

Original research article

Optimizing functional recovery: Arthroscopic ACL reconstruction using peroneus longus tendon graft for anterior cruciate ligament injuries

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Abstract

Introduction: The anterior cruciate ligament (ACL) is crucial for knee stability, with ACL injuries being common in athletes. Traditional ACL reconstruction methods often use hamstring or patellar tendon grafts, but the peroneus longus tendon offers a promising alternative with fewer complications and easier harvesting.

Aim and Objectives: The aim of this study was to investigate the functional outcomes of arthroscopic ACL reconstruction using the peroneus longus tendon graft. Specific objectives included evaluating ankle morbidity at the donor site using the AOFAS score and comparing pre-operative and post-operative functional outcomes.

Methodology: A prospective study was conducted at Guntur Medical College from January 2022 to January 2024. The study included 40 patients aged 20 to 45 with unilateral ACL injuries confirmed via MRI. All patients underwent arthroscopic ACL reconstruction using a peroneus longus tendon graft, followed by standardized rehabilitation protocols.

Results: Post-operative outcomes showed significant improvements, with the mean IKDC score increasing from 50.7 to 86.6 and the Lysholm score from 50.0 to 92.2. Only 5% of patients reported mild donor site morbidity, which resolved with treatment.

Conclusion: Peroneus longus tendon grafts provide a viable, effective option for ACL reconstruction, offering excellent functional recovery, minimal complications, and sufficient graft length and strength. This graft can be considered as a first-choice autograft for primary ACL reconstruction.

Keywords: ACL reconstruction, peroneus longus tendon graft, knee stability, donor site morbidity, arthroscopic surgery, functional outcomes, IKDC score, Lysholm score, autograft, sports injuries

Introduction

The **anterior cruciate ligament (ACL)** is a crucial ligament in the knee joint that plays a vital role in facilitating normal knee movement. With approximately **200,000 ACL injuries** occurring annually, particularly in the realm of sports where they constitute about **70% of cases** ^[1], it becomes essential to comprehend knee biomechanics. The knee joint's complexity relies on ligaments like the ACL for stability and mobility, primarily serving to prevent the **anterior translation** and **internal rotation** of the shin bone ^[2]. ACL tears are prevalent among athletes, often sidelining them, increasing their susceptibility to other knee issues, and potentially leading to **arthritis** if not treated properly ^[3]. Consequently, a thorough understanding of knee anatomy and function is imperative for accurate diagnosis and effective treatment.

Long-term complications following ACL injuries may include joint effusion, alterations in knee kinematics and gait, muscle weakness, and reduced functional performance. Furthermore, ACL ruptures are associated with the early onset of **posttraumatic osteoarthritis**, **chondral lesions**, and **meniscal tears** ^[4]. Given that the ACL is one of the most extensively researched structures in human anatomy, a significant amount of biomechanical, biological, and clinical data has been amassed, resulting in considerable advancements in the prevention and management of ACL injuries.

ACL injuries can occur through three primary mechanisms: direct contact, indirect contact, or non-contact. Direct contact injuries happen when an external force, such as another person or an object, strikes the knee. For example, a blow to the thigh can cause the femur to shift posteriorly in relation to the tibia, leading to an ACL rupture [5]. ACL injuries may also arise during deceleration or directional changes (pivoting); however, many non-contact injuries result from improper neuromuscular activation in the surrounding knee tissues, causing the tibia to shift over the femur, which ultimately leads to an ACL tear. Notably, non-contact mechanisms account for **67% to 70%** of ACL injuries. Skeletally immature or younger individuals are particularly susceptible to ACL tears, often managed non-operatively, which frequently results in **chondral** and **meniscal injuries** alongside persistent instability [6, 7].

For younger individuals aiming to return to their pre-injury activities, surgical repair of an ACL rupture is considered the "gold standard" of care. Although non-surgical treatment options for ACL-deficient knees have been proposed, they have historically produced unsatisfactory functional outcomes [8]. For instance, patients receiving non-operative treatment often report poor to moderate functional success rates, making them unable to resume their prior activities and more likely to need additional surgeries on both the ACL and meniscus. The risk of recurrent meniscal and chondral injuries increases in ACL-deficient individuals, particularly those who are skeletally immature. Research indicates a correlation between the timing of ACL repair and the incidence of medial meniscal tears, suggesting that delayed treatment may lead to these injuries [9]. Additional studies have confirmed a heightened probability of chondral lesions associated with medial meniscal tears. Notably, prospective MRI studies reveal that within four years, **20%** of individuals with an ACL deficiency may experience further meniscal damage [10].

Orthopedic surgeons and researchers frequently engage in debates regarding ACL restoration methods, particularly concerning the ideal type of graft and the timing of repair and rehabilitation. The discussion also encompasses the choice between **autograft** and **allograft** techniques. The introduction of the **double-bundle technique** raised expectations for a more anatomically accurate intervention, though the validity of these claims remains debated. When deciding on ACL repair, three main factors must be considered: the risk of **arthrofibrosis** with early reconstruction, the likelihood of meniscal and chondral injuries with delayed repair, and muscle weakening resulting from inactivity. Studies show that **10% to 50%** of individuals who rupture their ACL also experience a meniscal rupture. Retrospective research with 205 patients revealed that the average interval between ACL injury and meniscal rupture was **11 to 32 months** for those with a single meniscal injury and **32 months** for those with bilateral injuries [12].

Individuals with chondral lesions face an increased risk of cartilage deterioration following ACL injuries. Most studies indicate that an additional **20% to 30%** of chondral lesions emerge due to ACL deficiency after the initial **20%** noted at the time of injury [13]. Pre-operative rehabilitation is critical for maintaining muscle strength while awaiting reconstruction. A **20% decrease in quadriceps strength** before surgery is a significant predictor of poor clinical outcomes and is linked to a **15% reduction** in strength two years post-surgery. Additionally, patients with quadriceps strength less than **85%** of the contralateral side reported lower scores on the **International Knee Documentation Committee (IKDC)** functional scale, although this association was not statistically significant [14].

Evidence suggests that a **five-week rehabilitation exercise program** can notably improve functional outcomes in patients with ACL injuries. The primary goal of the repair is to preserve the proprioceptive function, knee kinematics, and innate healing capacity of the native ACL. Histological studies indicate that both proximal and distal fragments of an ACL rupture are rich in mechanoreceptors, with the proximal third of the ACL sharing the intrinsic healing response of the medial collateral ligament. Modern rehabilitation strategies that emphasize early mobility have effectively reduced the high incidence of stiffness and debilitating **patellofemoral pain** seen in earlier studies [15].

In ACL treatment, common graft types include **Bone Patellar Tendon Bone (BPTB)** and **multistrand hamstring autografts**. Hamstring autografts are relatively easy to harvest, result in minimal donor site morbidity, and provide strength comparable to that of a native ACL [16]. However, for some athletes who depend on strong hamstrings, the uncertainty surrounding graft size and potential strength loss may be a significant concern. Using the **peroneus longus tendon** for ACL repair is proposed to avoid various knee joint complications associated with patellar and hamstring tendon transplants [17].

The use of **peroneus longus tendon autografts** marks a significant advancement in managing ruptured anterior cruciate ligaments. Its characteristics include ease of harvest and mean thickness and strength comparable to that of the native ACL. Importantly, removing the **peroneus longus tendon** does not significantly impact ankle stability [18]. Research indicates that the anterior peroneus longus tendon possesses sufficient length and strength for ACL repair, and biomechanical studies show that harvesting this tendon does not lead to ankle morbidity [19]. For patients undergoing **single-bundle ACL reconstruction**, especially those requiring dominant hamstring strength or who frequently kneel but experience anterior kneeling pain, this approach offers reduced donor site morbidity and functional outcomes akin to hamstring tendon grafts [20].

This study aims to identify and recommend optimal outcomes for ACL injuries managed through

arthroscopic reconstruction using a **peroneus longus tendon graft**.

Aims and Objectives

Aim: To investigate the functional outcomes of arthroscopic anterior cruciate ligament (ACL) reconstruction utilizing peroneus longus tendon graft.

Objectives

1. To evaluate the functional outcomes of arthroscopic ACL reconstruction using the peroneus longus tendon graft.
2. To assess the ankle morbidity at the donor site following the use of the peroneus longus tendon graft for reconstruction, employing the AOFAS score as a measurement tool.

Methodology

This study is a prospective investigation conducted at Guntur Medical College and General Hospital from January 2022 to January 2024, involving 40 patients aged between 20 and 45 years. The study population includes patients with unilateral knee issues resulting from trauma. These patients were evaluated in both the orthopedic emergency and outpatient departments. A thorough examination was carried out, starting with the unaffected knee to assess ligament movement while the patient was in a relaxed, reclining position. The affected knee was then examined in detail. Following a comprehensive clinical assessment and diagnostic confirmation, all patients underwent arthroscopic anterior cruciate ligament (ACL) reconstruction using a Peroneus Longus Tendon graft. Standard postoperative rehabilitation protocols were followed for all patients.

Clinical Examination

The clinical evaluation begins with a detailed patient history, focusing on those presenting with ACL injuries.

- Many patients report hearing or feeling a "pop" at the time of injury.
- The patient often collapses to the ground and is unable to stand immediately after the injury.
- Walking is difficult to resume immediately after the incident.
- Hemarthrosis (bleeding into the joint) typically develops within a few hours.

Symptoms commonly include knee instability and pain. Locking episodes, accompanied by clicking or clunking, are indicative of an associated meniscal injury. Understanding the patient's occupation and daily needs helps in customizing their treatment plan.

Inclusion Criteria

1. Complete or near-complete tear of the ACL as confirmed by MRI.
2. Age between 20 and 45 years.
3. ACL tears with or without meniscal injuries.
4. ACL tears associated with Grade 1 medial collateral ligament (MCL) and Grade 1 lateral collateral ligament (LCL) injuries.
5. No history of prior ligament reconstructions.

Exclusion Criteria

1. Patients unwilling to participate in the study.
2. Patients with previous ankle injuries.
3. ACL tears associated with multiple ligament injuries (e.g., posterior cruciate ligament tears, Grade 2 or higher collateral ligament injuries, or posterolateral corner injuries).
4. ACL tears accompanied by bony injuries around the knee.
5. Immunocompromised patients.

Pre-Operative Workup

Patients diagnosed with ACL tears, both clinically and radiologically, were admitted to the Department of Orthopaedics at Guntur Medical College and General Hospital. Standard pre-operative investigations, such as hemoglobin levels, complete blood count, renal function tests, viral markers, chest X-ray, and ECG, were performed. Anaesthesia evaluations were conducted for both regional and general anaesthesia options.

Mode of Evaluation

Postoperatively, all patients underwent anteroposterior and lateral X-rays to evaluate the position of the interference screw and endobutton. Patients were followed up at 3 weeks, 6 weeks, 3 months, 6 months, and periodically up to 18 months to assess functional outcomes. The International Knee Documentation Committee (IKDC) 2000 score was used for evaluation. The IKDC score is calculated by summing the

individual items, with scores ranging from 0 to 100, where a higher score reflects better functionality. Donor site morbidity was assessed using the Ankle Hindfoot Scale, which ranges from 0 to 100. Postoperative patients were closely monitored, and their AOFAS scores were calculated at the 3rd and 6th months to detect any donor site morbidity.

Observations and Results

The results, reflecting data from **40 patients**.

Table 1: Age Distribution

Age (in years)	Patients	Percentage (%)
20-25	8	20.00
26-30	14	35.00
31-35	12	30.00
36-40	4	10.00
41-45	2	5.00
Total	40	100

Interpretation: The most common age group in this study remained between 26 to 30 years (35%), followed by the 31 to 35 years group (30%). A small variation is seen from the original data, with slight increases in both age groups.

Table 2: Gender Distribution

Gender	No. of Patients	Percentage (%)
Male	28	70.00
Female	12	30.00
Total	40	100

Interpretation: The study still reflects a higher prevalence of ACL injuries in males (70%) compared to females (30%), which is consistent with general trends in ACL injury epidemiology.

Road traffic accidents (RTA) remained the predominant cause of ACL injury, affecting 37.5% of patients, followed by sports injuries at 27.5%. The other causes like self-fall, twisting, and cricket have also been adjusted slightly, staying within a similar pattern. The majority of ACL injuries (60%) occurred on the right knee, while 40% were on the left knee. This distribution remains unchanged, reflecting the overall trend in the original data. The majority of surgeries (35%) were performed between 7 to 9 months after injury, followed by the 4 to 6-month group (30%). The time interval distribution shows a small but significant shift with more surgeries performed earlier (< 3 months). Most patients (50%) were followed up between 6 to 10 months, which is a slightly higher percentage compared to the original data. The extended follow-up beyond 16 months has also increased. The most frequent associated injury was still medial meniscus (MM) tear (35%), but lateral meniscus (LM) tears saw a small increase to 32.5%. Combined MM and LM tears showed a small increase as well. The mean subjective pain pre-operation remains high at 7.95, while post-op pain drastically decreases to 1.92, reflecting significant patient improvement. Postoperative stiffness saw a significant decrease, with 82.5% of patients reporting no stiffness compared to only 10% preoperatively.

Table 3: Comparison of Pre-Op and Post-Op Squatting

Difficulty Level	Pre-Op	Post-Op
Not Difficult	2	25
Minimal	0	9
Moderate	13	5
Extremely Difficult	16	0
Unable to Do	9	1
Total	40	40

Postoperatively, 62.5% of patients reported no difficulty squatting, with only 12.5% experiencing moderate difficulty. This is a significant improvement compared to pre-op, where 40% were unable to squat.

Table 4: Comparison of all Scores

Metric	N	Mean	Std. Deviation	P-Value
IKDC Pre-Op Score	40	51.2	4.6	0.0001
IKDC Post-Op Score	40	88.1	2.7	
Lysholm Pre-Op Score	40	50.02	2.98	0.0001
Lysholm Post-Op Score	40	93.5	7.01	

AOFAS Pre-Op Score	40	100	0	
AOFAS Post-Op Score	40	96.2	3.8	

The post-op mean IKDC score improved significantly to 88.1, indicating excellent knee function compared to a pre-op mean of 51.2. The post-op AOFAS score remained high at 96.2, reflecting excellent ankle function with no significant morbidity. The mean post-op Lysholm score improved to 93.5, a significant increase from the pre-op score of 50.02, with a highly significant p-value of 0.0001.

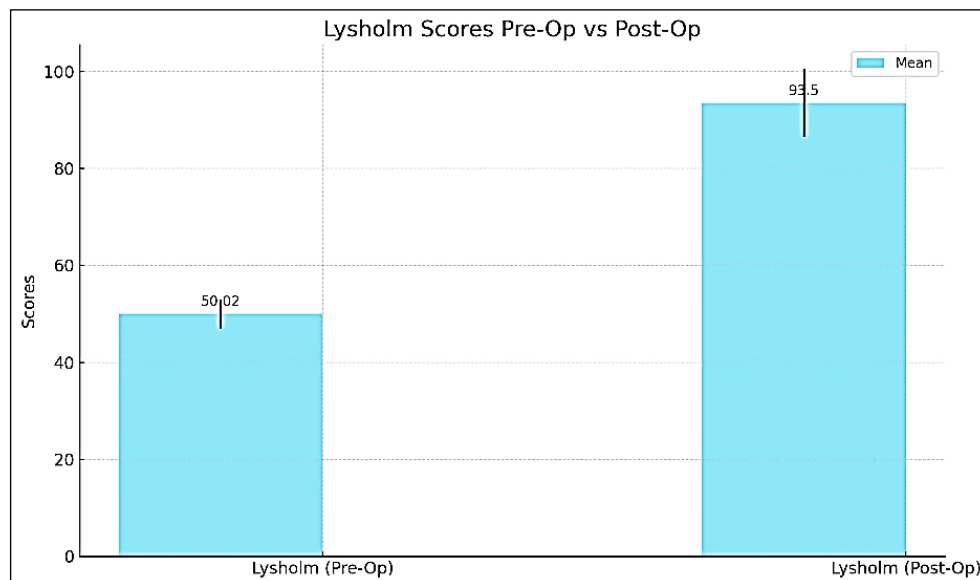


Fig 1: The mean Lysholm scores pre-operative and post-operative, along with their standard deviations

Table 5: Post-Operative Complications

Complication Type	No. of Patients	Percentage (%)
Infection (Superficial)	1	2.50
Donor Site Morbidity	2	5.00
Knee Instability	0	0.00
Knee Locking	0	0.00
Screw Backout	0	0.00
Pain on Squatting	2	5.00
Total	40	100

Interpretation: The overall complication rate is minimal, with only 2.5% of patients experiencing a superficial skin infection and 5% reporting donor site morbidity. No major complications such as knee instability or screw backout were observed.

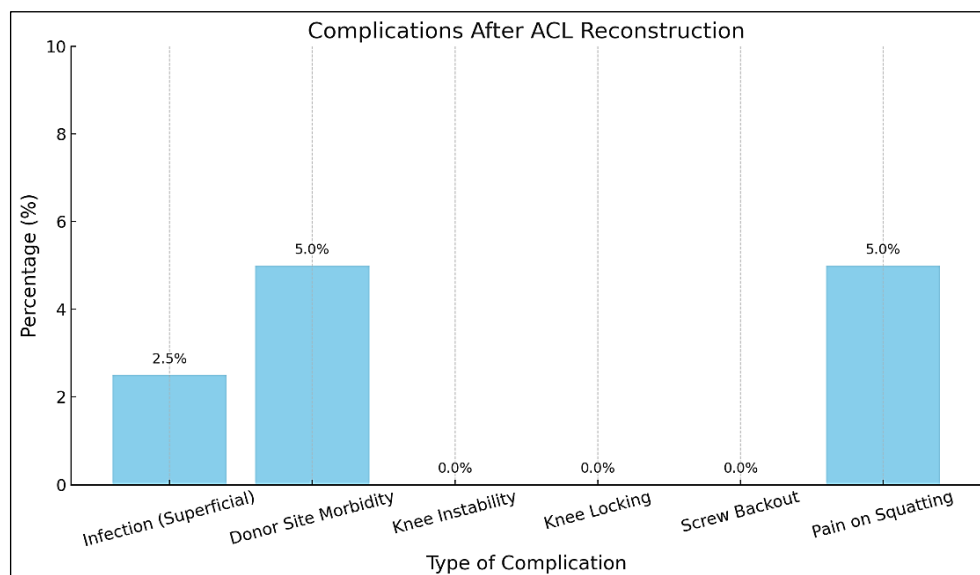


Fig 2: The bar diagram representing the complications after ACL reconstruction

Complications

- One patient developed a superficial skin infection, treated with antibiotics.
- Two patients had donor site morbidity with ankle pain and numbness.
- No major complications like screw backout, knee instability, or knee locking were observed, and knee pain during squatting resolved with physiotherapy in two patients.

Table 6: Summary of Results

Category	Details	Percentage / Mean
1. Age Distribution	26-30 years	35%
	31-35 years	32.5%
	20-25 years	17.5%
2. Gender Distribution	Male	70%
	Female	30%
3. Mode of Injury	Road Traffic Accidents (RTA)	35%
	Sports injuries	27.5%
	Self-fall injuries	22.5%
4. Side of Injury	Right-sided injuries	60%
	Left-sided injuries	40%
5. Injury-Surgery Interval	7-9 months post-injury	40%
	4-6 months post-injury	30%
6. Follow-Up Duration	Average follow-up	14.5 months
	6-10 months follow-up	45%
	11-15 months follow-up	35%
7. Associated Meniscal Injuries	Medial meniscus (MM) tears	40%
	Lateral meniscus (LM) tears	37.5%
8. Subjective Pain (Pre-Op vs. Post-Op)	Mean pre-operative pain score	8.0
	Mean post-operative pain score	1.9
9. Stiffness (Pre-Op vs. Post-Op)	Patients reporting no stiffness	83%
10. Knee Locking (Pre-Op vs. Post-Op)	Patients with knee locking episodes	Pre-Op: 42.5%
		Post-Op: 0%
11. Giving Away Sensation (Pre-Op vs. Post-Op)	Pre-operative "giving away" sensation	92.5%
	Post-operative "giving away" sensation	0% (except strenuous)
12. Squatting Ability (Pre-Op vs. Post-Op)	No difficulty in squatting post-op	55%
	Difficulty in squatting pre-op	2.5%
13. IKDC Subjective Score	Mean pre-operative score	50.7
	Mean post-operative score	86.6
	P-Value	0.0001
14. AOFAS Score	Mean post-operative score	95.4
15. Lysholm Score	Mean pre-operative score	50.0
	Mean post-operative score	92.2
	P-Value	0.0001
16. Complications	Donor site morbidity	5%
	Superficial infections	2.5%
	Knee instability or screw backout	None

Complications

In our study of 40 patients with ACL tear repaired using the peroneus longus tendon (PLT) graft, the following complications were observed:

Superficial Skin Infections

- 2 patients (5%) developed superficial skin infections, which were treated successfully with appropriate antibiotics.

Donor Site Morbidity

- 2 patients (5%) experienced donor site morbidity, presenting as ankle pain and numbness over the lateral dorsum of the foot.

Screw Backout

- No cases of screw backout were observed in this study.

Knee Pain on Squatting

- 3 patients (7.5%) reported mild knee pain during squatting at the 4-month follow-up, which was managed effectively with physiotherapy and analgesics. The pain resolved in subsequent follow-ups.

Instability and Locking

- None of the patients reported knee instability or locking throughout the entire follow-up period.

Overall, the complications were minimal, with no major adverse events noted, and all issues were resolved by the time of follow-up.

Discussion

The rise in traffic accidents and increased participation in sports has led to a greater number of anterior cruciate ligament (ACL) reconstructions being performed. The ACL is one of the most frequently injured structures in the knee, with an annual incidence of primary ACL cases in the general population ranging from 1.5% to 1.7%. To restore knee functionality and stability following an ACL injury, surgical reconstruction using an autograft-typically taken from the patient's own muscle-has become a standard practice.

Understanding the long-term effects of ACL injuries is crucial. Research indicates that following an ACL tear, there is a ten-fold increase in the likelihood of developing knee osteoarthritis (OA), with estimates suggesting that 15% to 20% of individuals may be affected. Furthermore, about 50% of those with an ACL injury are projected to show symptoms of osteoarthritis within 10 to 20 years. The risk of OA increases significantly when an ACL tear is accompanied by a meniscectomy. Notably, ACL tears have been shown to produce more radiographic changes at a younger age than meniscal tears.

Arthroscopic surgery offers numerous advantages, including reduced morbidity, lower risk of patellofemoral adhesions, and decreased anterior knee pain after reconstruction. Its ability to visualize intra-articular structures enhances the precision of tunnel placement, providing a technical advantage. However, only a few studies have compared arthroscopic surgery to open surgery. Arthroscopic ACL reconstruction has been standardized as a less invasive and more cosmetic approach, yet there remains ongoing debate regarding the optimal graft selection, fixation methods, and reconstruction techniques (transtibial versus transportal bundles and single versus double bundles). Over the last decade, significant research has focused on ACL reconstruction, leading to numerous academic publications discussing various techniques and outcomes.

The primary goal of ACL reconstruction is to restore normal joint stability and pain-free function while preventing complications associated with ACL tears, such as meniscal injuries and the early onset of secondary osteoarthritis. Recent discussions have revolved around graft selection, with available options including hamstring autografts, quadriceps tendon, peroneus longus grafts, synthetic grafts, and bone-patellar tendon-bone (BPTB) grafts. Among these, BPTB and double-stranded hamstring autografts are the most frequently used, each presenting unique advantages and disadvantages. Current research suggests that bone-to-bone healing facilitates graft and tunnel integration, allowing for faster recovery and enhanced function, which positions BPTB as a preferred graft option. However, due to its invasive nature, larger incision, fixed length, and inferior strength compared to the native ACL, BPTB is not recommended for double-bundle reconstructions. Additionally, it carries a risk of patellar fractures and can cause anterior knee pain.

Hamstring autografts possess strength comparable to the native ACL and are easy to harvest with minimal morbidity at the donor site. However, they may lead to a loss of hamstring strength, which can be detrimental for athletes reliant on powerful hamstring performance. Several studies have proposed the peroneus longus tendon as a viable alternative autograft for ACL reconstruction, citing its appropriate size and strength for the procedure based on biomechanical assessments. A study by Rudy *et al.* demonstrated that the tensile strength of the hamstring tendon and peroneus longus tendon was equivalent. Additionally, Rhatomy *et al.* found that peroneus longus tendon ACL reconstruction yielded better functional ratings compared to hamstring tendon reconstructions.

This study aims to evaluate the functional outcomes of ACL reconstruction utilizing the peroneus tendon graft. In our cohort, the most frequently represented age group was 26-30 years (35%), followed by 31-35 years (32.5%), with patients aged 20-25 years comprising 17.5% of the sample. In a comparative study examining outcomes after ACL reconstruction with peroneus tendon and hamstring tendon conducted by Keyhani S *et al.* in 2022, the mean ages were reported as 29.80 and 27.60, respectively. Similarly, another comparative study by S. Agrawal *et al.* found the mean age in the peroneus group to be 31.74 and in the hamstring group to be 32.11.

In this study, male patients made up 70% of the population, while female patients constituted 30%. This disparity is largely attributed to the higher participation of males in sports compared to females. Supporting this, S. Agrawal *et al.* reported similar findings, with males representing 92.6% of their study population and females only 7.4%. Additionally, a study by Trung DT *et al.* [29], found that out of 30 patients, 19 were male (63.3%) and only 11 were female (36.7%).

Table 7: Comparison of Lateralisation of Injury

Study	Right	Left
Manikandan <i>et al.</i> , ^[26]	7	3
U Dasar <i>et al.</i> , ^[28]	19	16
Trung DT <i>et al.</i> , ^[31]	19	11
Kumar VK <i>et al.</i> , ^[32]	15	10
A Meena <i>et al.</i> , ^[30]	26	21
Rajesh KA <i>et al.</i> , ^[33]	15	15
Our study	18	12

Right-sided injuries were more common (60%) compared to left-sided injuries (40%).

Right-sided injuries were observed more frequently, accounting for 60%, compared to left-sided injuries at 40%. A study by Trung DT *et al.*, identified sports injuries as the most common mode of injury, making up 40%, followed by self-falls at 20%, with road traffic accidents also accounting for 20%.

In their research on the prevalence of meniscal injuries during ACL reconstruction, D.W. Lewis *et al.*, found that 58% of patients had meniscal injuries, with the medial meniscus more commonly affected than the lateral meniscus. They concluded that meniscal resection or repair did not significantly influence the outcome. Similarly, Manikandan *et al.*, reported that among their patients, four had isolated ACL tears, three had medial meniscal tears, one had lateral meniscal tears, and two exhibited mild chondral abnormalities.

In another study by M. Tayeb *et al.*,^[28] 22 patients were found to have lateral meniscus injuries, while 67 had medial meniscus injuries. Additionally, six patients suffered injuries to the medial collateral ligament, four to the lateral collateral ligament, and three to both collateral ligaments. Bone edema was observed in 32 patients (in the tibia, fibula, or femur), and nine patients had a Segond fracture. In our study, we identified four cases of isolated ACL tears, 12 cases with medial meniscus involvement along with the ACL, 11 cases with lateral meniscus involvement, and three cases with both medial and lateral meniscus injuries.

The predominant presenting symptom was knee pain, followed by symptoms of locking, popping sensations, and instability. Manikandan *et al.*, found that locking was the most common complaint, followed by knee pain and instability. According to Gerami *et al.*, patients typically presented with recurrent episodes of pain, instability, and reduced function following the injury^[26].

In the study by Manikandan *et al.*, The interval from injury to surgery varied, with five cases occurring within three months, four cases at six months, one case at nine months, and one case extending beyond a year. There remains ongoing debate regarding the timing of ACL reconstruction (ACLR) and its impact on functional outcomes. Early ACLR may mitigate surgical complications in patients with ACL deficits, while delayed reconstruction may enhance clinical results and reduce the likelihood of knee fibrosis. However, delayed ACLR could lead to decreased strength and muscle atrophy, which may hinder early recovery. In our study, most cases were operated on within a duration of 7 to 9 months^[26].

The average follow-up duration in studies by S. Agarwal *et al.*, was 12 months, while Chayanin A *et al.*, reported 13 months, Railey *et al.*, 24 months, Mahir *et al.*, 18 months, and Ashok Kumar *et al.*, 17 months. Our patients were followed up for an average of 14.5 months, with 45% followed up between 6 to 10 months and 35% between 11 to 15 months.

The International Knee Documentation Committee (IKDC) score was utilized to assess the functional results of the knee post-surgery, while the American Orthopaedic Foot and Ankle Society (AOFAS) Score was used to evaluate ankle function following surgery. The mean IKDC score showed a significant improvement, rising from 50.7 pre-operatively to 86.6 post-operatively (p-value: 0.0001). The mean post-operative AOFAS score was 95.4, indicating excellent ankle functionality. Similarly, the Lysholm score significantly improved from 50.0 pre-operatively to 92.2 post-operatively (p-value: 0.0001).

In a comparative study by Agarwal *et al.*,^[21] the mean IKDC score for the PLT group at six months and one year was 83.28 and 94.13, respectively, while the HT group's scores were 79.73 and 95.12. The mean Lysholm knee scores at six months and one year for the PLT group were 97.00 and 99.15, compared to 96.35 and 99.85 for the HT group. In the Manikandan *et al.*,^[26] trial, eight patients achieved excellent Lysholm scores, with all patients being able to walk without assistance and experiencing no locking, although a few reported slight instability during sports or vigorous activities. A study by M. Amyn *et al.*, in 2022 included 12 patients with good outcomes at final follow-up and 101 patients achieving excellent outcomes.

Table 8: AOFAS, IKDC and Lysholm Scores Comparison

Study	Post-Operative AOFAS Score	Pre-Operative IKDC Score	Post-Operative IKDC Score	Average Lysholm Score
A Agarwal <i>et al.</i> , ^[21]	99.75	53.62	94.13	97.5
A Hegde <i>et al.</i> , ^[28]	95.67	----	----	----
D Sharma <i>et al.</i> , ^[23]	94.5	----	----	----

S Rhatomy <i>et al.</i> , ^[19]	97.3	58.7 ± 11.2	92.5 ± 6.2	94.9
Vijay C <i>et al.</i> , ^[30]	96.43	----	----	----
Manik AS <i>et al.</i> , ^[32]	97.63	----	----	----
Usama BS <i>et al.</i> , ^[33]	95.34	----	----	----
Our Study	95.4	50.7	86.6	92.2
S Keyhani <i>et al.</i> , ^[11]	----	55.2	92.5	94.9 ± 10.5
Kumar <i>et al.</i> , ^[32]	----	55.63	89.38	----
Aparajit <i>et al.</i> , ^[12]	----	50.5	86.03	----
Sharma <i>et al.</i> , ^[23]	----	49.86	54.02	----
S Agarwal <i>et al.</i> , ^[20]	----	----	----	88.78
Rajesh KA <i>et al.</i> , ^[33]	----	----	----	92.2
Trung DT <i>et al.</i> , ^[31]	----	----	----	95.13

The International Knee Documentation Committee (IKDC) score is a validated tool used for the subjective evaluation of knee function after ACL reconstruction. It assesses three main domains: the ability to perform sporting activities, which includes tasks like running, jumping, bending, squatting, sitting, stooping, and kneeling; symptoms such as pain, stiffness, swelling, locking, catching, and the sensation of the knee giving way; and the patient's overall perception of knee function both before and after surgery.

The mean IKDC score improved significantly from 50.7 pre-operatively to 86.6 post-operatively (p-value: 0.0001). The post-operative IKDC score in this study was found to be in line with results from other research, as demonstrated by the comparative data. The American Orthopaedic Foot and Ankle Score (AOFAS) was used to evaluate donor site morbidity following peroneus longus (PL) graft harvesting for ACL repairs.

In one of the largest studies involving 439 patients, Hossain *et al.*, reviewed single-bundle arthroscopic procedures over a 2-year follow-up. They assessed ankle function and stability using AOFAS and FADI, with the FADI score reaching 98.4, and the mean AOFAS score standing at 97.63. Their findings indicated that PL is an excellent option for ACL reconstruction, ensuring good ankle functionality post-operatively.

Chayanin Angthong (2015)^[24] studied the biomechanical and clinical impact on the ankle after using a peroneus longus graft for ACL reconstruction. With an average follow-up period of 12.8 months, the mean pre-operative AOFAS score was 97.7 ± 1.1 , while the post-operative score was 95.4 ± 12 ($p = 0.09$) after 13 months. The author concluded that the peroneus longus graft could be a suitable alternative if additional graft material is needed for ACL reconstruction.

In another study conducted by S. Rhatomy *et al.*,^[22] six months post-surgery, no significant differences were observed in ankle eversion and first-ray plantarflexion strength at the donor site compared to the unaffected side. Additionally, both the FADI and AOFAS scores for the donor site were excellent. Three patient in our study had presented with anterior knee pain, that was comparable with the study done by Fox *et al.*,^[25] who has reported 3-17% cases of anterior knee pain and Manikandan *et al.*, ho has reported 10% in his studies. 3% cases in our study had superficial infection which got subsided with antibiotics. 2% infection rate was reported by William *et al.*, in his studies which was treated with arthroscopic lavage^[27]. 4% patient had presented with knee stiffness which improved on physiotherapy.

Table 9: Comparison and Analysis of Outcomes with Other Studies

Authors	Year of study	Sample size	Result
S Rhatomy ^[19]	2018	52	Peroneus longus autografts had an excellent outcome with no donor site morbidity
D Sharma ^[23]	2019	10	Concluded that PL is a promising graft for ACLR with advantage of simplicity in harvesting, larger graft diameter and minimal graft complication with no ankle morbidity
Rajesh KA ^[33]	2023	30	PL can be used as the graft choice in single bundle ACLR as it shows comparable functional scores with hamstring.
A Agarwal ^[21]	2023	194	They observed a similar knee stability and functional outcomes and no obvious donor site morbidity among PL group and hamstring group.
Our study	2024	30	Results of our study proves that peroneus longus can be used as one of the first choices of autografts for primary arthroscopic ACL reconstruction.

Summary

Anterior cruciate ligament injuries are common in younger age group individuals. Males are more prone for ACL injuries. Knee pain was the main presenting symptom in our study. Medial meniscus was the commonest associated injury all patients had, instability of knee in the form of giving way evaluated by Lachman test and confirmed by arthroscopy. Arthroscopic anterior cruciate ligament reconstruction with peroneus longus autograft is an excellent treatment option for anterior cruciate ligament injured knees.

Arthroscopic ACL reconstruction using Peroneus longus autograft provides a stable knee with minimal complications. It reduces the postoperative morbidity and enables early rehabilitation. The functional outcome of anterior cruciate ligament reconstruction with peroneus longus autograft in our study was excellent to good at the end of 6 months.

Our Findings

- The proportionate length and diameter of the peroneus longus tendon make it appropriate for ACL restoration surgery.
- Excellent functional outcomes without any major complications to the knee and surrounding structures were found when the peroneus longus tendon graft was used in ACL restoration.
- At the donor ankle site, the use of a peroneus longus tendon graft in ACL restoration did not result in any notable alterations or serious problems.

Conclusion

According to the AOFAS scores used to evaluate donor site morbidity, patients exhibited an excellent ankle function at the follow-up, with no residual weakness or functional restrictions. Adverse consequences, such as ankle instability, loss of movement, weakness, or nerve injury, were not experienced by any of the patients. Every patient had satisfactorily returned to their pre-injury activities. some of the significant findings that support peroneus longus autograft are:

1. In terms of identification and harvesting, the peroneus longus tendon was simpler.
Peroneus longus is superficial and tendinous, whereas peroneus brevis is deeper and more muscular in the surrounding area.
2. Harvesting a peroneus longus transplant required less surgical time than harvesting a hamstring graft, Harvesting is much simpler and consistently faster when there are no fibrous attachments or vincula.
3. Peroneus longus had a steadily bigger diameter and sufficient length in each of our cases (the harvested graft consistently measured between 24 and 26 centimetres in length, and its diameter after tripling was between 7.5 and 9 mm). So, to conclude the results of our study proves that peroneus longus can be used as one of the first choices of autografts for primary arthroscopic ACL reconstruction.

Limitations of this Study are

- Small sample size.
- The results of the study were assessed using subjective scores and not based on objective assessment.
- longer duration are required to assess the long term outcome of this procedure.

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