



A COMPARATIVE STUDY OF THE FUNCTIONAL OUTCOME OF HAMSTRING TENDON VERSUS PERONEUS LONGUS TENDON IN ARTHROSCOPIC RECONSTRUCTION OF THE ANTERIOR CRUCIATE LIGAMENT OF KNEE.

Orthopaedics

Dr Shakti Swarup Panda

Assistant professor orthopaedics, Hi tech medical college and hospital Bhubaneswar.

Dr B Suraj Subudhi

Post graduate resident, Hi tech medical college and hospital Bhubaneswar.

ABSTRACT

Anterior cruciate ligament is pivotal in maintaining knee joint stability, in case of any injury it is usually followed by degenerative changes of the joint. The semitendinosus and gracilis tendon can be used to harvest hamstring tendon (HT) autografts. Most popular graft configurations being quadrupled hamstring. The peroneus longus (PL) tendon is another suitable option for autograft, as it is superficial and can be easily harvested. The aim of our study is to compare the functional outcome between the peroneus longus tendon and hamstring tendon in arthroscopic ACL Reconstruction. The clinical outcomes in the knee will be assessed using International Knee Documentation Committee (IKDC) Score and LYSHOLM score. **Material And Methods:** In this prospective cross-sectional comparative study, a total of 30 patients underwent arthroscopic anterior cruciate ligament (ACL) reconstruction. Patients were grouped in two categories, one with hamstring tendon autograft and the other with peroneus longus tendon autograft between July 2022 and July 2024. **Result:** In our study, 30 patients of ACL injury were operated. 15 patients each were included in both the group, the IKDC grading of functional outcome was normal (Grade A) in 10 patients (66.67%) and near normal (Grade B) in 5 patients (33.33%) in Group A hamstring tendon whereas in peroneus longus group B it was normal (Grade A) in 11 patients (73.33%) and near normal (Grade B) in 4 patients (26.67%). There was no significant difference in IKDC grading (post op) distribution between two groups ($p=0.690$). **Conclusion:** The present study suggests that comparative functional outcome analysis on the use of hamstring tendon and peroneus longus tendon grafts showed no significant differences. However, the peroneus longus is the most preferred graft alternative because of its adequate length and graft thickness.

KEYWORDS

Acl tear, hamstring graft, peroneus longus graft, arthroscopic reconstruction

INTRODUCTION:

Anterior cruciate ligament is pivotal in maintaining knee joint stability, in case of any injury it is usually followed by degenerative changes of the joint. ACL is a thick band that extends from the anteromedial aspect of the intercondylar region of the tibial plateau and connects to the lateral femoral condyle. It is made of connective tissue and collagenous fibres (1). When the knee is extended the ACL has a mean length of 32mm and width of 7 - 12 mm. The ACL has two components the anteromedial bundle and posterolateral bundle. ACL plays an important role in stabilizing knee joints against translational and rotational forces.

ACL tear can be evaluated using a variety of provocative tests like the anterior drawer test, pivot shift test, and Lachman test. The most common method for diagnosing ACL pathology is MRI. Knee diagnostic arthroscopy can also be used for diagnosis to distinguish between total, partial, and chronic tears [2]. Arthroscopic ACL reconstruction is the commonest procedure for ACL pathology (3,4). ACL reconstruction enhances knee stability and function. ACL reconstruction can be performed using a variety of surgical techniques as well as different graft materials. (5). The choice of graft has significantly been changing in the past few decades with each graft option having its own advantages and disadvantages.

The bone-patellar tendon-bone (BPTB) graft is the most effective graft option as it facilitates bone-to-bone healing which allows for the efficient integration of the graft within the tunnel. This results in speedy recovery to sports and routine activities [6]. Although the BPTB autograft has been a gold standard, there is risk of anterior knee discomfort, risk of patellar fracture and a fixed length of graft. Hence its choice is limited for revision ACL reconstruction and highly demanding athletic cases only.

The semitendinosus and gracilis tendon can be used to harvest hamstring tendon (HT) autografts. Most popular graft configurations being quadrupled hamstring [7]. Hamstring tendon autograft is easy to harvest and is associated with less donor site morbidity and the strength as compared to the native ACL morphology. The disadvantages of hamstrings include unpredictable graft and damage to sartorial branch of saphenous nerve while harvesting and premature graft transaction.

The peroneus longus (PL) tendon is another suitable option for autograft, as it is superficial and can be easily harvested. Important

functions of PL include plantar flexion of the ankle, eversion of the sole, maintenance of the transverse arch, and stability.⁽⁸⁾

The aim of our study is to compare the functional outcome between the peroneus longus tendon and hamstring tendon in arthroscopic ACL Reconstruction. The clinical outcomes in the knee will be assessed using International Knee Documentation Committee (IKDC) Score and LYSHOLM score.

MATERIAL AND METHODS:

In this prospective cross-sectional comparative study, a total of 30 patients underwent arthroscopic anterior cruciate ligament (ACL) reconstruction. Patients were grouped in two categories, one with hamstring tendon autograft and the other with peroneus longus tendon autograft between July 2022 and July 2024. The diagnosis of ACL tear was established by the patient's medical history, physical examinations (Lachman test and anterior drawer test), and magnetic resonance imaging findings.

The inclusion criteria were individuals aged 18–50 years, clinical and radiological evidence of acl tear, providing written informed consent for surgery and normal contralateral knee. The exclusion criteria were associated cartilage lesions grade III or higher, previous knee surgery, revision ACL cases, previously infected surgery and associated fracture if any. Similar surgery, anaesthesia and rehabilitation protocol was performed in both the groups and followed at 1 month, 3 months, 6 months and 1 year. Both the groups were assessed with LYSHOLM and IKDC score at each follow up and results compared.

Surgical Procedure

All surgeries were performed with patients positioned supine under regional anaesthesia. The surgery was done under tourniquet. Standard anterolateral and anteromedial portals were done. Diagnostic arthroscopy was conducted to confirm the diagnosis, followed by harvesting of either the peroneus longus or hamstring tendon.

Peroneus Longus Tendon Harvesting:

The peroneus tendon is harvested from the ipsilateral leg. The incision site is marked at a distance of 1–2 cm above and 1 cm posterior to the lateral malleolus. The incision was made through the skin, subcutaneous tissue, and superficial fascia. The tendons of peroneus brevis and peroneus longus were identified, the distal end of the PL tendon was sutured to the peroneus brevis tendon. The PL tendon was stripped with a closed tendon stripper.



Figure 1



Figure 2

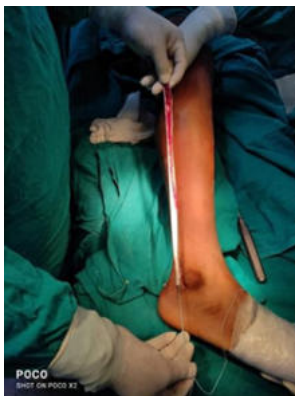


Figure 3

Hamstring Tendon Harvesting:

Around 2 – 3 cm oblique skin incision taken over the pes anserinus on the anteromedial side of the proximal tibia 3 to 4 cm below the joint line. Sartorial fascia cut and gracilis and semitendinosus tendons separated. Tendons cut from tibial side and whip stitched with polyester suture and harvested using closed tendon stripper.

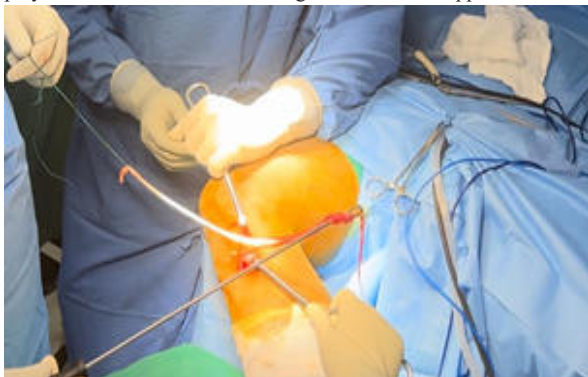


Figure 4



Figure 5

Following graft preparation, measurement of graft diameter done with the help of sizing tube. Remnant of acl and fibrous tissue removed until the attachment site of both femoral and tibial side appreciated. With the help of appropriate femoral offset femoral tunnel done aiming the area around resident's ridge and tibial tunnel was drilled with the help of tibial guide aiming the tibial eminence in line with the posterior border of anterior horn of lateral meniscus and the prepared graft was passed using outside in technique with ethibond sutures and secured using fixed loop endobutton on femoral side and peak screw on the tibial side. Closure was done.

Post Operative Rehabilitation:

All patients with ACL reconstruction were mobilized using crutches immediately after surgery, and partial weight bearing started after 7 days and subsequently full weight bearing was encouraged gradually. 3 weeks non weight bearing protocol was followed in case of additional meniscus repair with ACL reconstruction. The range of motion exercises of knee and ankle were immediately started for all groups and gradually increased to strengthen the quadriceps and extend the range of motion in the knee. Follow-up sessions were scheduled on the 15th day post operative for suture removal and at 1 month, 3 months, 6 months and 1 year. Both the groups were assessed with LYSHOLM and IKDC score at each follow up and results compared after surgery.

RESULT:

In our study, 30 patients of ACL injury were operated. 15 patients each were included in both the group, Group A included patients with hamstring tendon and Group B with peroneus longus. The mean age of patients in Group A is 31.8 years and group B is 30.13 years. In both groups, males' preponderance was noticed i.e. 53.33% in group A and 66.66% in group B. In both the groups, most of the patients had right side involvement i.e. 60% in group A and 73.33% in group B. In both the groups majority of patients sustained injury due to road traffic accidents followed by sports related injury and lastly domestic fall. The average graft diameter of Group A is 7.62 mm and that of Group B is 8.55 mm.

Table 1

Parameters	Group A (Hamstring tendon)	Group B (peroneus tendon)
Total	15	15
Mean age	31.8 years	30.13 years
Range (age)	32 years	30 years
Sex	08(53.33%)	10(66.66%)
Male		
Female	07(46.66%)	05(33.33%)
Side involved		
Left side	06(40%)	04(26.66%)
Right side	09(60%)	11(73.33%)
Mean graft diameter	7.62 mm	8.55 mm

In Group A hamstring tendon showed excellent in 10 patients (66.66%) and good in 05 patients (33.33%), with mean score of 90 +/-3.18.

whereas group B peroneus longus excellent in 11pts (73.33%) & good in 4 patients (26.67%) with a mean of 92.2+/-2.65. There was no significant difference in mean Lysholm score (post op) comparison between two groups ($p=0.439$).

The IKDC grading of functional outcome was normal (Grade A) in 10 patients (66.67%) and near normal (Grade B) in 5 patients (33.33%) in Group A hamstring tendon whereas in peroneus longus group B it was normal (Grade A) in 11 patients (73.33%) and near normal (Grade B) in 4 patients (26.67%). There was no significant difference in IKDC grading (post op) distribution between two groups ($p=0.690$).

DISCUSSION:

In our study, we evaluated functional outcome of 30 ACL injury patients operated for arthroscopic ACL reconstruction. Nearly half of all knee injuries occur to the anterior cruciate ligament (ACL), making it the most common injured ligament of the knee [9]. ACL reconstruction is important to prevent impeding instability and associated secondary complications. Its reconstruction with autografts is widely practised. The autografts usually involve harvesting from hamstring tendon, peroneus longus tendon, quadriceps tendon and bone patellar tendon bone graft. The present study was done to compare the reconstruction of ACL by hamstring and peroneus longus tendon by comparing the functional outcome of both groups. The choice of graft and the site of harvest is the most crucial consideration.

In our study the mean age of patients in Group A is 31.8 years and group B is 30.13 years. This indicates a clear preponderance in young active individuals. In comparison to study conducted by Hurd W J et al [10] and Sanders TL et al [11] both studies concluded similar results of majority injury in younger individual.

In the present study, majority of patients of both Group A (53.33%) and Group B (66.66%) were males. This clearly indicates a male preponderance which may be because of greater participation of males in contact and collision sports. Hurd W J et al [10] and Sanders TL et al [11] concluded similar results.

In our study we observed that majority of patients in both groups sustained injury due to road traffic accidents followed by sports related injury and lastly domestic fall. Study conducted by Shuaib et al [13] also concluded RTA as the commonest etiology for ACL in Indian population as compared to western population where sports related injuries are the commonest.

In the present study, we used both peroneus longus tendon graft and hamstring autograft and compared the average diameter of the peroneus longus tendon graft was 8.55mm and hamstring tendon graft was 7.62mm, hence peroneus longus graft diameter met the ideal diameter criteria. Magnussen et al [12] stated the ideal minimum graft diameter of 8 mm is best to avoid graft rupture.

Comparing both the groups in our present study, the mean difference in Lysholm score calculated at each follow-up were found to be statistically not significant and improved over the period of follow-up, from preoperative to 12 months. Similar results were observed in the mean IKDC scores of both the groups which was statistically not significant over subsequent follow up.

Comparative functional outcome analysis on the use of hamstring tendon and peroneus longus tendon grafts showed no significant differences between the pre- and 12-month post-surgery, based on the IKDC and Lysholm Knee Scoring Scale. When compared to other studies Keyhani et al [14] in their study comprising of 130 patients compared functional outcome of peroneus longus vs hamstring graft in ACLR and found no significant difference in clinical outcome and knee stability. Another study by Rhatomy S et al in 2019, showed a statistical analysis comparing the postoperative functional score for the hamstring and peroneus longus tendon groups, the mean IKDC score was statistically insignificant [15].

CONCLUSION:

The present study suggests that comparative functional outcome analysis on the use of hamstring tendon and peroneus longus tendon grafts showed no significant differences between the pre- and 12-month post-surgery, based on the IKDC and Lysholm Knee Scoring Scale. However, the peroneus longus is the most preferred graft alternative because of its superficial location, adequate length to

prepare a threefold adequate thickness graft, less donor site morbidity and short operative time.

REFERENCES:

- Evans J, Nielson JL. Anterior Cruciate Ligament Knee Injuries. 2022 May 5. In: Stat Pearls [Internet]. Treasure Island (FL): Stat Pearls Publishing; 2022 Jan-. PMID: 29763023
- Eberl R. [Anterior cruciate ligament rupture in children with open growth plate: Diagnostics and treatment]. *Unfallchirurg*. 2019;122(1):17–21. doi: 10.1007/s00113-018-0589-1.
- Shaerf DA, Pastides PS, Sarraf KM, Willis-Owen CA. Anterior cruciate ligament reconstruction best practice: A review of graft choice. *World J Orthop*. 2014;5:23-9.
- Iorio R, Vadalà A, Argento G, Di Sanzo V, Ferretti A. Bone tunnel enlargement after ACL reconstruction using autologous hamstring tendons: A CT study. *Int Orthop*. 2007; 31:49-55.
- Ahn JH, Lee SH. Anterior cruciate ligament double-bundle reconstruction with hamstring tendon autografts. *Arthroscopy*. 2007;23:109. e1-4.
- Adam F, Pape D, Schiel K, et al. Biomechanical properties of patellar and hamstring graft tibial fixation techniques in anterior cruciate ligament reconstruction: Experimental study with roentgen stereometric analysis. *Am J Sports Med*. 2004;32(1):71–78. doi: 10.1177/0095399703258608.
- Runer A, Keeling L, Wagala N, et al. Current trends in graft choice for anterior cruciate ligament reconstruction – part I: Anatomy, biomechanics, graft incorporation and fixation. *J Exp Orthop*. 2023; 10:37. doi: 10.1186/s40634-023-00600-4.
- Kerimoglu S, Aynaci O, Saraçoglu M, Aydin H, Turhan AU. Anterior cruciate ligament reconstruction with the peroneus longus tendon. *Acta Orthop Traumatol Turc*. 2008; 42:38-43.
- Kaeding CC, Léger-St-Jean B, Magnussen RA. Epidemiology and diagnosis of anterior cruciate ligament injuries. *Clin Sports Med*. 2017;36(1):1–8. doi: 10.1016/j.csm.2016.08.001.
- 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*. 2014 Apr 16;96(8):685-94.
- Sakai H, Yajima H, Kobayashi N, Kanda T, Hiraoka H, Tamai K, et al. Gravity-assisted pivot-shift test for anterior cruciate ligament injury: a new procedure to detect anterolateral rotatory instability of the knee joint. *Knee Surg Sports Traumatol Arthrosc*. 2006 Jan;14(1):2.
- Magnussen RA, Lawrence JT, West RL, Toth AP, Taylor DC, Garrett WE. Graft size and patient age are predictors of early revision after anterior cruciate ligament reconstruction with hamstring autograft. *Arthroscopy*. 012 Apr;28(4): 526-31. doi: 10.1016/j.arthro.2011.11.024. Epub 2012 Feb 1. PMID: 22305299.
- Shuaib Ahmed, Munis Ashraf, Santosh Sahanand, David V Rajan: Can ACL tears be restricted to sports injuries alone? A retrospective analysis; *Indian J Orthop*. 2021 March 15;55(suppl 2):402-408
- Keyhani S, Qoreishi M, Mousavi M, Ronaghi H, Soleymannha M. Peroneus Longus Tendon Autograft versus Hamstring Tendon Autograft in Anterior Cruciate Ligament Reconstruction: A Comparative Study with a Mean Follow-up of Two Years. *Arch Bone Jt Surg*. 2022 Aug;10(8):695-701. doi: 10.22038/ABJS.2022.59568.2938. PMID: 36258748; PMCID: PMC9569136.
- Wasserstein D, Sheth U, Cabrera A, Spindler KP. A Systematic Review of Failed Anterior Cruciate Ligament Reconstruction with Autograft Compared with Allograft in Young Patients. *Sports Health*. 2015 May;7(3):207-16.