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Ligament Reconstruction in Patients Operated Arthroscopically with Bone-Patellar Bone Graft Using Lysholm Score

Khalil Ur Rehman, Shahzad Inam, Atiq Ur Rehman, Mohsin Javid*, Idris Khan, Syed Arsalan Akbar

Department of Surgery, Combined Military Hospital, Peshawar/National University of Medical Sciences (NUMS) Pakistan,
*Department of Surgery Combined Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

ABSTRACT

Objective: To assess the mean Lysholm score after arthroscopic anterior cruciate ligament Anterior Cruciate Ligament (ACL) reconstruction with a bone-patellar tendon-bone graft.
Study Design: Prospective longitudinal study.
Place and Duration of Study: Department of Orthopaedic, Combined Military Hospital, Peshawar Pakistan, from Oct 2020 to Apr 2021.
Methodology: Arthroscopic anterior cruciate ligament reconstruction with bone-patellar tendon-bone graft was performed in 70 patients. Baseline characteristics were recorded, and patients were followed up for six months. Functional outcome was determined using the Lysholm score.
Results: The mean age of patients was 32.38±11.83 years. The majority, 59(84.3%) of the patients were males. Of the 70 patients, 36(51.4%) had a right knee involved. The mean Lysholm score at baseline was 50.46±6.93. At six months, a Lysholm score of 85.49±9.05 was recorded, and the mean difference was found to be statistically significant (p<0.001) using paired t-test.
Conclusion: Significant change in Lysholm score at six months was observed in the study sample. Reconstructing the anterior cruciate ligament with a bone-patellar-tendon bone graft improved the Lysholm score and, thus, functional outcome.
Keywords: Anterior cruciate ligament reconstruction (ACL); Arthroscopy, Bone-patellar tendon-bone, Lysholm score.

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INTRODUCTION

The knee joint is the most commonly injured joint in trauma, which results in a tear to the anterior cruciate ligament (ACL).[1] ACL tear initially results in knee joint instability, pain, and restricted daily life activities. This leads to degeneration of the meniscus and articular cartilage, leading to knee osteoarthritis.[2] Therefore, ACL reconstruction is a common procedure nowadays. There are two techniques for surgical reconstruction of ACL- open and arthroscopic.[3]

Nowadays, arthroscopic reconstruction is the most popular procedure. Different autografts like Bone-Patellar-Tendon Bone (BTB), Hamstring Graft, Quadriceps graft etc., are used here. BTB graft is the most commonly used modality.[4] The graft is obtained from the middle third of the patellar tendon through a skin incision given longitudinally over the patellar tendon from the patella lower end to tibial tuberosity.[5] Though this type of graft is commonly used, long-term randomized research is required to have consensus upon the best graft substance.[6]

An orthopaedic surgeon needs to measure the clinical outcome after a knee procedure. As the basic aim of every orthopaedic treatment is the restoration of good functional status, it is important to consider the clinical outcome objectively and the patient's perception of the intervention.[7] Several tools such as AKSS, Cincinnati, HSS, IKDC-subjective, KOOS, Kujala, Lysholm, OKS, SF-36, WOMAC and Tegner have been developed over time to assess better follow-up of the patients and comparison of the results with the trials.[8,9] In addition, the Lysholm Knee scoring system has comprehensive applicability beyond estimating knee ligament surgery outcomes.[10]

We conducted this study in a local population with a large sample size to get reliable results. We thus may reinforce the use of a patellar bone tendon graft for ACL reconstruction. This can also help to reduce morbidity. Thus, the present study was proposed to determine the functional outcome of arthroscopically reconstructed ACL with a BTB graft using the Lysholm score.

METHODOLOGY

The prospective longitudinal study was conducted at the Department of Orthopaedic Surgery, Combined Military Hospital, Peshawar Pakistan, from October 2020 to April 2021 after approval by the Institutional Ethical Review Committee (Ref No: Tgr 54/21). Sample size was calculated with expected

Correspondence: Dr Khalil Ur Rehman, Department of Orthopedic, Combined Military Hospital, Peshawar Pakistan
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mean Lysholm score, i.e., 83.06±4.17, with patellar bone tendon graft for ACL reconstruction.[10] Non-probability, consecutive sampling techniques were used for data collection.

Inclusion Criteria: Patients with clinical, radiological and arthroscopically confirmed ACL tears were included in the study.

Exclusion Criteria: Patients associated with posterior cruciate ligament tear, tibial plateau fractures, bilateral knee injuries and moderate to severe osteoarthritis confirmed on X-rays with ACL deficiencies were excluded.

Informed consent was obtained to carry out this study. A demographic profile (age and gender) was also obtained. ACL was reconstructed arthroscopically using a BTB graft. This was done under spinal anaesthesia. Then patients were followed up in OPD for six months. After six months, patients were evaluated for Lysholm score (as per operational definition).[11] All information was collected through a specially designed proforma.

Statistical analysis: Statistical Package for social sciences (SPSS) version 21 was used for data analysis. Numbers and percentages were calculated for categorical variables. At the same time, mean and standard deviation were calculated for variables with continuous nature like age, BMI and baseline and post-operative Lysholm score. Paired sample t-test was used to see the mean difference in Lysholm score at baseline and six months post-operative. The *p*-value of ≤0.05 was considered statistically significant.

RESULTS

A total of 70 patients were included in the final analysis, with 59(84.30%) males and 11(15.70%) females with a mean age of 32.38±11.83 years. Of the total, 36(51.4%) patients had right knee, and 34(48.6%) had left side involved. The mean body mass index (BMI) of patients was 23.91±3.16. There were 37 (52.86%) patients who had BMI ≤24.9 and 33(47.1%) of the patients had BMI ≥25 (Table-I). The baseline mean Lysholm score was 50.46±6.93. The mean Lysholm score after six months was 85.49 ± 9.05, with a range of 32. A paired sample t-test was used to compare the mean difference at baseline and post-operative at six months. The statistically significant mean difference was observed in the Lysholm score (p<0.001) at a 95% confidence interval, as shown in Table-II. An improvement of 35.04±10.63 in the Lysholm score was noted.

Table-I: Background Characteristics of the Study Participants (n=70)

Variables		Mean±SD	Min	Max	n (%)
Age (years)		32.38±7.21	21	46	
Age groups	21-29				28(40)
	30-38				28(40)
	39 & above				14(20)
Gender	Female				11(15.70)
	Male				59(84.30)
BMI		23.91±3.16	17	33	
BMI cut offs	≤24.9				37(52.86)
	≥25				33(47.14)
Anatomical site	Left				34(48.60)
	Right				36(51.40)

sd: standard deviation, Body mass index (BMI)

Table-II: Mean Comparison of Lysholm Score at Baseline and 6 Months Post-Operative (n=70)

Parameter	Arthroscopic ACL reconstruction		*p*-value
	Before Treatment Mean±SD	After Treatment Mean±SD	
Lysholm Score	50.46±6.93	85.49±9.05	<0.001

DISCUSSION

Among knee injuries, anterior cruciate ligament (ACL) tear is commonly operated. The knee ligament provides both AP and rotational stability to the knee joint. Consequently, there are various surgical operations to reconstruct a torn ACL, both open and arthroscopic.[12]

In the current study, patients' mean age was 32.38±11.83 years, with minimum and maximum ages of 21 and 46 years. Another study reported that the average age of patients was 28.25±8.32 years. A study was conducted in 2011 by Marimuthu *et al*. on 79 patients to look for the functional outcome of ACL reconstructed with a patellar BTB graft. Nearly 57% had ACL torn on the right side, aged 20 to 52 years, and 43% had left side involved.[11] Our results showed that over half of the patients had ACL tears on the right side. This finding is comparable to the above study.

In this study, there were 59(84.3%) male and 11(15.7%) female. In our study, 70 patients completed the six months follow-up. The mean Lysholm score was 85.49±9.05 after the procedure. Baltaci and co-authors reported that functional outcomes could be accomplished after ACL reconstruction with BTB grafting and rehabilitation comparable to unaffected leg.[12] We in this study did follow-up for six months and found that the mean Lysholm score after six months was 85.49±9.05 with minimum and maximum Lysholm as

68 and 100. A study conducted in Pakistan from June 2010 to 2013 reported that the mean Lysholm score after open ACL reconstruction with patellar bone tendon graft was 83.06±4.17 at one year (fair to the good outcome)5, which is consistent with our result. Another study reported an average increase in Lysholm score from 47(47-75) in the pre-op group to 87(68-95) in the post-op group.[13] In the current study, the Lysholm at six months was 68-100. These findings are also in favour of the findings in the current study.

Various studies have compared different reconstructing grafts that can be used for ACL reconstruction, such as BTB Vs Hamstring Graft and BTB vs LARS (Ligament Augmentation and Reconstruction System). One such study by Li *et al*. compared BTB to a Hamstring graft and showed that BTB gives better rotational stability than a Hamstring graft.[14] Another study by Pen *et al*. compared BTB to Ligament Augmentation and Reconstruction System (LARS), which showed no statistically significant difference between the two in their outcome.[15] Similarly, several other studies have shown the relationship between the strength of quadriceps muscles and isokinetic measurements post-ACL reconstruction surgery.[16]

Though different autografts can be used, commonly used ones are either BTB or Hamstring grafts. Similarly, different allografts used are the tendon of the tibialis posterior muscle, tendon Achilles, tendon of the tibialis anterior, tendon of peroneus longus and BTB.[17] The results we obtained six months postoperatively are satisfactory, and a better Lysholm score was obtained. In the management of ACL reconstruction, rehabilitation is of prime importance. Therefore, before being recruited for study purposes, all patients were counselled to follow rigorous rehabilita-tion practice to develop an effective range of knee movement. The normal time frame of postoperative ACL rehabilitation is eight months, while accelerated ACL rehabilitation takes 4-5 months to attain its final goals.[5,18,19] Per our institution's guidelines, patients underwent a modified accelerated rehabilitation program.

CONCLUSION

We concluded that reconstructing ACL with a patellar BTB is beneficial for higher changes in Lysholm score at six months of surgery. In addition, a patellar bone tendon graft for ACL reconstruction can reduce related morbidity and obtain fair to good functional outcomes post-surgery.

Conflict of Interest: None.

Authors Contribution

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

KUR & SI: Data analysis, drafting the manuscript, critical review, approval of the final version to be published.

AUR & MJ: Study design, concept, data interpretation, critical review, approval of the final version to be published.

IK & SAA: Critical review, 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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