

Is Peroneus Longus autograft safe and effective alternative for Anterior Cruciate Ligament Reconstruction?

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ABSTRACT

Objective: To determine the functional outcomes Peroneus Longus (PL) autograft for Anterior Cruciate Ligament Reconstruction (ACLR).

Methods: This descriptive study was conducted in AO Hospital Karachi Pakistan from 21st January 2020 to 21st January 2022. All adults patients with Anterior Cruciate Ligament (ACL) tear fulfilling the inclusion criteria were treated arthroscopically with ipsilateral PL autograft. Post operative knee function was assessed with International Knee Documentation committee (IKDC) score and Tegner-Lysholm score at three months, six months, one year and two years follow up. Ipsilateral Ankle and foot function was assessed with American Orthopaedic Foot and Ankle Society (AOFAS) score. Pain intensity was measured with Visual Analogue Scale (VAS).

Results: We operated 30 patients of ACL tear with ipsilateral Peroneus Longus tendon autograft. The mean age was 27.73± 4.14 years. All patients were male. Left knee was operated in 18(60%) and right in 12(40%). At two years follow up the IKDC score and Tegner-Lysholm score significantly improved from pre operative 50.87±12.96 and 66.86±16.96 to 90.40±5.98 and 96.53±5.73 respectively (p<0.05). The intensity of pain was significantly reduced from pre operative VAS 3.36±1.86 to 0.77±0.85 at two years follow up.(p<0.05). The foot and ankle function was not affected by PL autograft harvesting as indicated by AFOAS score of 98.63 ± 3.88 at two years follow up.

Conclusion: Excellent functional outcome was achieved with Peroneus Longus tendon autograft for Anterior Cruciate Ligament Reconstruction (ACLR) in our series. PL can be a safe and effective alternative to other autografts for ACLR without any significant donor site morbidity.

Keyword: Anterior Cruciate Ligament, AOFAS, autograft, IKDC, Peroneus Longus, Tegner-Lysholm.

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INTRODUCTION

Anterior Cruciate Ligament (ACL) reconstruction is one of the most commonly performed Orthopaedic and sports surgery reconstruction procedure.¹ Autograft selection for ACLR however is debatable but many surgeons still prefer bone- patellar tendon-bone (BPTB) and hamstring autografts although both of them have complications and some donor site morbidity.^{2,3} Since anterior knee pain is common with BPTB autograft hamstring autograft gained popularity amongst the sports surgeons as it provided comparable functional outcomes and knee stability.^{4,5}

Many surgeons after reporting laxity and weakness of the hamstring muscles after harvesting hamstring autograft favoured ipsilateral Peroneus Longus (PL) tendon as choice of graft for ACLR.⁶ The PL tendon causes eversion of the ankle joint. Due to its synergistic function with Peroneus Brevis, PL tendon is relatively safe to harvest without significant impairment of its function.⁷ PL tendon autograft is a potential graft for many Orthopaedic reconstructive procedures besides ACLR.⁸ Its biomechanical properties and thickness permit its use for ACLR. The tensile strength of PL is similar to Hamstring

autograft but higher than BPTB and Quadriceps tendon.⁹ The surgeons can harvest PL autograft with relatively small incision which results in less donor site morbidity.¹⁰ Previous literature reported that PL autograft can provide good functional outcomes comparable to Hamstring autograft because of its larger diameter and than Hamstring and BPTB autografts.¹⁰⁻¹²

We hypothesized that PL autograft is a safe and effective alternative to other conventional autografts used for ACLR. The objective of our study was to determine the functional outcomes PL autograft for Anterior Cruciate Ligament Reconstruction (ACLR).

METHODS

We conducted this descriptive study in AO Hospital Karachi Pakistan from 21st January 2020 to 21st January 2022. All adult patients with ACL tear diagnosed clinically (positive Lachman's test, anterior drawer test and Pivot shift test) and confirmed on MRI were included. Patients with previous knee surgeries, infection, ankle instability, surgery and fractures around ankle were excluded. The study protocols were approved by the Ethical Committee of our hospital. Informed written consent was obtained from all study participants. In the included subjects complete history and physical examination was carried out. Relevant investigations were undertaken. The pre operative functional assessment of the affected knee was carried out using International Knee Documentation committee (IKDC) score¹³ and Tegner-Lysholm score.¹⁴ The IKDC score is a validated tool of knee functional assessment with score of 0 to 100 with 0 indicating lowest functional outcome and higher symptoms whereas 100 indicating excellent functional outcome and no symptoms. The Tegner-Lysholm score ranges from 0 to 100 with score of >90 indicates excellent functional outcome, 84 to 90 score is good outcome, 65 to 83 fair score and <60 score is poor score. The pre operative ipsilateral ankle and foot function was assessed with American Orthopaedic Foot and Ankle Society (AOFAS) score.¹⁵ This score ranges from 0 to 100. (the higher the score the better the functional outcome). The pre operative knee pain was assessed with Visual Analogue Scale (VAS) with 0 indicating no pain and 10 indicating very severe pain.

All the surgeries were performed under general or spinal anaesthesia and by the same team of

experienced Orthopaedic and sports surgeons. A uniform standard surgical technique for ACLR and ipsilateral PL harvesting was adopted for all cases. Post operative supervised physical therapy was mandatory for all patients. Follow up visits were scheduled at 2nd week after surgery initially and then monthly for six months and then quarterly for two years. The functional outcome of knee and ankle was assessed with IKDC score, Tegner-Lysholm score and AOFAS score at three months, six months, one year and two years follow up. Knee pain was assessed with VAS. The post operative functional outcome and pain was compared with pre operative evaluation.

The data was analysed by using SPSS software version 26. The frequencies and percentages were used to analyse descriptive statistics. The non-parametric Kruskal Wallis test was used to compare pre-operative and post-operative functional scores (IKDC, Tegner-Lysholm, AOFAS and VAS). P value < 0.05 was considered statistically significant. Data was presented in tables where necessary.

RESULTS

In this study we performed arthroscopic ACLR with ipsilateral PL autograft in 30 patients. The mean age of our study participants was 27.73 ± 4.14 years. All the patients were male. Majority (60%, n=18) of patients had left knee ACLR while right knee was operated in 12 (40%) patients. The aetiology of ACL tear was sports injuries in 12 (40%) patients, road traffic accidents in 9 (30%) and fall in 9 (30%) patients. All patients had negative Lachman's test, Pivot shift test and anterior drawer test after reconstruction. A comparison of pre operative and post operative knee functional outcome and pain intensity is shown in table I. At two years follow up the IKDC score and Tegner-Lysholm score significantly improved from pre operative 50.87 ± 12.96 and 66.86 ± 16.96 to 90.40 ± 5.98 and 96.53 ± 5.73 respectively (p < 0.05). The intensity of pain was significantly reduced from pre operative VAS 3.36 ± 1.86 to 0.77 ± 0.85 at two years follow up (p < 0.05). The foot and ankle function was not affected by PL autograft harvesting as indicated by AOFAS score of 98.63 ± 3.88 at two years follow up. There was no intra-operative or major post operative complication in our study.

Table I: Comparison of pre operative and post operative knee functional outcome and pain intensity.

S. No	Outcome variable	Pre operative (mean±SD)	Post operative 3 rd month (mean±SD)	Post operative 6 th month (mean±SD)	Post operative 12 th month (mean±SD)	Post operative 24 th month (mean±SD)	P value
1	IKDC score	50.87±12.96	61.82±6.84	76.60±6.83	89.07±3.41	90.40±5.98	<0.001
2	Tegner-Lysholm score	66.86±16.96	77.50±6.46	90.20±4.13	96.20±4.58	96.53±5.73	<0.001
3	VAS	3.36±1.86	1.63±0.71	1.30±0.75	1.03±1.06	0.77±0.85	<0.001

DISCUSSION

Our study revealed that the PL tendon autograft for ACLR had good functional outcomes, significant pain reduction and no major donor site morbidity at 2 years follow-up. The most important decision in reconstructing a rupture ACL is the selection of ideal autograft.¹⁶ For decades BPTB and hamstring grafts were used for ACLR but an ideal autograft for ACLR is still controversial,¹⁷ because BPTB and hamstring autograft have many complications.¹⁸ Because of its substantial diameter and excellent biomechanical properties the PL tendon is currently the tendon of choice for ACLR.^{18,19}

In our study we documented that excellent functional outcome was achieved with Peroneus Longus tendon autograft for arthroscopic ACLR. PL can be a safe alternative to other autograft for ACLR without any significant donor site morbidity. Rhatomy²⁰ was the opinion that PL tendon had substantially larger diameter than the hamstring tendon ($P=0.012$) and produced comparable results to the Hamstring autograft for ACLR but with less donor site morbidity.

Shi FD et al¹⁸ performed biomechanical study and concluded that PL tendon is safe and effective autograft for ACL reconstruction. These authors reported that the tensile strength of PL and Hamstring tendon was $4,268\pm 285$ and $4,090\pm 265$, respectively. He J et al²¹ conducted a systematic review and meta-analysis utilizing 23 studies and 925 patients with ACLR. They concluded that PL autograft had comparable functional outcome and graft survival to Hamstring autograft for ACLR. Slight decrease in ankle function can occur with PL harvesting but it avoided major morbidity of graft harvesting around knee in cases of Hamstring harvesting. Contrary to the above studies Marin and colleagues²² conducted a systematic review comprising of two articles comparing Hamstring with PL autograft for ACLR. These authors concluded that short term outcome of both grafts are the same but PL graft can not be recommended for routine ACLR

because of lack of strong evidence of minimal donor site morbidity.

Our study had few limitations. The design of our study was descriptive. Our sample size was small. Further studies are therefore recommended to verify the safety and efficacy of PLT autograft in ACLR.

CONCLUSION

Excellent functional outcome was achieved with Peroneus Longus tendon autograft for Anterior Cruciate Ligament Reconstruction (ACLR) in our series. PL can be a safe and effective alternative to other autograft for ACLR without any significant donor site morbidity.

Conflict of Interest: None

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