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Comparison of Functional Outcome of Anterior Cruciate Ligament Reconstruction Using Bone –Patellar Tendon- Bone Autograft Versus Hamstring Tendon Autograft

[1]Dr Riyaz NN, [2]Dr Sunil.V, [3]Dr Sandeep KR
[1]*Associate Professor Department of Orthopaedics Pariyaram Medical College, Kannur, Kerala, India.*
[2]*Professor and Head of the Department, Department of Orthopaedics Pariyaram Medical College, Kannur, Kerala, India.*
[3]*Senior Resident Department of Orthopaedics Pariyaram Medical College, Kannur, Kerala, India.*

Abstract:*The purpose of this study is to compare the functional outcome of Arthroscopic anterior cruciateligament reconstruction using Bone-Patellar tendon – Bone autograft versus Hamstring tendonAutograft. 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 system. We assessed thepatients at one and two years interval.*

I. Introduction

The knee joint is the largest and most complex joint in the human body. The joint capsule andligaments, 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 mostimportant weight bearing joints in the human body. It is devoid of muscle cover and is readilyinjured in trauma. Knee joint comprises of three independent articulations: medial and lateraltibiofemoral 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.

II. 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) and Hamstring tendon autograftfor 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 assisted techniques . The hamstring tendons were harvested through a small longitudinal anteromedial incision over the pesanserinus insertion. The graft was then prepared for a quadrupled semitendinosusgracilis graft. The bone-patellar tendon-bone autograft was harvested via a longitudinal incision (usually 4-5cm 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 collateralligament 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 guidewire was used to pass asuture 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 graftwereBioscrew or interference screw at femoral end and tibial end.

The fixation for hamstring tendon autograft were Endobutton at femoral aspect and suture wheel or Bioscrew.After the procedure , an intra-articular vacuum drain was placed through the inflow cannula portal into the joint. The drain was removed at 24-48 hours postoperatively. The knee was placed in a compressive dressing and hinge knee brace locked in full extension.Post- operatively evaluation was done as follows:. Functional outcome measured by using TegnerLysholm Knee Scoring scale, Modified Cincinnati scoring and International Knee Documentation Committee score (IKDC).

Results:

TegnerLysholm Scoring	B P T B	H T A	P Value
A t 1 y e a r			
E x c e l l e n t	2	4	0 . 3 2 9
G o o d	8	6	
A t 2 y e a r			
E x c e l l e n t	8	5	0 . 1 6 0
G o o d	2	5	

MCS Scoring	BPTB	H T A	P Value
A t 1 y e a r			
G o o d	1 0	1 0	-
A t 2 y e a r			
Excellent	8	6	0.329
G o o d	2	4	

International Knee Documentation Scoring	BPTB	HTA	P Value
A t 1 y e a r			
E x c e l l e n t	1	0	0 . 3 0 5
G o o d	9	1 0	
A t 2 y e a r			
E x c e l l e n t	8	6	0 . 3 2 9
G o o d	2	4	

BPTB**:** Bone –patellar tendon-bone
HTA : Hamstring Tendon Autograft
MCS : Modified Cincinnati Scoring
This study shows that BPTB group has a better patient subjective functional scores compared to HTA group.

III. Discussion

Twenty patients were included in this study. There were 10 patients in the BPTB group and 10 patients in the hamstring group. Majority were males 19, and 1 was a female.In our study Bone –patellar tendon-bone group patients showed better results in terms of functional outcome measured by using TegnerLysholm Knee Scoring scale, Modified Cincinnati scoring and International Knee Documentation Committee score (IKDC).In a similar study, Corry, et al found that the two grafts did not differ in terms of clinical stability, range of motion and general symptoms. The hamstring tendon group also had lower graft harvest site morbidity.[1]

In the study of arthroscopic anterior cruciate ligament reconstruction with bone-patellar tendon-bone graft, Akgun, et al found that the best results could be obtained if the reconstruction was done in the sub-acute period between 3-5 weeks post-injury.[2]The patients in the bone-patellar tendon-bone group would have more desire to return to sports activity or higher functional demand than in the hamstring group, therefore higher expectation.

On the contrary, with similar prospective randomized comparisons, Beynnon,et al 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- gracillis tendon graft with regard to knee laxity, pivot shift grade, and strengths of the knee flexor muscle.[3] However, the two groups had comparable results in terms of patient satisfaction, activity level,and knee functions.

In 2001, Yunes, et al 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 techniquesyielded good results, patellar tendon reconstruction led to higher postoperative activity levels and greater static stability than hamstring reconstruction.[4]Using the same and extended numbers of controlled trial, Freedman, et al found that the rate of graft failure in the patellar

tendon group was significantly lower and a significant higher proportion of patients in the patellar tendon group had a side to-side difference of less than 3mm on KT-1000 arthrometer testing than in the hamstring tendon group.[5] There was a higher rate of manipulation under anesthesia or lysis of adhesions and of anterior knee pain in the patellar tendon group and a higher incidence of hardware removal in the hamstring tendon group. They concluded that patellar tendon autografts had a significantly lower rate of graft failure and resulted in better knee stability and increased patient satisfaction compared with hamstring tendon autografts. However, patellar tendon autograft reconstruction resulted in an increased rate of anterior knee pain.[6]

IV. Conclusion

The outcome for patients in this study undergoing ACL reconstruction with a bone –patellar tendon-bone graft is superior to hamstring tendon autograft in terms of functional outcome measured by using TegnerLysholm Knee Scoring scale, Modified Cincinnati scoring and International Knee Documentation Committee score (IKDC).This is very significant as the majority of the patients are the younger population involved in strenuous work, sports activities.

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