

## Functional Outcome of Unilateral Peroneus Longus Autograft in Arthroscopic Anterior Cruciate Ligament Reconstruction

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### ABSTRACT

**Objective:** To evaluate the functional outcome of unilateral peroneus longus autograft in arthroscopic anterior cruciate ligament reconstruction

**Study Design:** Cross-sectional study.

**Place and Duration of Study:** Orthopedic Department, Combined Military Hospital, Lahore Pakistan, from Jul 2020 to Jun 2021.

**Methodology:** We included all the patients who underwent ipsilateral peroneus longus autograft for anterior cruciate ligament reconstruction. Fixation was achieved with a bio-absorbable screw on the tibial side and an endobutton on the femoral side. Lateral or medial meniscectomy was performed according to the requirement. Post-op X-rays were done to assess the position of the endobutton and tibial tunnel. Eight millimetres tunnels were drilled, and the tendon was tailored accordingly. Results were assessed for pain, infection, range of motion and instability after three months of surgical procedure.

**Results:** A total of 52 patients were included in the final analysis. The mean age of the study participants was  $33.36 \pm 6.353$  years. At the end of three months, pain 6(11.5%) and restricted range of motion 6(11.5%) were the common untoward outcomes reported by the patients. High body mass index and lack of engagement in physiotherapy had a statistically significant relationship with the presence of untoward outcomes in our study ( $p$ -value $<0.05$ ).

**Conclusion:** Peroneus longus is a strong, robust autograft for anterior cruciate ligament reconstruction with excellent functional results. Very few patients had untoward effects, and those, too, were of mild intensity. Patients with high body mass index and those not engaging in physiotherapy emerged as high-risk patients for having untoward effects after the surgery.

**Keywords:** Anterior cruciate ligament reconstruction, Arthroscopy, Peroneus longus autograft.

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### INTRODUCTION

An anterior cruciate ligament (ACL) is a strong band of tissue that helps connect the femur to the tibia. ACL tear is a sprain or tear of this ligament that most commonly occurs during sports that involve sudden changes in direction or stops, jumping and landing, such as basketball, football, hockey, tennis and squash.<sup>1,2</sup> Patients with ACL tears feel a popping sensation and may have swollen knees. Patients can have joint instability, and weight bearing on the affected joint may feel painful.<sup>3</sup>

The diagnosis of ACL tear can be accurately made using clinical history and physical examination. Diagnosis can be confirmed by magnetic resonance imaging (MRI), which provides accurate images of abnormalities of the morphology of ACL.<sup>4,5</sup>

Arthroscopy is highly accurate, with a diagnostic accuracy of up to 95%, and is considered the gold standard. However, Arthroscopy is an invasive procedure which is done under anaesthesia and carries the risk of complications like infection and bleeding. This necessitates post-procedure hospitalisation, hence increasing the cost of treatment. Therefore, many clinicians prefer MRI, and MRI remains the first-line non-invasive diagnostic tool for many clinicians.<sup>6,7</sup>

The profound advancements in arthroscopic surgery over the last few decades, along with clinical and complementary diagnostic tools, have encouraged orthopaedic surgeons to use it for diagnostic and treatment purposes. ACL reconstructive surgery has also significantly evolved recently and now includes the option of using allografts and autografts.<sup>8,9</sup> Autografts are more commonly used than the allografts. Different autografts have been tried with varying degrees of success; these include bone patellar tendon bone, hamstring and peroneus longus, etc.<sup>10</sup> Peroneus

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longus autografts serve as one of the best methods due to non-cross contamination, good histocompatibility, rapid healing and low cost of treatment. The study aimed to determine the function outcome of unilateral peroneus longus autograft in arthroscopic anterior cruciate ligament reconstructive surgeries. Therefore, we had planned to observe the effectiveness of autologous peroneus longus in ACL reconstructive surgeries in our setup.

**METHODOLOGY**

The cross-sectional study was conducted at Combined Military Hospital Lahore from July 2020 and June 2021 after approval from the Institutional Review Board Committee (letter number 305/2021). The sample size was calculated using the WHO sample size calculator using the population proportion of joint instability after surgery as 10%.<sup>11</sup> A non-probability consecutive sampling technique was used to gather the sample.

**Inclusion Criteria:** Patients of either gender, aged 18 to 45 years presenting with anterior cruciate ligament injury and undergoing arthroscopic ligamentous reconstruction of ACL via unilateral peroneus longus autograft were included in the study.

**Exclusion Criteria:** Patients with redo surgeries or those with causes of damage other than injury were not included in the study. Patients with bone or other solid or haematological malignancies were also included in the exclusion criteria. Patients who were lost to follow-up and could not be assessed three months after the surgical procedure were excluded as well.

Anterior cruciate ligament injury was diagnosed by a consultant orthopaedic surgeon based on clinical and radiological methods. Patients presenting with ACL injury undergoing arthroscopic ligamentous reconstruction of ACL via unilateral peroneus longus autograft were included in the study after applying the inclusion/exclusion criteria. Arthroscopic ligamentous reconstruction of ACL via unilateral peroneus longus autograft was done in a standard manner under general anaesthesia. Fixation was achieved with a bio-absorbable screw on the tibial side and an endobutton on the femoral side. Lateral or medial menisectomy was performed according to the requirement. Post-op X-rays were done to assess the position of the endobutton and tibial tunnel. 8mm tunnels were drilled, and the tendon was tailored accordingly.<sup>12</sup> Patients were followed up for three months after the surgery to look for outcomes. Pain, infection, range of motion and instability were studied in all the patients.

Pain was regarded as significant if rated >6 on the visual analogue scale; infection was diagnosed by a consultant surgeon based on clinical examination and relevant investigations. Range of motion included flexion and extension, which was achieved using a goniometer.<sup>13</sup> Lachmann and Pivot shift tests were used to assess the joint stability.<sup>14</sup>

Statistical Package for Social Sciences (SPSS) version 21.0 was used for the data analysis. Quantitative variables were expressed as Mean ± SD and qualitative variables were expressed as frequency and percentages. Chi-square test was applied to explore the inferential statistics. The *p*-value lower than or up to 0.05 was considered as significant.

**RESULTS**

A total of 52 patients were included in the final analysis. The mean age of the study participants was 33.36±6.353 years. All of the patients included in our study were males (Table-I). At the end of three months, pain 6(11.5%) and restricted range of motion 6(11.5%) were the common untoward outcomes reported by the patients. Wound infection occurred in 2(3.8%) patients, resolved with dressing and antibiotic use. (5.7%) had a positive pivot shift test, while 2(3.8%) had a positive Lechmann test. High body mass index (*p*-value<0.001) and lack of engagement in physiotherapy (*p*-value 0.017) had a statistically significant relationship with the presence of untoward outcomes in our study (*p*-value<0.05) (Table-II).

**Table-I: Demographic details of Study Participants (n=52)**

Study Parameters	n(%)
<b>Age (years)</b>	
Mean±SD	33.36±6.353 years
Range (min-max)	19 years±42 years
<b>Body mass index</b>	
Normal	35(67.3%)
Overweight	12(23.1%)
Obese	05(9.6%)
<b>Outcome variables at 3 months</b>	
Pain	6(11.5%)
Infection	2(3.8%)
Restricted range of motion	6(11.5%)
Negative pivot shift test	3(5.7%)
Negative lechmann test	2(3.8%)

**DISCUSSION**

Anterior cruciate ligament injury is a common athletic injury accounting for half of all knee injuries, with being more common in female athletes with a 4.5:1 ratio.<sup>2</sup> Treatment involves ligamentous ACL reconstruction utilising various techniques and graft

choices rotational/rotational stability of the knee joint, thus allowing the patients to return to preinjury level. Peroneus longus is considered a strong, robust, thick graft with minimal donor site morbidity.<sup>10</sup> We conducted this study to evaluate the functional outcome of unilateral peroneus longus autograft in arthroscopic anterior cruciate ligament reconstruction.

**Table-II: Relationship of various variables showing disease severity with high Body Mass Index (n=52)**

Factors Studied	Unevent Ful Outcome	Positive Untoward Outcome Variables	p-value
<b>Age</b>			
<25 years	15(41.7%)	05(31.25%)	0.472
>25 years	21(58.3%)	11(60.75%)	
<b>Engagement in physiotherapy</b>			
No	12(33.3%)	11(60.75%)	0.017
Yes	24(66.7%)	05(31.25%)	
<b>Body Mass Index</b>			
Normal Over-weight or obese	31(86.1%) 05(13.9%)	04(25%) 12(75%)	<0.001

He *et al.* concluded that the Lachman test, donor site pain, and graft failure had no statistically significant difference in both groups, making both methods equally effective.<sup>15</sup> Rhatomy *et al.* conducted a study to compare the clinical outcome and donor site morbidity of ACL reconstruction with hamstring tendon autografts versus peroneus longus tendon autografts in patients with an isolated ACL injury.<sup>16</sup> They followed up with patients for one year and concluded that peroneus longus tendon autograft had better long-term outcomes than hamstring tendon autograft. We only followed up with patients for three months and found the peroneus longus graft a robust option for ACL reconstruction.

A similar study was performed by Kumar *et al.* in our neighbouring country, India, to evaluate the clinical outcome and donor site morbidity of ACL reconstruction with Peroneus longus tendon autografts in patients with isolated ACL injury.<sup>17</sup> They revealed similar results to ours, and very few patients had mild untoward effects related to outcome, including positivity of pivot shift and Lachman test. Mo *et al.* studied this subject extensively and published a Systematic Review and Network Meta-Analysis. They included 45 trials with 3992 patients and found that patellar tendon autograft had the best results when the outcome was seen via the Lachman test and Tegner score.<sup>18</sup> We had the same findings with Peroneus longus tendon autograft when we used pain, infection, range of motion and Lachman test as outcome measures.

**LIMITATIONS OF STUDY**

The study design was cross-sectional, and no comparison was made with any other method, so we cannot infer that this method is the best available method for the reconstruction of ACL and should be used in the routine. Moreover, long-term follow-ups still need to be done to look for the results after six months or one year. Many confounding factors could affect the outcome, which may be controlled in future studies.

**CONCLUSION**

Peroneus longus is a strong, robust autograft for anterior cruciate ligament reconstruction with excellent functional results. Very few patients had untoward effects, and those, too, were of mild intensity. Patients with high body mass index and those not engaging in physiotherapy emerged as high-risk patients for having untoward effects after the surgery.

**Authors Contribution**

Following authors have made substantial contributions to the manuscript as under:

SM & WAN: Data acquisition, data analysis, drafting the manuscript, approval of the final version to be published.

MN & AR: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

ATM & ZS: Concept, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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## Arthroscopic Anterior Cruciate Ligament Reconstruction

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