

Assessment of functional outcome of anterior cruciate ligament reconstruction using bone - patellar tendon - bone autograft

Abstract

The purpose of this study is to assess the functional outcome of Arthroscopic anterior cruciate ligament reconstruction using Bone-Patellar tendon – Bone autograft. This study is very much relevant because of the younger age group of patients who sustained the ligament injury and the need for them to rehabilitate as early as possible without much delay. The age group in our study was between 20-45 years of age. We assessed the postoperative range of motion, patient satisfaction in the post operative period using functional scoring systems. We assessed the patients at one and two year's interval. We obtained 80% excellent results in our study at the end of the two years follow up period.

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Introduction

The knee joint is the largest and most complex joint in the human body. The joint capsule and ligaments, which provide structural stability to the knee, are very much vulnerable to injury because of the forces acting along the long axis of the lower limbs. Knee is one of the most important weight bearing joints in the human body. It is devoid of muscle cover and is readily injured in trauma. Knee joint comprises of three independent articulations: medial and lateral tibio femoral joints and patellofemoral joint. Rupture of the anterior cruciate ligament (ACL) is a common injury in active especially in the younger age group, and one of the most common knee injuries in sports. The healing response after ACL rupture is poor. Without surgical reconstruction, the ACL deficient knee is limited. So are the patient's activities and such ACL deficiency can lead to future degenerative changes.

Materials and methods

Our scientific review and human use committees approved our research protocol for this study at our institution. We assessed the functional outcome of arthroscopic anterior cruciate ligament reconstruction using bone-patellar tendon-bone autograft (BPTB) for two years post-operative period. The evaluation methods of ACL reconstruction include full clinical examination of the injured extremity including evaluation of the range of motion and anteroposterior stability of the knee, functional testing, subjective knee scores, and evaluation of the patient's activity level. Patients included in this study their age ranged from 20- 45 years. Inclusion criteria included patients who are diagnosed to have ACL tear clinically Lachman positive and Pivot shift test positive and confirmed by MRI in an otherwise healthy patient who experienced knee instability in daily activities or wished to maintain his/her pre injury level of activities. Exclusion Criteria includes contra lateral ACL deficiency, bilateral ACL reconstruction, revision ACL surgery, previous knee operation, concomitant medical illness and patients who are not fit for surgery. The anterior cruciate ligament was reconstructed with a single-incision, arthroscopic techniques. Bone-patellar tendon-bone autograft was harvested via a longitudinal incision (usually 4-5 cm in length) over the patellar tendon. The graft was prepared into a bone-patellar tendon-bone construct with the leading suture on the patellar side.

The portals were the anteromedial and anterolateral portals. Routine notchplasty was done. Tibial tunnel was placed at a 55-degree sagittal angle, starting just lateral to the medial collateral ligament using tibial guide according to the size of the graft. With the knee flexed at 90 degrees, a guide pin was passed through the tibial tunnel to the femoral tunnel position. The femoral tunnel was reamed according to the size of the graft. The eyelet guide wire was used to pass a suture loop with tails through the femoral tunnel and out through the lateral thigh. Retrieve the loop through the femoral tunnel. Use this loop to pass the graft up through the tibial tunnel and then guide it into the femoral tunnel. The fixation method for bone- patellar tendon- bone graft were Bioscrew or interference screw at femoral end and tibial end.

Post- operatively evaluation was done as follows: Supine range of motion measurements with goniometer, effusion, checking for associated complications. Stability testing included the Lachman test, anterior drawer test. Functional outcome measured by using Tegner Lysholm Knee Scoring scale, Modified Cincinnati scoring and International Knee Documentation Committee score (IKDC).

Results

Ten patients were included in our study. All were males. Age group between 20-45 years. Seven patients (70%) had sports related injury, two patients (20%) had incidents due to activities of daily living, one patient (10%) had road traffic accident. The duration between injury and surgery ranged from two weeks to two years. Seven patients (70%) had right knee involvement and three patients (30%) had left knee involvement.

This study shows that none of the patients had knee effusion at one and two years follow-up. All patients had more than 90 degrees of knee flexion at one and 2 years of follow up. 80% patients had excellent subjective knee score outcome at the end of 2 years study (Table 1-5).

Table 1 Effusion

| Follow up | Effusion | BPTB |
|-----------|----------|------|
| 1 year | None | 10 |
| 2 years | None | 10 |

Table 2 Knee range of Flexion

| Follow-up | Range of Flexion (in degrees) | BPTB |
|-----------|-------------------------------|------|
| 1 year | >90 | 10 |
| 2 years | >90 | 10 |

Table 3 Tegner Lysholm Scoring

| Follow-up | Tegner Lysholm Scoring | BPTB | P Value |
|-----------|------------------------|------|---------|
| 1 year | Excellent | 2 | 0.329 |
| 1 year | Good | 8 | |
| 2 years | Excellent | 8 | |
| 2 years | Good | 2 | |

Table 4 Modified Cincinnati Scoring (MCS)

| Follow-up | MCS Scoring | BPTB | P Value |
|-----------|-------------|------|---------|
| 1 year | Good | 10 | - |
| 2 years | Excellent | 8 | 0.329 |
| 2 years | Good | 2 | |

Table 5 Tegner Lysholm Scoring

| Follow-up | International Knee Documentation Scoring | BPTB | P Value |
|-----------|------------------------------------------|------|---------|
| 1 year | Excellent | 1 | 0.305 |
| 1 year | Good | 9 | |
| 2 years | Excellent | 8 | 0.329 |
| 2 years | Good | 2 | |

Discussion

The goal of our study was to assess the functional outcome of arthroscopic anterior cruciate ligament reconstruction using Bone-Patellar tendon-Bone autograft. There is significant difference between duration of injury and procedure done (2 weeks to 2 years). Manual Lachman and Anterior drawer tests were used for stability testing post surgery. We assessed the post operative knee movements, effusion, and patient satisfaction using subjective knee scores. We obtained excellent outcomes in 80% patients in terms of patient satisfaction scores postoperatively. In the study of arthroscopic anterior cruciate ligament reconstruction with bone-patellar tendon-bone graft, Akgun et al.¹ found that the best results could be obtained if the reconstruction was done in the sub-acute period between 3-5 weeks post-injury.¹ Beynnon et al.² found that after three years of follow-up, the objective results of anterior cruciate ligament reconstruction with a

bone-patellar tendon-bone were superior to those of reconstruction with a two-strand semitendinosus- gracilis tendon graft with regard to knee laxity, pivot shift grade, and strengths of the knee flexor muscle.² However, the two groups had comparable results in terms of patient satisfaction, activity level, and knee functions. In 2001, Yunes et al.³ were the first to report a meta-analysis conducted from controlled trials of patellar tendon versus hamstring tendons for ACL reconstruction. They found that the patellar tendon patients had a greater chance of attaining a statically stable knee and nearly a 20% greater chance of returning to pre injury activity levels. They concluded that although both techniques yielded good results, patellar tendon reconstruction led to higher postoperative activity levels and greater static stability than hamstring reconstruction.³

Conclusion

We assessed the outcome for patients in this study undergoing ACL reconstruction with a bone -patellar tendon- bone graft in terms of clinical stability range of motion and return to activity. This is very significant as the majority of the patients are the younger population involved in strenuous work, sports activities. However we need a larger number of study groups and further duration follow up assessment is required to assess very long-term outcomes.

Acknowledgments

None.

Conflicts of interest

None.

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