



“PROSPECTIVE INTERVENTIONAL STUDY TO EVALUATE CLINICAL OUTCOME AND DONOR SITE MORBIDITY IN PATIENTS WITH ISOLATED ACL INJURY TREATED WITH ARTHROSCOPIC ACL RECONSTRUCTION WITH PERONEUS LONGUS TENDON AUTOGRAFTS”

Orthopaedics

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ABSTRACT

Objective: To compare the clinical outcome and donor site morbidity of ACL reconstruction with Peroneus longus tendon autografts in patients with isolated ACL injury. **Methods:** Patients with Isolated ACL injury at S.M.S. medical college were assigned to evaluate the clinical outcome and donor site morbidity of ACL reconstruction with Peroneus longus tendon autografts and record and results were assessed via physical examination. Donor site morbidity of the foot and ankle after tendon harvesting was assessed using Medical Research Council (MRC) grading of ankle and foot movements. **Results:** In this study sample of 32 patients, after proper follow up, the ankle functions were grossly preserved in almost all the patients which was elucidated by grading the power of the muscles of the foot movements and 93.7% of patients reported an IKDC score 85-94 (good score) at 2 yr. follow up. **Conclusions:** With the result of this study, the use of the peroneus longus as the graft of choice in single-bundle ACL reconstruction can be encouraged in clinical practice, because it shows comparable functional scores compared with the hamstring tendon with less donor site morbidity.

KEYWORDS

ACL reconstruction, peroneus longus, donor site morbidity.

INTRODUCTION:

Anterior cruciate ligament (ACL) injuries are common in athletes, incapacitating for certain sports activities and predispose towards meniscal and cartilage lesions and if left untreated may evolve to arthrosis. The incidence of ACL injury in general population is 1:3000. The knee is essentially a hinged joint that is held together by the medial collateral, lateral collateral, anterior cruciate, and posterior cruciate ligaments. The ACL runs diagonally in the middle of the knee, preventing the tibia from sliding out in front of the femur, as well as rotational stability to the knee.

ACL reconstruction improves knee stability and function with many graft types, either autografts or allografts^[1]. Among these grafts, bone patellar tendon bone (BPTB) and four strand hamstring autografts are most common autografts used for ACL reconstruction and each has its advantages and disadvantages^[2,3,5]. Use of peroneus longus tendon autograft is a recent development in the field of ACL reconstruction. Some previous studies reported using the peroneus longus tendon as the first choice for an autograft in ACL reconstruction, with good clinical outcome and minimal donor site morbidity^[8,9].

MATERIAL AND METHODS:

The study was conducted in Orthopaedics department of S.M.S. medical college from November 2020 to July 2022 with minimum 6 month follow up. 32 cases were selected and thorough clinical examination was done (Lachman test, anterior drawer test and pivot shift test). Tests were also done to exclude concomitant other knee ligaments injuries. Patients are evaluated with x-rays of knee and confirmed by MR imaging.

Inclusion Criteria

a. Patients between age group of 18 to 45 years presenting with primary isolated ACL injuries.

Exclusion Criteria

- ACL tear associated with other knee joint ligament, menisci, or tendon injury.
- Any knee joint anatomical or pathological abnormality other than ACL tear.
- Patient having ankle joint, foot or hip joint abnormality.

On acute presentation, prior to reconstruction surgery patient is treated conservatively with knee immobilizer, physiotherapy for achieving near full range of motion, symmetric quadriceps strength and to decrease joint effusion. Once the inflammation subsides, patient is posted for surgery.

Surgical Procedure

Arthroscopic reconstruction of ACL was performed in supine position under spinal anaesthesia with pneumatic tourniquet used in all surgeries. Peroneus longus tendon was harvested through a 2-3 cm incision along the posterior border of the distal fibula, followed by superficial fascia incision. After hemostasis, peroneus longus tendon was identified and sutured distally with intact peroneus brevis tendon to avoid retraction (Fig 1).



Fig.1 Exposing PL graft

The tendon was sutured with No. 2 of heavy non-absorbable suture and cut with a scalpel and harvested using a long tendon stripper to at least 5 cm from the fibular head to prevent peroneal nerve injury (Fig 1).



Fig. 2 PL graft Retrieval

Graft was prepared through standard technique and looped into triple/quadruple strands for single bundle ACL reconstruction and measured (Fig 3).

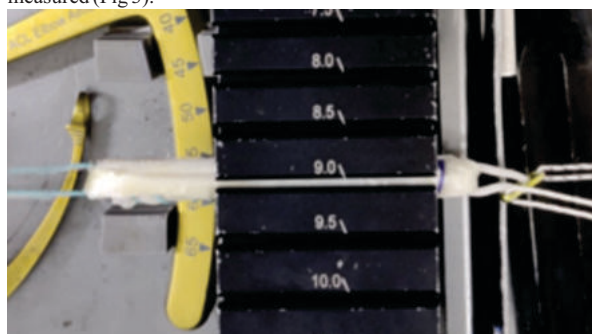


Fig. 3 Graft measurement taken

Standard arthroscopic portals were made and through diagnostic arthroscopy was done. Thereafter femoral and tibial tunnels were created at anatomical attachment sites using an appropriately sized reamer as determined by the thickness of the harvested graft and graft was inserted by applying constant traction and secured at anatomical sites of femur and repeated cycling of knee joint is done to avoid kinking in graft and finally graft secured at tibial tunnel using endobutton/titanium screw. After reconstruction, stability of ACL was checked by Lachman's test, which showed no laxity.

POST-OPERATIVE CARE

The knee brace was unlocked to allow 0-90 degrees knee motion on the second or third postoperative day and the patient was discharged. Weight bearing as tolerated was allowed with support by walker, initially only 50% body weight in 1st post-op week than 50-75% body weight during 8-14 days post-op. Full weight bearing without support was allowed as soon as the patients were comfortable and regained proper muscle power of operated limb to avoid misbalancing. The usual clinical follow-up included review at 10-14 days for wound inspection and suture removal, the brace set to 0-120 degrees at 4 weeks and removed at 6 weeks. Wall sliding semi-squats were allowed as early as possible. Bicycling was allowed at 2-3 months and general strengthening exercises continued. Returning to sports involving jumping, pivoting, or side-stepping was prohibited until 9 months post-operatively but with variable patient compliance.

FOLLOWUPPLANS:

Post-operative knee function was evaluated by the International Knee Documentation Committee (IKDC) and assessment of MRC scoring for donor site ankle and foot done at 2 weeks, 6 weeks, 3-month, 6 months (at least), 1 year and 2 year follow ups.

OBSERVATIONS AND RESULTS:

Out of 32 patients, 25 were male and 7 were female. 9.0 mm diameter was noted in majority of cases undergoing peroneus longus graft harvesting accounting for 50.0% of total cases (Table 1).

Table 1: Thickness Of PL Graft

Thickness of graft (mm)	No. of patients	Percentage(%)
7.5	1	3
8.0	3	9

8.5	7	22
9.0	16	50
9.5	5	16

The length of the Peroneus longus graft harvested in the study ranged from 290-330 mm. The mean length was 292.8 mm.

Post operatively, knee joint stability was assessed using Lachman test which showed 0-2mm translation in 30 cases (93.7%), while patients (6.3%) had 3-5mm translation (Table 2).

Table 2: Lachman's translation test preop v/s post op

Lachmans translation	Pre- Op	Post-Op
A 0-2mm	7	30
B 3-5mm	17	2
C 6-8mm	5	0
D 9-10mm	3	0

Pivot shift test was negative in 30 out of 32 cases postoperatively.

30 out of 32 patients (93.7%) reported an IKDC score 85-94 (good score) at 2 yr. follow up with Mean IKDC Score was 92.3 at 2 yr. follow-up period (Table 3).

Table 3: IKDC Subjective Assessment

I.K.D.C. Subjective Assessment -2 yr	Total
(B) SCORE 85-94	30
(C) SCORE 65-84	2
Total	32

For evaluation of ankle ROM, MRC grading of flexion/extension, inversion/eversion, and rotation of ankle in the operated ankle assessed and compared with opposite normal ankle. Post-Op, MRC grading of the operated ankle was grade 5 in all the cases and ankle movements were grossly preserved in all the cases.

DISCUSSION:

Rupture of the ACL impairs the stability of the knee, resulting in difficulty with athletic performance, increases risk of subsequent meniscal injury, and increased risk of early degenerative joint disease. The outcome of repair alone is inferior to the results after reconstruction or repair with augmentation. Anterior cruciate ligament reconstruction has been advocated to improve knee stability^[1] and reduce the incidence of later meniscal tears, although the latter has not been proved by scientific experimentation.

Many techniques for ACL reconstruction have been proposed and tested, including prosthetic ligament, allograft, autograft, graft with prosthetic augmentation, and extraarticular reconstruction. Autografts of peroneus longus tendon or hamstring tendon are now preferred by most surgeons, and extraarticular reconstruction is rarely used. Open and arthroscopic techniques of graft substitution have been compared but have not shown significant differences in outcome^[2,3].

The peroneus longus graft has been accepted for ligament reconstruction because of its strength, safety, and less donor-site morbidity. The peroneus longus graft allows surgeons to harvest the autograft via a relatively small incision, resulting in fewer donor-site complications^[4,9]. According to Rhatomy et al., the use of a peroneus longus graft provides good functional outcomes that are comparable with those of a hamstring autograft, but it has a larger graft diameter and its harvest results in less thigh hypotrophy^[7,10]. Additionally, Cao also found the Peroneus longus a good substitute of anterior cruciate ligament reconstruction and its resection has no major influence for ankle joint^[11].

The limitation of this study is use of MRC grading for evaluation of ankle and foot functional outcome which does not provide objective results as compared to FADI and AOFAS score and newer devices such as arthrometer.

CONCLUSION:

In this Hospital based prospective interventional study for ACL reconstruction, Peroneus longus tendon autografts had an excellent functional outcome (IKDC, Pivot Shift test, MRC grading) and it is an appropriate autograft source for ACL reconstruction in view of ease of harvest, adequate size, cosmetically appealing, considering excellent post-operative knee scores. With the result of this study, the use of the peroneus longus as the graft of choice in single-bundle ACL

reconstruction can be encouraged in clinical practice, because it has comparable functional scores compared with the hamstring tendon as suggested by previous similar studies with less donor site morbidity, especially in groups of patients who frequently kneel in their daily activities, as they do in our country.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Frank CB, Jackson DW. The science of reconstruction of the anterior cruciate ligament. *J Bone Joint Surg Am* 1997;79:1556-76
2. van Eck CF, Schreiber VM, Liu TT, Fu FH. The anatomic approach to primary, revision and augmentation anterior cruciate ligament reconstruction. *Knee Surg Sports Traumatol Arthrosc* 2010;18:1154-63.
3. Miller SL, Gladstone JN. Graft selection in anterior cruciate ligament reconstruction. *Orthop Clin North Am* 2002;33:675-83.
4. Otis JC, Deland JT, Lee S, Gordon J. Peroneus brevis is a more effective evtor than peroneus longus. *Foot Ankle Int* 2004;25:242-6.
5. Frank CB, Jackson DW. The science of reconstruction of the anterior cruciate ligament. *J Bone Joint Surg Am* 1997;79:1556-76.
6. Murawski CD, van Eck CF, Irrgang JJ, Tashman S, Fu FH. Operative treatment of primary anterior cruciate ligament rupture in adults. *J Bone Joint Surg Am* 2004;96:685-94.
7. Thomas AC, Wojtys EM, Brandon C, Palmieri-Smith RM. Muscle atrophy contributes to quadriceps weakness after anterior cruciate ligament reconstruction. *J Sci Med Sport* 2016;19:7-11.
8. Angthong C, Chernchujit B, Apivatgaroon A, Suchao-in K. The anterior cruciate ligament reconstruction with the peroneus longus tendon: a biomechanical and clinical evaluation of the donor ankle morbidity. *J Med Assoc Thai* 2015;98:555-560
9. Kerimoğlu S, Aynaci O, Saraçoğlu M, Aydin H, Turhan AU. Anterior cruciate ligament reconstruction with the peroneus longus tendon. *Acta Orthop Traumatol Turc* 2008;42:38-43
10. Sasetyo DR, Rhatomy S, Pontoh LA. Peroneus longus ten-don: the promising graft for anterior cruciate ligament reconstruction surgery. *Asia Pac J Sport Med Arthrosc Rehabil Technol* 2017;9:25.
11. Cao HB, Liang J, Xin JY. Treatment of anterior cruciate ligament injury with peroneus longus tendon. *Zhonghua yi xue za zhi*. 2012 Sep;92(35):2460-2.