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Study of functional outcome of arthroscopic ACL reconstruction using hamstring tendon autograft

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Abstract

Introduction: The most common ligament injured in knee is anterior cruciate ligament. This ligament is related to stability, prevention of excessive rotation and forward motion of knee. Accurate reconstruction should be done to achieve excellent functional outcome.

Objectives: The main aim was to assess the functional outcome of arthroscopic ACL reconstruction using hamstring tendon auto graft. Also the study intended to describe early weight bearing and early mobilisation and rapid rehabilitation for good clinical recovery after surgery.

Methodology: The study was done among 40 subjects who were between 18yrs to 50yrs, with ACL deficient knees, associated menisci injuries. The subjects excluded were having severe co-morbidities, multi ligament injuries and previously operated knee. The Patients were assessed with the IKDC score and single hop test preoperatively and after 6 months.

Results: In the study 1 subject didn't return to pre injury activity level and other 39 came back to pre injury activity level. In the study IKDC score and single hop test after 6 months showed a higher mean in comparison to pre operative evaluation.

Conclusion: The technique of ACL reconstruction offers a normal or near normal function and pre and post operative outcome is improved by IKDC score or single hop test

Keywords: Anterior cruciate ligament; hamstring; tendon; reconstruction

Introduction

Ligaments around the knee joint is very important for stability. Anterior cruciate ligament (ACL) originates from medial surface of lateral femoral condyle and courses distally and anteriorly to insert on the intercondylar eminence. The main role of ACL is to prevent anterior translation of tibia [1-3]. Tear of ACL ligament is such commonly seen serious injury in knee [4]. Activating muscles neighbouring the joint is an important function of ACL, so when it tears it may lead to change in muscle role. Reconstruction is necessary in such cases [5, 6]. There are multiple methods studied for this procedure [7]. Reconstructing the torn ligament with either Hamstring tendon or bone patellar tendon bone graft is required. Mechanical stability is lesser in reconstructed ACL compared to native ACL. [8-10] HT tendons are widely used nowadays due to the decline in complication rate. Methods of preparation are of two types, classical one being retraction of tendons while the other maintains tibia bone insertion [10-17]. Studies shows that HTgraft and BPTB graft were equal in all the terms by clinical and radiological outcomes. There were some postoperative complications seen in BPTB graft, but even though it gave a stable knee [9, 10, 13, 17-21].

Methodology

This is a longitudinal observational type of study done among a total of 40 cases both men and women. Patients presented with ACL injuries in SSSMC & RI, Ammapettai, Chengalpet district, Tamil Nadu. Study period is 18 months. Patients within the age group between 18yrs to 50yrs, ACL deficient knees, associated menisci injuries.

Patients with severe co morbidities, multi ligament injury and previously operated knee are excluded from this study. The calculated sample size from previous data with a prevalence value of 81.35% is 40.

Rocedure

After ethical committee clearance, the study was started. All the patients in our study were undergone surgery under spinal anaesthesia in supine position.

Surgical technique

The method of single bundle ACL reconstruction was done with one tibia bone tunnel and one femur bone tunnel with

their centres that match with the centre of the native ACL tibia and femur bone connection location correspondingly. The femur bone tunnel was made using the antero medial portal producing an anatomic femur bone tunnel location. The graft was set at the tibia bone side using bio screw / titanium interference screw and endo button fixed at the femur bone side.



Ham string tendon graft harvest and graft preparation

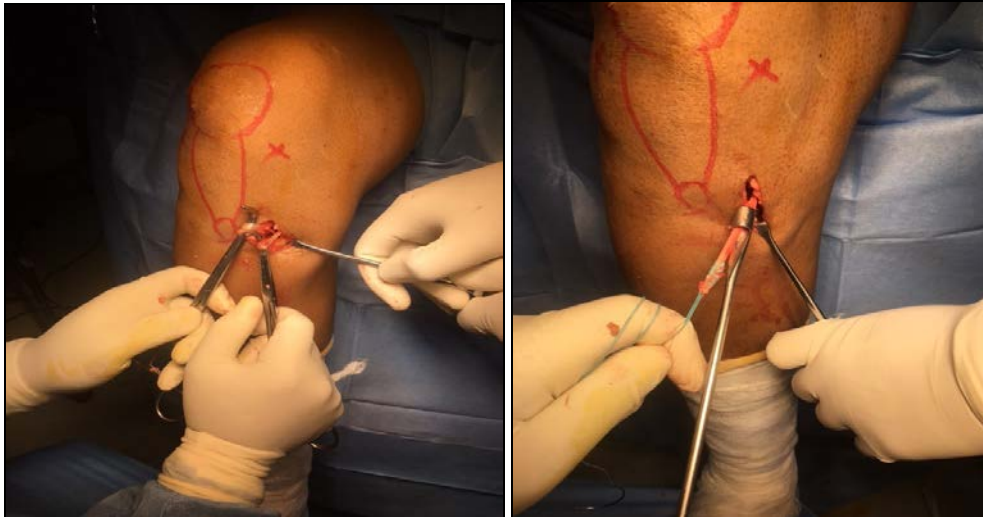
A 3 centi metre oblique shaped skin incision was prepared initiating 5 cm underneath the medial joint line and 1 centi metre medial to the tibia bone tuberosity. The oblique incision was favoured because it gives a wider exposure of pes anserinus and there was fewer possibility of harm to the patellar branch of the saphenous nerve. It was intended to do the graft yield and tibia bone tunnel drilling through the single incision. The superior border of the pes anserinus was recognized utilising the fingers. This upper border was raised and fascia incised.

The hamstring tendons can be sensed with fingers running from above downwards. The lowest one felt was semi tendinosus tendon. After recognizing the ham string tendons, the sartorius fascia was alienated all along the route of the tendons (gracilas and semi tendinosus), taking concern to protect the deep layer holding the Medial Collateral Ligament. With the aid of right angled artery forceps, the gracilis and then the semi tendinosus were hooked out. The tendon ends were joined with double loop knot to aid in traction.

The knee was positioned in 90 degrees of flexion and blunt dissection done proximally by fingers until the musculo tendinous junction thereby discharging grip and accessory bands, while nonstop traction was being given through the threads. The main band which joins the medial head of gastrocnemius was regularly cut with the assist of scissors. It was

established that as the tendon was drawn distally, there should be no dimpling posterior over the gastrocnemius. The distal end of the tendon was freed using scissors. Then a tendon stripper was advanced over the tendon in line with it preserving firm, stable and mild pressure and at the same time giving traction by holding the threads. If there was any struggle felt, then the stripper was withdrawn, adhesions disconnected and again the stripper was advanced and tendon yielded.

The gracilis was usually more muscular showing than the semi tendinosus. The yielded graft was then positioned on Graft master board. The tendons were separated of any residual muscle fibres with the assist of blunt end of the blade. The tendon ends were spruced to attain uniform size. A whipstitch was positioned at both ends of the tendons. Around 3-4 centi metre of both the ends of the grafted tendon was stitched together. The two tendons were looped over a umbilical tape. The composite graft was then passed through the graft sizer. The diameter of the tunnel to be made was similar to the smallest sizing sleeve through which the quadrupled tendon graft passed with minimum friction. The graft length to be positioned within the femur bone tunnel was marked to make sure correct position of graft inside the femur bone tunnel while being scrutinised arthro-scopically. The loop of the four stranded graft was tied to the posts in the graft master board and pre tensioning was made by giving a pressure of about 15 pounds for 15 minutes



IKDC scoring system and single hop test was used for assessment of patients post operatively.

Statistical Analysis

Data was entered in MS excel sheet and analysed using SPSS software version 16. P-values less than 0.05 were considered statistically significant.

Results

Results of the study are based upon descriptive statistics and inferential statistics. Descriptive statistics includes age, gender, mode of injury, associated injury, weight bearing/mobilisation day, single hop test, IKDC score and return to pre injury activity.

The mean (SD) of age in years was 34.90(9.17) years. The maximum age was 50 years and minimum was 22 years. The median age was 36 years and mode of the age was 24 years. Among the 40 subjects 13(32.5%) of the subjects were between the age group of 35- 44 years, 12(30%) belongs to <25 years, 8(20%) belonged to > 45 years and 7(17.5%) belonged to 25-34 years. Out of 40 subjects 28 were males and 12(30%) were females. Most of the subjects 19(47.5%) had a history of RTA, 7(17.5%) had a history of fall from height, 5(12.5%) had a history of sports injury Kabadi, 2(5%) had a history of sports injury from badminton, cricket, volleyball and 1(2.5%) had a history of kick by bull, self fall and sports injury by foot ball. Among the subjects 27(67.5%) showed right sided injury and 13(32.5%) showed left sided injury. Out of 40 subjects 11(27.5%) had medial side of knee injury, 4(10%) had lateral side injury and 25(62.5%) had no injury. The mean (SD) of weight bearing day was 3.25(1.06) days and that of mobilization day was 23.13(1.95) days. The minimum and maximum weight bearing days were 2 and 5 respectively. The minimum and maximum mobilisation days were 21 and 28 days respectively.

Inferential statistics includes comparison of single hop test pre op and post op and comparison of IKDC score pre op and post operatively. The mean (SD) of single hop test preoperatively was 42.25(8.26) cm and that of 6 months post operatively was 83.38 (14.11) cm. The minimum and maximum single hop tests preoperatively were 25 and 57 cm respectively. The minimum and maximum single hop test after 6 months post operatively was 10 and 98 cm respectively.

The IKDC score preoperatively and after 6 months post operatively distribution among the subjects. The mean (SD) of IKDC score preoperatively was 53.21 (8.81) and that of 6 months post operatively was 84.62 (7.13). The minimum and

maximum IKDC score preoperatively were 28.70 and 74.70 respectively. The minimum and maximum IKDC score after 6 months post operatively was 66.67 and 95.40 respectively. Single hop test and IKDC score showed better improvement comparing pre op with post op values.

Discussion

We did this study mainly to achieve better functional outcome by using hamstring tendon autograft for reconstructing torn ACL.

We included 40 subjects in this study. minimum age was twenty two and maximum age was fifty. Males were 28 out of 40 and females were 12 out of 40. Right sided injured patients were more in our study which is 27 and left side injured were 13 patients. Mode of injury was RTA in 19 subjects and 7 had fall and 7 had sports injury. Most of injuries were due to twisting or fall from ground^[3].

The mean of weight bearing was 3.125 days and the mean day of mobilisation is 23.13 days. Mean of single hop test pre op - 42.25cm, at 6 months post op - 83.38cm. IKDC mean of pre op - 53.21 days, after 6 months post op - 84.62cm. IKDC score showed severely abnormal score was seen in 39 out of 40 subjects in pre op except one who had near normal and post op follow up 20 subjects attained near normal, 11 had normal, eight were having abnormal scores and was severely abnormal in one subject.

Thirty nine subjects attained pre injury activity level and only one was not able to attain pre injury activity level. IKDC score and single hop test was used to assess the functional outcome, both the tests showed higher mean after 6 months post operatively compared to the pre operative values.

Conclusion

All 40 patients included in this study were having complete tear of anterior cruciate ligament of which reconstruction is the only option. The mean values of IKDC score and single hop test was improved at 6 months follow up except one patient who did not attain pre injury activity level. There were nil significant differences among genders. Activity of daily living improved after reconstructing torn ACL with Hamstring tendon autograft.

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