

Comparative Study of Anterior Cruciate Ligament Reconstruction Advantages in the Autograft Method in Comparison with the Allograft Method with Midterm Follow Up

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ABSTRACT

Background: Anterior cruciate ligament rupture is one of the most common problems in active people, especially athletes with complications of pain and inflammation and knee instability. The most important treatment for this damage is reconstruction of torn ligaments, which is done with an alternate graft. These grafts have different types.

Aim: To assess the anterior cruciate ligament reconstruction using autograft and allograft and compare them.

Methods: In this study, 75 patients who referred to the Clinic of Firoozgar Hospital for the reconstruction of anterior cruciate ligament between the years of 2015-2017 and who had the characteristics of entering the study were selected and then divided into two groups: autograft (44) and allograft (31) and surgery was performed by a surgeon and the results of the surgery were evaluated using IKDC questionnaire, KT stability arthrometer, Pivot shift test and Lachman test.

Results: 67 patients were Male and 8 patients were female. The mean age of the participants was 31 years, and the mean BMI was 24. The mean follow-up time was 28 months. The average score obtained with the IKDC questionnaire was 76.16 in allograft group and 79.61 in autograft group, the average displacement in examination with KT1000 arthrometer was 3.7 mm and 3.65 mm, and in 20 patient LACHMANT test were positive (>5mm), 8 PIVOT shift test were positive (3 Autograft vs 5 Allograft). There was no significant statistical difference between Autograft and Allograft groups except in demographic indexes (age and BMI).

Conclusion: The recent study demonstrated that the anterior cruciate ligament reconstruction has favorable results, and if the selection conditions are the same, there is no statistically significant difference in the clinical responses between the two types of grafts, which indicates efficacy of both surgical procedures are clinically relevant.

Key words: Anterior cruciate ligament, Allograft, Autograft.

INTRODUCTION

The anterior cruciate ligament (ACL) is one of the most commonly injured ligaments of the knee. In general, the incidence of ACL injury is higher in people who participate in high-risk sports, such as basketball, football, skiing, and soccer⁽¹⁾. The anterior cruciate ligament (ACL) is the most commonly reconstructed ligament in the knee, with approximately 100,000 reconstructions performed each year in the United States⁽²⁾. Historically, options for surgical treatment have included primary repair with or without synthetic augmentation and reconstruction using either biological tissue grafts or prosthetic ligaments. Primary repairs with or without augmentation have tended to fail at restoring stability to the knee and are not a common treatment option today⁽³⁾. Anterior cruciate ligament (ACL) reconstruction is considered as the standard surgical procedure for the treatment of ACL tear. However, there is a crucial controversy in terms of whether to use autograft or allograft in ACL reconstruction⁽⁴⁾. There remains a considerable amount of controversy over whether an autograft or an allograft should be used⁽⁵⁾. There is recent evidence that use of allograft tendons for anterior cruciate ligament (ACL) reconstruction in young patients may result in increased failure rates compared with autologous grafts⁽⁶⁾. The ideal

graft for use in anterior cruciate ligament reconstruction should have structural and biomechanical properties similar to those of the native ligament, permit secure fixation and rapid biologic incorporation, and limit donor site morbidity⁽⁷⁾. Several factors associated with patient outcome after anterior cruciate ligament (ACL) injury. These factors include predictors of high grade knee laxity, the impact of meniscus treatment on joint space narrowing after surgery, graft selection, treating diabetic patients, predictors of clinically significant pain, and outcomes of patients where meniscus tears were left in situ without treatment. The presence of meniscus tears and generalized laxity predict a lax examination under anesthesia prior to surgery. Allograft reconstructions carry a 5.2 times increased risk of re-tear compared to autograft⁽⁸⁾.

MATERIAL AND METHODS

In this study we want to compare midterm results of two method of ACL reconstruction using allograft and autograft. Patients with isolated ACL tear were included in and exclusion criteria were⁽¹⁾ generalized ligament laxity⁽²⁾ previous knee injury that resulting in knee pain⁽³⁾ contralateral knee injuries. Patients without any other knee disorders randomly divided in two groups, allograft and autograft, and then they underwent surgical procedure with

tibialis anterior tendon allograft or hamstring (semitendinosus /gracilis) tendon autograft.

All surgery was done by only one surgeon and same technique. Patient's demographic data collected and Clinical results of procedure evaluated with arthrometer KT1000 and pivot shift test and IKDC questionnaire. Data analysis was done with SPSS software 23 edition and compared with paired sample t-test and ANOVA.



Figure 1: Postop Radiographs

RESULTS

75 patients with isolated ACL tear who referred to our clinic between September 2015 to November 2017 were included. Patients divided in two groups (31 allograft and 44 autograft). 67 patients were male and 8 females. The mean age was 31.15±7.20 years and the mean BMI was 24.24±2.04. The mean follow-up period was 28.8 months (15 – 37 month). (Table 1)

Table 1: Demographic data

	allograft	autograft	P-value
age	27.58±4.92	33.66±7.35	0.04
BMI	23.75±1.69	24.60±2.31	0.033

In stability test with arthrometer KT1000 anteroposterior displacement of tibiofemoral joint with 20 lb pressure was detected. ≥5 mm displacement intended to positive Lachman test. Results shows that autografts are slightly looser than allografts and we have more anteroposterior displacement (Table 2).

Table 2: KT1000

	allograft	autograft	P-value
Mean displacement(mm)	3.65±1.02	3.70±1.12	0.908
Displacement ≥ 5mm (number)	5	9	8.856

14 patient have displacement more than 5mm but only 3 of them have complaint of giving way. That demonstrates us although some patients have positive Lachman test but only a few of them have clinical manifestations and it slightly impress their functions.

Final score of International Knee Documentation Committee (IKDC) questionnaire in the end of follow up period shows every patient significantly satisfied from surgery (more than 75% in both group) and comparison of

two groups demonstrates that there is no significant difference between them (Table 3).

Table 3: IKDC score

Allograft	autograft	P-value
76.16±17.02	79.61±11.08	0.605

3 patients in autograft group (6.8%) had positive Pivot shift test and in allograft group 5(16.1%) had positive results but they have not statistically meaningful difference. Although patients that underwent ACL-R with allograft have more rotational instability but it doesn't impress their daily function and sport activity.

DISCUSSION

The anterior cruciate ligament resists the combined motions of anterior tibial translation and internal tibial rotation, The term "stability" refers to the ability of an ACL reconstruction to restore normal knee motion limits that resist abnormal tibiofemoral compartment translations (anterior subluxations) and does not refer to patient complaints of giving way⁹ Female athletes have been reported to have a higher rate of anterior cruciate ligament injury compared to male athletes especially in sports that have cutting movement. Tears of the ACL can be devastating injuries because many athletes do not return to their preinjury levels of participation, despite aggressive rehabilitation^{10,11}. The outcome of nonoperative treatment of ACL tears, compared to surgical treatment, in skeletally immature patients who return to sports is poor¹². The rate of successful ACL reconstructive surgery has been reported to be about 90% in restoring knee stability and patient satisfaction in the adult population¹³. Although widely accepted and investigated, ACL reconstruction still continues to evolve with many technical issues under debate and dependent on surgeon preference. These include tunnel placement, use of double- vs. single-bundle technique, type of fixation, and graft selection¹⁴. Once the decision to reconstruct is made the next critical decision is with regards to the graft choice. The factors considered by the surgeon include donor site morbidity, reported rates of graft failure, familiarity with the graft, surgical time, associated complications, ability to restore the patient's activity to pre-injury level and cost-effectiveness. The choice of the graft is broadly between an autograft, allograft or a synthetic graft¹⁵.

Our study demonstrate that ACL-R has good results in stability of anteroposterior displacement and rotational movement. Patients are highly satisfied from ACL-R with both methods (autograft and allograft) and in both of these groups high IKDC score was reported. So, if we have same condition in patient selection, we can use both of these techniques.

CONCLUSION

There is no significant difference in midterm functional and stability results of Anterior cruciate ligament reconstruction with allograft and autograft, if the selection of patient and method of surgery were equally. So surgeons can involve the patients to make decision that witch kind of graft can be used and this leads to more satisfaction. But more studies

with greater sample size and longer follow up must be done.

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