

To Evaluate the Stability and Functional Outcome in ACL Reconstruction by Semitendinosis Graft in Low-Demanding Patients

Stability and Functional Outcome in ACL Reconstruction by Semitendinosis Graft

Syed Ali Raza¹, Haseeb Saqlain Bajwa², Muhammad Kamran¹, Muhammad Kashaf Naseer¹, Naveed Ali Shair² and Amir Sohail³

ABSTRACT

Objective: This study aimed to evaluate the stability and functional outcomes of ACL reconstruction using the semitendinosus graft.

Study Design: This was a prospective cohort study.

Place and Duration of Study: This study was conducted at the Mayo Hospital OPD in Lahore between April 2022 and April 2023.

Methods: A total of 15 patients with confirmed ACL ruptures, diagnosed clinically and through MRI, were recruited from the Mayo Hospital OPD in Lahore between April 2022 and April 2023. All surgeries were performed under a tourniquet, and the semitendinosus graft was used as the graft material. Functional outcomes were assessed using the Lysholm knee score.

Results: Among the 15 patients, 10 (66.66%) had twisting injuries, 3 (20%) were involved in car accidents, and 2 (20%) had previously experienced falls. Three patients (20%) exhibited positive grade I Lachman test results at the final follow-up, while 12 (80%) showed good outcomes with negative Lachman test results. The mean satisfaction rate was 7.1 ± 0.6 at three months and increased to 9.1 ± 0.1 at six months post-surgery. Before treatment, 6 (40%) patients had stability grade 3, and 9 (60%) had stability grade 2. The average Lysholm knee score before surgery was 66.1 ± 5.6 ; after surgery, it improved significantly to 92.3 ± 4.3 . A paired t-test demonstrated a substantial improvement in the Lysholm knee score following surgery (p -value < 0.001).

Conclusion: In conclusion, using the semitendinosus graft in ACL reconstruction resulted in excellent outcomes, including improved stability, minimal intraoperative trauma, and high patient satisfaction.

Key Words: ACL, Lysholm Knee Score, semitendinosus graft

Citation of article: Raza SA, Bajwa HS, Kamran M, Naseer MK, Shair NA, Sohail A. To Evaluate the Stability and Functional Outcome in ACL Reconstruction by Semitendinosis Graft in Low-Demanding Patients. Med Forum 2024;35(2):7-10. doi:10.60110/medforum.350202.

INTRODUCTION

The anterior cruciate ligament (ACL) is a vital stabilizer of the knee joint but is susceptible to injury, commonly occurring during activities like jumping

¹. Department of Orthopaedic Surgery, KEMU/Mayo Hospital, Lahore.

². Department of Orthopedic and Spine Surgery, Lahore General Hospital Lahore.

³. Department of Orthopaedic Surgery, Jinnah Hospital Lahore.

Correspondence: Syed Ali Raza, Senior Registrar, Department of Orthopaedic Surgery, KEMU/Mayo Hospital, Lahore.

Contact No: 03415456057

Email: ssherazi1990@yahoo.com

Received: October, 2023

Accepted: December, 2023

Printed: February, 2024

and sports. Such injuries often force individuals to discontinue sports and physically demanding jobs. Research conducted by Del Bel has identified sports as a significant contributor to ACL injuries, with a greater impact on younger individuals than their older counterparts^[1]. ACL injuries can also lead to meniscus damage, potentially resulting in osteoarthritis over time. In the United States, ACL injuries have a prevalence of approximately 1 in 3000 people, with roughly 120,000 cases reported annually^[2]. Males are more commonly affected than females. The surgical procedure known as ACL Reconstruction is often necessary to restore knee stability. If left untreated, patients experience instability, difficulty traversing uneven terrain, and challenges with running and jumping, significantly affecting their quality of life.

Over time, various surgical techniques have been developed, ranging from repair to reconstruction and open procedures to arthroscopic rebuilding^[3]. Successful graft placement is essential for achieving improved functional outcomes. The prevailing

technique for reconstruction involves a single bundle, typically restoring 60 to 70% of knee function^[4].

Multiple graft options are available, with the commonly employed Bone Patellar Tendon Bone (BPTB)^[5]. Among hamstring grafts, the tendons of the Gracilis and Semitendinosus muscles are frequently used^[6]. The quadruple hamstring graft has demonstrated notable advancements in ACL reconstruction outcomes due to its superior tensile strength, nearly three times that of the native ACL^[7]. Moreover, it is associated with fewer complications compared to alternative graft choices.

While ACL reconstruction has made significant strides, it remains an evolving field to address complications and enhance surgical outcomes^[8]. Thoughtful graft selection, precise tunnel placement, and carefully designed early rehabilitation programs can help minimize common surgical complications^[9].

This study's primary objective is to provide evidence-based insights that substantiate claims in the existing literature, eliminating conjectural statements often rooted in clinical or surgical experiences. The study's findings will facilitate informed decision-making when selecting appropriate surgical procedures for ACL injuries.

METHODS

From April 2022 to April 2023, a comprehensive study was conducted within the Department of Orthopedic Surgery at Mayo Hospital in Lahore, Pakistan. The study aimed to investigate the outcomes of surgical procedures for patients with ACL injuries.

Study Type: This was a prospective cohort study.

Study Setting: The study was conducted at Mayo Hospital in Lahore, Pakistan, within the Department of Orthopaedic Surgery.

Sampling Method: A purposive, non-probability sampling strategy was employed to select participants.

Inclusion Criteria: Patients of any gender between the ages of 18 and 40 years with a clinically confirmed complete ipsilateral ACL tear, as verified by MRI, were included in the study.

Exclusion Criteria: Patients with preexisting osteoarthritis, neuropathy, myopathy, multiple ligamentous injuries, a history of prior ACL reconstruction, or active infections.

Data Collection: Demographic data such as age, gender, height, and weight of the patients was recorded. Details about the circumstances of the injury, the mechanism of knee involvement, and any associated injuries were documented. Before surgery, patients underwent a thorough preoperative evaluation. This included assessing a range of motion, using the Lachman and Pivot Shift tests, and evaluating lateral and medial collateral ligament injuries in both surgical and non-operative knees.

Surgical Procedure: Patients were admitted to the hospital one day before surgery and made anesthesia-

ready after obtaining informed consent. The semitendinosus tendon was identified and marked while the patient was supine. A tourniquet was applied, and the knee and leg were prepared for surgery. The semitendinosus tendon was harvested at the tendomuscular junction and then transferred to the medial surface of the tibia for insertion. The knee joint was accessed, fat was removed, and tunnel sections were defined. The femoral tunnel was created with the knee at 90 degrees of flexion, and the tibial tunnel was positioned at the center of the ACL insertion. After removing soft tissue, the graft was secured at the lateral epicondyle locations using a suture passer, and the proximal tibia was drawn anteriorly. A femur or tibia condyle bone graft was placed into each tunnel.

Testing: The Lachman test assessed tibia translation on the femur after graft fixation. Following aseptic procedures, the surgical wound was closed. Patients' knees were immobilized in extension using knee immobilizers. They were gradually transitioned to weight-bearing and discharged the next day. A structured rehabilitation program was followed by patients for six months post-surgery. Patients were monitored in the Ortho OPD at 2, 4, 10, 18, and 24 weeks post-surgery.

Stability and Lysholm knee ratings were recorded both before and after surgery.

Data Analysis: Paired t-tests were conducted to determine the significance of variance before and after the procedure. Data analysis was performed using SPSS software version 26, and statistical significance was considered for p-values less than 0.05.

RESULTS

Of the fifteen patients, eleven (73.33%) were men and four (26.66%) were women (Figure 1).

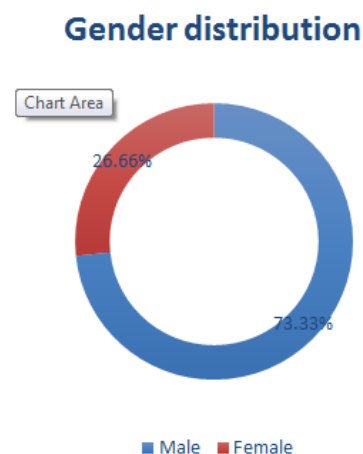


Figure No. 1: Gender distribution in the study population:

The patients' mean age group was 26.7 + 5.8.10, meaning that 66.66 percent of the patients had twisting

injuries, 20% had driving accidents, and 13.33 percent had a history of falls. A 15-week return to work was the average (Figure 2). Before therapy, nine patients (60 percent) had stability (LACHMAN TEST grade 3), and six patients (40 percent) had stability (grade 2). Three patients (20%) had grade-1 positive results after treatment, and twelve (80%) had negative results (Table

Distribution of Mechanism of Injury

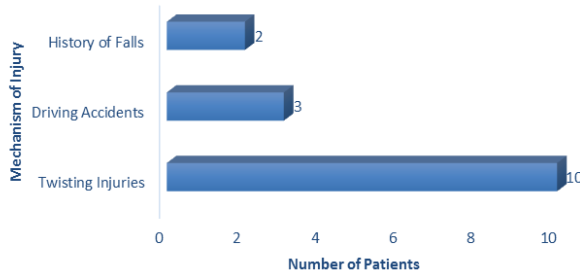


Figure No. 2: Distribution of mechanism of injury in the study population:

Table No. 1: Stability score:

Treatment	Stability score				Total
	Score 0	Score 1	Score 2	Score3	
Before	0 0.0%	0 0.0%	9 60%	6 40%	15 100%
After	12 80%	3 20%	0 0.0%	0 0.0%	15 100%

The Lysholm score was computed both before and following the procedure. Before surgery, the average Lysholm knee score was 66.1 ± 5.6 . Six months following surgery, the average Lysholm knee score was 92.3 ± 4.3 . A paired t-test was employed to find the mean difference between the pre-and post-operative times. The outcomes demonstrated a p-value < 0.001 substantial improvement in the Lysholm knee score following surgery (Table 2).

Table No. 2: Difference between LKSS before and after surgery

Lysholm Knee Score	Mean	SD	P-value
Before Surgery	66.1	5.6	<0.001
After Surgery	92.3	4.3	

Utilizing a performance concerning knee function both before and after surgery, the patient satisfaction rate was also determined. Three and six months following surgery, the findings were evaluated. The information demonstrates that following surgery, the patient satisfaction rating significantly improved (Table 3).

Table 3: Patient satisfaction at three and six months:

Patient Satisfaction Rate	Mean	SD	Minimum	Maximum
At 3 months	7.1	0.59	6	8
At 6 months	9.1	0.10	8	10

DISCUSSION

An anterior cruciate ligament (ACL) injury is a common ligamentous injury in the knee joint. It is often associated with sports participation and traffic accidents, leading to symptoms of knee instability during activities such as walking on uneven surfaces or sports involvement^[10-12].

A study conducted by Majewski et al. over ten years highlighted that ACL injuries are the most prevalent knee joint injuries^[13]. Their research showed a higher incidence rate in males (68.1%) aged 22 to 29.

In our study, which included 11 men (73.33%) and 4 women (26.66%), we aimed to investigate the outcomes of ACL injury treatment^[14, 15]. Reconstruction of an acute ACL injury is recommended by Buda et al. Based on a seven-year follow-up of fifty patients treated for ACL injuries, their research suggested that surgical intervention yielded better functional outcomes than conservative management^[16]. This supports the idea that ACL reconstruction is necessary for restoring knee stability.

Our study involved thirty-five participants who completed a six-month follow-up. The mean age of the patients was 26.7 ± 5.8 years. Among them, 10 (66.66%) had twisting injuries, 3 (20%) were in auto accidents, and 2 (13.33%) had a history of falls.

According to Syed Danish Ali et al., half of their patients achieved an excellent functional outcome when utilizing the Bone Patellar Tendon Bone (BPTB) graft for ACL reconstruction^[17]. In contrast, the other half had a fair functional outcome. Six months post-surgery, the average Lysholm knee score significantly improved to 92.3 ± 4.3 , indicating remarkable progress in knee function.

Our investigation also assessed patient satisfaction regarding knee function before and after surgery. Evaluations were conducted at three and six months post-surgery. After three months, the mean satisfaction rate was 7.1 ± 0.6 , which increased to 9.1 ± 0.1 after six months. These findings demonstrate a substantial improvement in patient satisfaction following surgery.

We assessed knee joint stability immediately after surgery using the Lachman test, classifying it as Grade 1 with 3-5 mm translation, Grade 2 with 5-10 mm translation, and Grade 3 with greater than 10 mm translation. Our results showed that 3 (20%) patients had grade-1 positive Lachman test results, while 12 (80%) had negative results.

It's important to acknowledge the limitations of this study, including its small sample size and the inclusion of low-demanding patients, which may limit the generalizability of the results to a larger and more active population. Additionally, our study focused on short-term outcomes up to six months post-surgery. Long-term follow-up may be necessary to fully assess

stability and functional outcomes in ACL reconstruction using the semitendinosus graft.

CONCLUSION

We have determined that using a semitendinosus graft produces outstanding outcomes regarding stability and patient contentment. Furthermore, this procedure causes minimal harm to the patient, allowing for early mobilization and a prompt return to work. Therefore, it is recommended as the primary choice for the surgeon and the patient regarding ACL reconstruction.

Author's Contribution:

Concept & Design of Study: Syed Ali Raza
 Drafting: Haseeb Saqlain Bajwa, Muhammad Kamran
 Data Analysis: Muhammad Kashaf, Naseer, Naveed Ali, Shair, Amir Sohail
 Revisiting Critically: Syed Ali Raza, Haseeb Saqlain Bajwa
 Final Approval of version: Syed Ali Raza

Conflict of Interest: The study has no conflict of interest to declare by any author.

Source of Funding: None

Ethical Approval: No. KEMU/12/2022 dated 10.01.2022

REFERENCES

- Del Bel MJ. Assessing the Functional Capacity of the Knee Joint Among Boys and Girls Suffering Anterior Cruciate Ligament (ACL) Injuries. Université d'Ottawa/University of Ottawa 2023. <https://ruor.uottawa.ca/server/api/core/bitstreams/660b84b5-37ca-4f69-ac71-46b5b491ed7a/content>
- Hoskins T, et al. The cost-effectiveness of antibiotic-loaded bone cement versus plain bone cement following total and partial knee and hip arthroplasty. *J Orthopaedics* 2020;20:217-220.
- Hohmann E, Tetsworth K, Glatt V. Open versus arthroscopic surgical treatment for anterior shoulder dislocation: a comparative systematic review and meta-analysis over the past 20 years. *J Shoulder Elbow Surg* 2017;26(10):1873-1880.
- Strauss MJ, et al. The use of allograft tissue in posterior cruciate, collateral and multi-ligament knee reconstruction. *Knee Surgery, Sports Traumatol Arthroscopy* 2019;27:1791-1809.
- Kim SJ, et al. Bone-patellar tendon-bone autograft could be recommended as a superior graft to hamstring autograft for ACL reconstruction in patients with generalized joint laxity: 2-and 5-year follow-up study. *Knee Surgery, Sports Traumatol Arthroscopy* 2018;26(9):2568-2579.
- Assi C, et al. The gracilis and semitendinosus muscles: a morphometric study on 18 specimens with clinical implications. *Surgical Radiologic Anat* 2022;44(6):813-820.
- Naendrup JH, et al. Kinematic outcomes following ACL reconstruction. *Current Reviews Musculoskeletal Med* 2016;9:348-360.
- Pappas E, et al. Lessons learned from the last 20 years of ACL-related in vivo-biomechanics research of the knee joint. *Knee Surgery, Sports Traumatol Arthroscopy* 2013;21:755-766.
- Nyland J, et al. Anterior cruciate ligament reconstruction, rehabilitation, and return to play: 2015 update. *Open Access J Sports Med* 2016:21-32.
- Logerstedt DS, et al. Knee stability and movement coordination impairments: knee ligament sprain: clinical practice guidelines linked to the international classification of functioning, disability, and health from the Orthopaedic Section of the American Physical Therapy Association. *J Orthopaedic Sports Physical Therapy* 2010;40(4):A1-A37.
- Khan A, Jamil M, Butti S, Ahmad I, Ullah H, Khan A. Causes, Precautions and Management of Risk Factors Associated with Sports Injuries: Risk Factors Associated with Sports Injuries. *The Therapist (J Therapies Rehabilitation Sciences* 2023;Sep 30:54-6.
- Bahr R, et al. The IOC manual of sports injuries: an illustrated guide to the management of injuries in physical activity: John Wiley & Sons 2012. DOI:10.1002/9781118467947.ch1
- Majewski M, et al. Midterm and long-term results after arthroscopic suture repair of isolated, longitudinal, vertical meniscal tears in stable knees. *Am J Sports Med* 2006;34(7):1072-1076.
- Ambulgekar RK, Sen K, Study of Various Ligamentous and Meniscal Injuries in Acute Knee Injury (AKI). *Ind J Applied Res* 2020;10(8).
- Sriharsha DY, Yaratapalli SR, Varaprasad G. Functional Outcome of Arthroscopic Anterior Cruciate Ligament Reconstruction by Anatomical Single Bundle Hamstring Allograft—A Prospective Study. *IOSR J Dent Med Sciences (IOSR-JDMS)* 2018;17(3):34-63.
- Buda R, et al. Augmentation technique with semitendinosus and gracilis tendons in chronic partial lesions of the ACL: clinical and arthrometric analysis. *Knee Surgery, Sports Traumatology, Arthroscopy* 2006;14: 1101-1107.
- Ali SD, et al. Functional outcome of ACL reconstruction using patellar bone tendon bone graft. *Age* 2014;30(68):30.