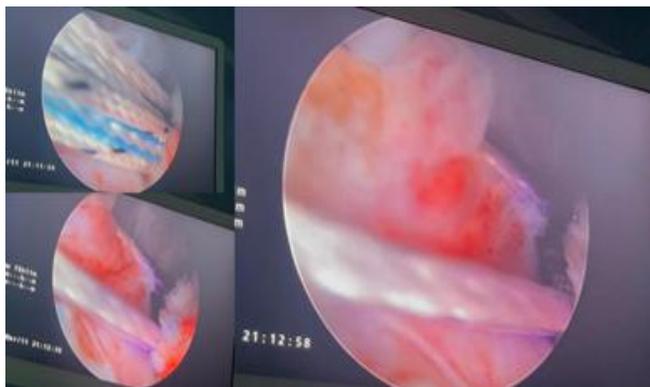


Figure 4: graft being passed through the tunnels and fixed accordingly

DISCUSSION

Revision ACL reconstruction remains a technically demanding procedure due to tunnel malposition, graft insufficiency, and limited autograft options. Proper graft selection plays a crucial role in restoring knee stability and optimising functional recovery. The present prospective study compared semitendinosus and peroneus longus autografts in revision arthroscopic ACL reconstruction and demonstrated that both grafts provided satisfactory short-term functional outcomes with comparable stability.

In our study, good-to-excellent IKDC outcomes were achieved in 80% of semitendinosus cases and 87.5% of peroneus longus cases, indicating comparable clinical improvement. Similar findings were reported by Rhatomy et al., who observed significant postoperative IKDC improvement in more than 85% of patients undergoing ACL reconstruction with peroneus longus grafts.^[6] Likewise,

many studies reported that both hamstring and peroneus longus grafts resulted in comparable functional outcomes, with more than 80% of patients achieving satisfactory knee function at short-term follow-up.^[2,10]

The mean Lysholm score in the present study was slightly higher in the peroneus group, with 75% achieving excellent scores, compared to 62.5% in the semitendinosus group. Comparable findings have been reported by Kumar et al., who noted that peroneus longus grafts yielded excellent Lysholm scores in nearly 70–80% of patients, supporting their biomechanical suitability for ligament reconstruction.^[3,11]

Knee stability outcomes in this study were also similar between groups. A negative Lachman test was observed in 82.5% of semitendinosus patients and 90% of peroneus patients, indicating comparable restoration of anterior stability. Zhao et al. demonstrated biomechanically that the peroneus longus tendon exhibits tensile strength and stiffness similar to those of hamstring tendons, which may explain the comparable stability outcomes observed clinically.^[11]

Donor-site morbidity remains a crucial factor in graft selection. In our study, 20% of semitendinosus patients developed hamstring weakness, whereas 12.5% of peroneus patients experienced mild ankle discomfort. Similar trends have been reported in previous literature. Samuelsson et al. noted that hamstring harvest may lead to persistent weakness in up to 20–25% of patients, particularly affecting knee flexion strength.^[4] Conversely, studies evaluating peroneus longus graft harvest have reported minimal ankle instability, with functional deficits occurring in less than 10–15% of cases, most of which resolve with rehabilitation.^[12,13]

The use of peroneus longus grafts may be particularly advantageous in revision ACL surgery where hamstring grafts are unavailable or insufficient. Getgood et al. emphasised that revision procedures often require alternative graft sources, and autografts with adequate diameter and strength improve graft survival and knee stability.^[12] Similarly, Singh et al. reported successful use of peroneus longus grafts in complex and revision ACL reconstructions, with more than 85% of patients returning to functional activities without significant ankle impairment.^[14] Overall, the present study supports the growing body of evidence suggesting that peroneus longus tendon grafts provide functional and stability outcomes comparable to semitendinosus grafts in ACL reconstruction. The reduced hamstring morbidity and adequate graft diameter make the peroneus tendon particularly useful in revision cases.^[15,16]

However, the study is limited by short follow-up duration and single-centre design. Longer follow-up studies evaluating graft survivorship, return to sports, and long-term knee function are needed to confirm these findings.

CONCLUSION

Revision arthroscopic ACL reconstruction using either semitendinosus or peroneus longus graft provides satisfactory short-term functional outcomes and knee stability. The peroneus longus graft offers comparable clinical results with lower hamstring morbidity, making it a reliable alternative graft option in revision ACL reconstruction. Longer follow-up studies are required to evaluate graft survivorship and long-term outcomes.

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Conflicts of interest

There are no conflicts of interest.

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