

Evaluation of Functional Outcomes of Anterior Cruciate Ligament Reconstruction with Hamstring Autograft

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Abstract

Background: The anterior cruciate ligament (ACL) is an intra-articular, extra-synovial structure present in the central complex of the knee joint, which, along with other structures in the knee joint, controls, limits motion, and maintains the static and dynamic equilibrium of the knee joint. The knee joint is the most frequently injured joint, with the ACL being the most commonly affected ligament. The most commonly used grafts are hamstring autograft and bone-patellar tendon-bone graft. In this study, we are highlighting anatomical ACL reconstruction by hamstring autograft. This study was undertaken to evaluate the results of arthroscopic anatomical ACL reconstruction with hamstring autograft using the Lysholm Knee Scoring Scale.

Methods: This is the study of 40 cases of arthroscopic ACL reconstruction using hamstring autograft in a medical center in Ahmedabad, India, with a minimum follow-up of 6 months.

Results: Results in this study are calculated according to the Lysholm Knee Score. 55% of patients showed excellent results, 40% showed good results, and 5% showed fair results. Average Lysholm Score was 90 in 40 patients.

Conclusion: Anatomical ACL reconstruction using hamstring autograft technique has yielded excellent to good results in almost all patients with minimal complication and provided stable knees.

Keywords: Knee Joint; Anterior Cruciate Ligament; Anterior Cruciate Ligament Reconstruction; Hamstring; Autografts

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Background

Being the largest and the most complex joint, the knee joint is highly susceptible to complex ligamentous injuries, and the most commonly endured are anterior cruciate ligament (ACL) injuries. The rising incidence of ligament injuries in the knee is attributed to the growing number of road traffic accidents (RTAs) and the higher participation in sports. The ACL, along with other ligaments and the capsule, is the primary stabilizer of the knee, prevents anterior translation, and restricts valgus and rotational stress to a certain degree (1, 2).

When an ACL is injured, the symptoms of knee instability, pain, and a decrease in joint function occur. Although conservative treatment with intensive physiotherapy, bracing, and lifestyle modification can be tried in less active patients, in symptomatic young active individuals, ACL reconstruction is necessary. ACL injuries with concurrent meniscal injury need to be addressed, or else the person can develop an early onset of osteoarthritis (OA) of the knee. Lipscomb first used semitendinosus and gracilis for ACL reconstruction in 1982 (3). Friedman, in 1988, was the first person who did the arthroscopic reconstruction of ACL using a four-strand hamstring autograft (4). Wagner et al. in their study found that the hamstring autograft was superior in function and knee stability, thus recommending hamstring autograft even in high-level athletes (5). The reconstruction of the ACL is generally delayed for a period of 6 to 8 weeks after the injury. ACL reconstruction within the first week of injury had a higher incidence of arthrofibrosis compared to those

who underwent surgery after 3 weeks, as observed by Shelbourne et al. in their study. A 6- to 8-week interval between injury and surgery is essential for the injured knee to resolve inflammation (swelling, effusion, erythema) (6).

This study was undertaken to evaluate the outcomes of arthroscopic anatomical ACL reconstruction with hamstring autograft using the Lysholm Knee Score.

Methods

Study Design and Patient Characteristics: This is the study of 40 cases of arthroscopic ACL reconstruction using hamstring autograft in Sardar Vallabhbhai Patel Institute of Medical Sciences and Research (SVPIMSR) Center in Ahmedabad, India, and followed serially for 7 to 12 months.

Patients who were clinically and radiologically diagnosed to have ACL injuries, with age above 18 years, and a minimum of 6-month follow-up were included in this study. Patients associated with OA changes in X-ray and ACL injuries with associated intra-articular fractures were excluded from this study.

Procedure: After a detailed clinical examination, all the patients were subjected to radiographic and magnetic resonance imaging (MRI) confirmation of the diagnosis (7). They then underwent the surgical reconstruction as described below.

The patient was anesthetized and positioned supine. Diagnostic arthroscopy was done using a standard technique. Complete tear of ACL was identified. Semitendinosus and gracilis tendon graft extraction and preparation were done, femoral and tibial tunnels were



prepared using the standard technique, and graft placement was done. The graft was secured on the femoral side using a closed loop and button and on the tibial end with a tibial post screw or interference screws.

Evaluation: Postoperatively, radiographs were done, and patients were immobilized in a long knee brace with elevation and asked to perform an active ankle pump. Patients were discharged between the 2nd and 4th post-op days. Suture removal was done between the 10th and 14th post-op day. Patients were mobilized with a long knee brace without knee bending for 4 weeks, and after 1 month, knee bending along with quadriceps and hamstring exercises were started. Patients were serially evaluated at 1 month, 2 months, 3 months, 6 months, and 12 months. At each follow-up, the patient was assessed clinically, and details were recorded as per proforma (Figure 1). The functional outcome of patients was evaluated using the Lysholm Knee Scoring Scale.



Figure 1. Post-op x-ray and functional outcome 38 y/o Male, Right ACL tear, 18 months follow up, Lysholm score 94/100.

Results

Patient Characteristics: 90% of the patients in our study belonged to the 20-40 years age group, most commonly in 26-30 (35%) years age group, followed by 31-35 (22.5%), 21-25 (20%), 36-40 (10%), > 40 (10%), and 18-20 (2.5%) (Table 1).

Age (year)	n (%)
18-20	1 (2.5)
21-25	8 (20.0)
26-30	14 (35.0)
31-35	9 (22.5)
36-40	4 (10.0)
> 40	4 (10.0)
Total	40 (100)

In our study, 82.5% (n = 33) of the patients were men, and 17.5% (n = 7) of patients were women. Thus, ACL injury is more common in men.

Modes of injury for ACL in our study are RTAs (55%, n = 22), falls (35%, n = 14), and sports injuries (10%, n = 4).

In our study, knee pain (100%, n = 40) and instability (100%, n = 40) were the most common and consistent symptoms. Swelling was present in 37.5% (n = 15) of patients, and locking sensation was present in 27.5% (n = 11).

Anterior drawer test, Lachman test, and pivot shift test were the most consistent findings (100%, n = 40) in complete ACL tear. McMurray's test was positive in cases associated with a meniscus injury. 22.5% (n = 9) of patients had a positive test for medial meniscus and 10% (n = 4) for lateral meniscus.

92.5% (n = 37) of patients in our study had no difficulty in squatting, and only 7.5% (n = 3) had minor inconvenience. 82.5% (n = 33) of patients in our study had no difficulty in sitting cross-legged, whereas 17.5% (n = 7) had trivial difficulties.

Surgical Outcome: The average injury-surgery interval was 4 months. 50% (n = 20) of patients underwent surgery within 4-6 months of injury, and 42.5% (n = 17) underwent between 0-3 months.

The average follow-up period in our study was 18 months, with 47.5% (n = 19) having 13-18 months of follow-up, 32.5% (n = 13) having 19-24 months, 15% (n = 6) having 6-12 months of follow-up, and 5% (n = 2) having > 24 months of follow-up.

70% of the patients had an excellent range of motion (ROM) (more than 110°) without any difficulty. 47.5% (n = 19) had 110-120°, 22.5% (n = 9) had 120-130°, and 27.5% (n = 11) had 100-110° ROM. 2.5% of patients had a ROM less than 100° (Table 2). One patient in our study had pain and stiffness up to 4 months postoperative due to lack of compliance towards physiotherapy. Pain resolved eventually, and the patient achieved up to 100° of flexion with the help of physiotherapy later on.

ROM achieved	n (%)
<100	1 (2.5)
100-110	11 (27.5)
110-120	19 (47.5)
120-130	9 (22.5)
Total	40 (100)

ROM: Range of motion

55% (n = 22) of patients showed excellent results, 40% (n = 16) showed good results, and 5% (n = 2) showed fair results (Table 3). The average Lysholm Score was 90.

Lysholm Score	n (%)
Excellent	22 (55)
Good	16 (40)
Fair	2 (5)
Total	40 (100)

Discussion

Due to the increased incidence of RTAs and an increased number of people participating in sports activities, the number of ACL reconstructions being done over the years has been on the rise. Arthroscopic reconstruction of the injured ACL has become the gold standard, leading to extensive studies and considerable attention on its outcomes.

In our study, the most common mode of injury was RTA, followed by falls. Male predominance was found in our study. Most of the patients were in the age group of 26-30 years. Half of patients underwent ACL reconstruction 4 to 6 months after injury. There was not much difference in the side of injury.

Lewis et al. in their study on the incidence of meniscal injuries at the time of ACL reconstruction found that 58% of patients had meniscal injuries and that the medial meniscus was most commonly injured. They also found that meniscal repair or resection had no impact on the final outcome (8).

In our study, there was associated meniscal injury in 37.5% of patients. The most commonly injured was the medial meniscus, which was in accordance with other studies.

The average Lysholm Score at the end of the study of Chaudhary et al. was 92 (9), Jomha et al. was 94 (10), Williams et al. was 91 (11), Mahiroğullari et al. was 93.5 (12), and in our study, the average Lysholm score at the last follow-up was 90, which was comparable with the above studies (13).

Williams et al. in their analysis of 2500 arthroscopic ACL reconstruction cases found an infection rate of 0.3% (14).

In our study, one patient had a complication in the form of superficial infection at the graft site, which resolved after debridement and antibiotic cover and showed a good outcome (86/100) as per our scoring system.

Conclusion

The patients who underwent primary ACL reconstruction at our hospital with the previously mentioned technique and graft showed highly favorable outcomes. The clinical relevance of the data is significant. It highlights the successful nature of this technique in a concise and repeatable format. Functional outcomes of our study were similar to the previously published studies. From this series, it can be concluded that anatomical ACL reconstruction using the hamstring autograft technique has yielded excellent to good results in almost all patients with minimal complication and provided stable knees.

Conflict of Interest

The authors declare no conflict of interest in this study.

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